

MACWORLD

November 1986 \$3.95

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The Macintosh Magazine

WORLD OF REVIEWS

- ★ More New Macintosh Products Than Ever
- ★ Save Time and Money with Hard Disk Utilities
- ★ What's Now, What's Next! Inside Mac Graphics
- ★ Choose the Best—Seven External Drives

NEW!

Turbo Pascal for the Mac: incredibly fast and fully integrated!

Borland's new Turbo Pascal for the Mac™ is so incredibly fast that it can compile 1,420 lines of source code in the 7.1 seconds it took you to read this sentence.

And reading the rest of this page takes about 5 minutes, which is plenty of time for Turbo Pascal for the Mac to compile at least 60,000 lines of source code!

Turbo Pascal for the Mac does both Windows and "Units"

The separate compilation of routines offered by Turbo Pascal for the Mac creates modules called "Units"—which can be linked to any Turbo Pascal® program. This "modular pathway" gives you "pieces" which can then be integrated into larger programs. (You build the "pieces" once, and you know they work, so you can use them again without having to recompile.) The immediate benefits of this technique are a more efficient use of memory and a reduction in the memory space needed to run large programs. (What you need to run Turbo Pascal for the Mac is 256K minimum—or half a Fat Mac, 1 drive, and the ability to handle astonishing speed.)

"The timing of Turbo Pascal for the Mac couldn't be better. The recent success of the Macintosh in business and its continuing momentum in higher education coincide well with the introduction of Turbo Pascal for the Mac. Turbo Pascal is already an industry standard in the IBM-PC-compatible world, and we're very excited to see Borland International's new commitment to provide this national's new commitment to provide this and other modestly priced, high-quality software for the Macintosh computer."

John Sculley, Chairman,
Apple Computer, Inc.

"Turbo Pascal has become the language of choice at major educational institutions around the country, and more than 400,000 copies of the IBM PC version have been sold. We believe that Turbo Pascal for the Mac is the ideal educational and professional programming tool for the Macintosh."

Philip Kahn, President,
Borland International



Turbo Pascal for the Mac is so compatible with Lisa that they should be living together

Not just Lisa®, but also Macintosh Programmers' Workshop Pascal™. Routines from either one can be compiled and run with only the subtlest changes. Turbo Pascal for the Mac is also compatible with the Hierarchical File System™ of the Macintosh.™ (You can define default volume and folder names for the names used in compiler directives.) Compatibility is also familiarity, and you'll feel right at home with Turbo Pascal for the Mac because it fits neatly into every aspect of the Macintosh environment. The pull-down menus are there, along with dialogue boxes to guide you in making choices and picking options.

Turbo Pascal for the Mac cranks out more than 12,000 lines a minute

Better than 12,000 lines per minute of compiled source code race out of Turbo Pascal for the Mac. There is definitely "No Waiting." And none of the "stop/start" compiling delays that afflict some of the software programs that we're not mentioning here. (They can take 10 minutes to do what Turbo Pascal for the Mac can do in 10 seconds!)

You don't spend a lot of up-front time learning to use Turbo Pascal for the Mac. It's as easy as it is fast—which is not to say that it's over-simplified or written for people who have recently learned to walk erect. Instead, it's electronic proof that sophistication and complication don't need to go hand-in-hand.

In all software, there's the Hard Way, the Wrong Way, the Weird Way, the No Way, and the Borland Way. Welcome to the Borland Way!

How to walk and chew gum!

Turbo Pascal for the Mac lets you do up to 8 different things at once. You can have up to 8 separate programs in memory, work on one, move on; work on another, move back—or duck and weave between all 8 at the same time! And you can do these 8 Easy Pieces while you run the compiler. Multiple editing windows allow you to edit, compile, and execute each window individually. With several windows open at the same time, you switch from one open window to another faster than a cat burglar—and never get caught. It's "take the source code and run!"

The 27-Second Guide to Turbo Pascal for the Mac

- Compilation speed of more than 12,000 lines per minute
- "Unit" structure lets you create programs in modular form
- Multiple editing windows—up to 8 at once
- Compilation options include compiling to disk or memory, or compile and run
- No need to switch between programs to compile or run a program
- Streamlined development and debugging
- Compatibility with Lisa Pascal™ and Macintosh Programmers' Workshop Pascal
- Compatibility with Hierarchical File System of your Mac
- Ability to define default volume and folder names used in compiler directives
- Search and change features in the editor speed up and simplify alteration of routines
- Ability to use all available Macintosh memory without limit
- "Units" included to call all the routines provided by Macintosh Toolbox



Clear your desk, SideKick's here!

SideKick® brings true desktop management and communications to your Mac. Now you can automatically dial phone numbers, log on to bulletin boards, schedule appointments, jot down notes,

calculate business expenses—and more—while running all your other Mac software. Once you get SideKick you'll wonder how you ever did without it!

See order form on right-hand page ▶

Introducing Reflex for the Mac, **NEW!** Borland's remarkable new relational database

Because it is a truly relational database, Reflex for the Mac lets you get your various acts together. Lets you connect "A" to "B" to "C," or "Dog" to "Cat" to "Fight." Or whatever links and connections you need to make and need to see. It's a simple spreadsheet-style series of electronic and visual cross-references. There's a clear connection (which you first make by drawing it on-screen) between "Client"—"Matter"—"Attorney"—"Time Sheet"—"Expenses" and "Bill." Or between "Slow Driver in Left-Hand Lane"—"Mile-long Traffic Jam" and "Shot from Behind." It's all relational.

Designed to make the most of your Mac's visual talents, Reflex for the Mac lets you place fields and pictures wherever you want them on the page—and print them that way with your Report Generator.

A funny way to use Reflex for the Mac

Let's say you have to make a lot of speeches and you like to tell jokes, but can't always remember the right one for the right audience at the right time. So you use Reflex for the Mac to set up multiple files

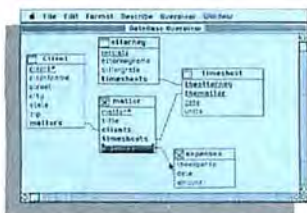
that all connect to each other.

Your "Joke" file connects to your "Audience" file, which is split into categories like "Friendly," "Hostile," "Dumb," "Student" or whatever—all of which are interconnected and relational. Reflex for the Mac lets you find the right joke for the right audience, right now.

(The serious sides of business include applications like client billing, stock portfolio management, tax planning, and your checkbook.)



After opening the "Overview" window, you draw link lines between databases directly onto your Macintosh screen.



The link lines you draw establish both visual and electronic relationships between your databases.



You can have multiple windows open simultaneously to view all members of a linked set—which are interactive and truly relational.

Mac News for Kangaroos!

Heart of America, one of the U.S. 12-meter contestants in the America's Cup races in Australia, is relying on Reflex for the Mac to help Bring The Cup Up. (They're also using Borland's SideKick and Turbo Pascal.) Reflex analyzes 20 different variables like wind speed, heel angle, backstay load, trim tab angle, rudder angle and 15 other criteria to show and tell Heart of America where to be when—and what to do now to win!



You need Reflex for the Mac

Get some Reflex action out of your Mac. Call now. With Reflex for the Mac, you'll have all the right connections—for only \$99.95!

Heart of America's skipper Buddy Meigs with Borland International's skipper Philippe Kahn on a testing, training, and analytical run, Santa Cruz, California.

“ Really uses the visual strength of the Mac to produce a database design tool

Adam Greene, InfoWorld

... a stunningly wonderful application generator/dbms

Esther Dyson, Release 1.0

Bridges the gap between the pretty programs and the power programs

Stewart Alsop, PC Letter ”

YES! I want the best!

Send me Turbo Pascal for the Mac, Reflex for the Mac, or SideKick for Mac at:

\$99.95

To order by phone or for a dealer nearest you, call (800) 255-8008 in CA call (800) 742-1133

Turbo Pascal for the Mac \$99.95 \$
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Minimum system requirements:

Turbo Pascal for the Mac: 256K Reflex for the Mac: 512K SideKick for the Mac: 128K

M52



Vive la différence

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Borland products include Turbo Prolog, Turbo Pascal, Turbo Pascal for the Mac, Turbo Tutor, Turbo Editor Toolbox, Turbo Database Toolbox, Turbo Graphix Toolbox, Turbo GameWorks, Turbo Lightning, Lightning Word Wizard, Reflex The Analyst, Reflex for the Mac, Reflex Workshop, SideKick, SideKick, The Macintosh Office Manager, Traveling SideKick, and SuperKey—all of which are trademarks or registered trademarks of Borland International, Inc. or Borland Analytics, Inc. Traveling SideKick is not in any way associated with Traveling Software, Inc. of Seattle, Washington.

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MACWORLD

November 1986

The Macintosh™ Magazine

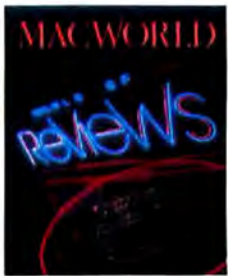
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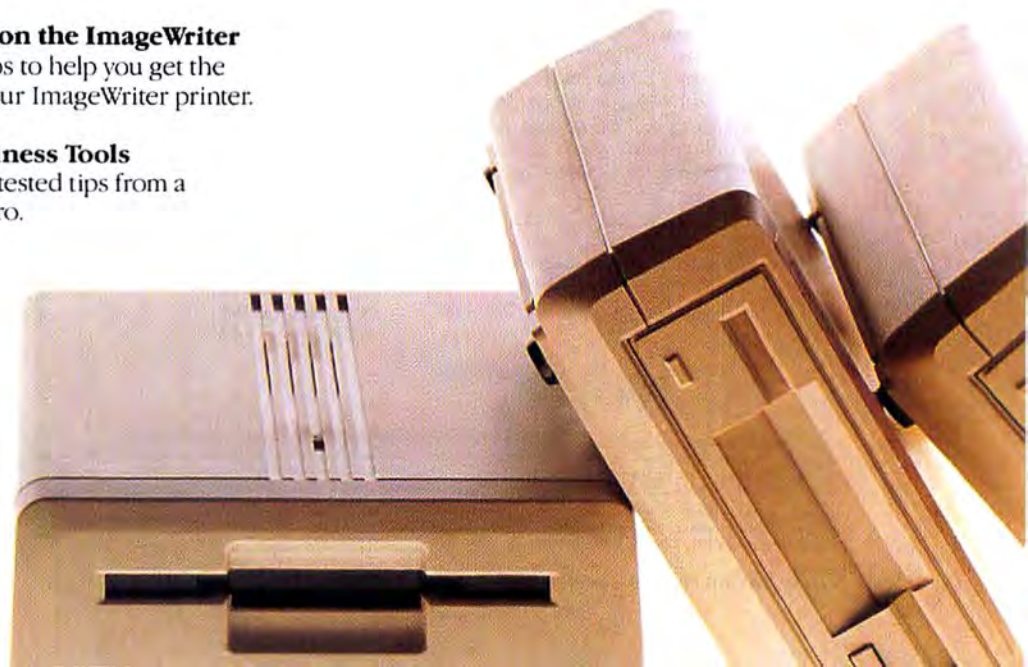
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- *The Flat Mac* A laptop version from Dynamac.
- *Cloak and Dagger* Apple infiltrates the intelligence community.
- *The Version-Number Game* Apple's software-numbering scheme deciphered.
- *Multiuser Games* *Maze Wars+*, *Strategic Conquest*, and others.
- *Looking for LaserWriter Spoolers* Hardware and software solutions.

Plus, previews of three new desktop publishing tools, the word on *HabaWord*, scuffles in the SCSI market, Target's *Viola!* outliner, *Lightspeed Pascal*, and more.

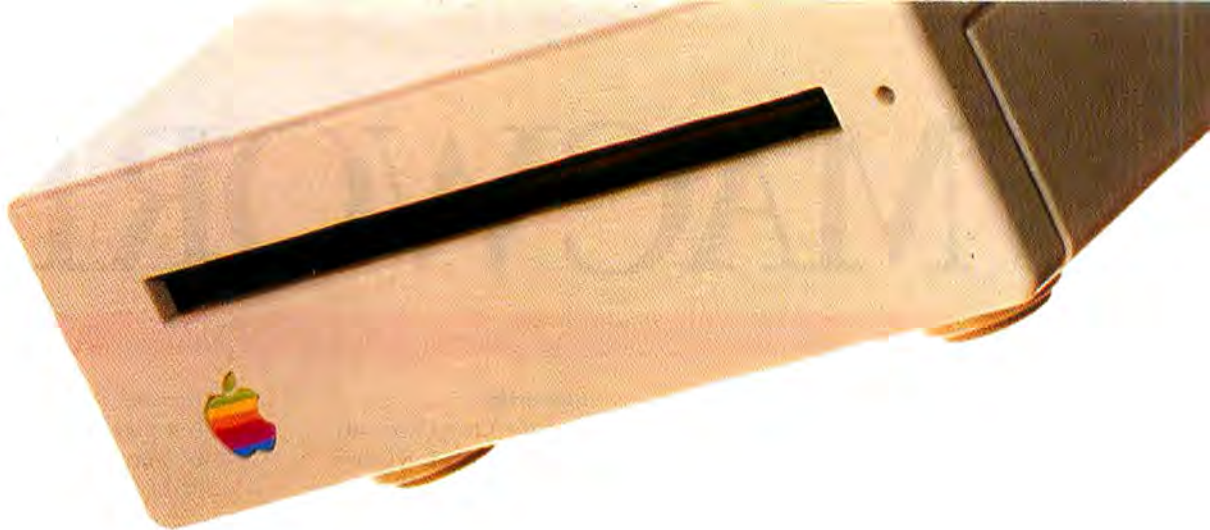


On the Cover

See our new, expanded *Reviews* section, plus feature reviews of Stat80, CAD software, and external disk drives.



Who makes the fastest, quietest, smallest, sturdiest external double-sided drive? See "Both Sides Now," page 106, for reviews of seven contenders.



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- The Fountain of Fonts**
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- Big-Time Graphics**
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- From a New Perspective**
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- The Mac Hits the Switch**
X-10 Powerhouse home control system.
- Xmodem Accelerator**
TurboDownload communications.
- Role Your Own**
World Builder game construction.
- BASIC Gets off the Street**
True BASIC compiler.
- Teaching Tools**
MicroGrade and *MicroTest II*.
- Mapmaker, Mapmaker, Make Me a Map**
MacMap map templates.



Planning a monumental undertaking? If you use MacProject, the pointers in this month's installment of our new department, Mac Business Tools, can help you cut big jobs down to size.



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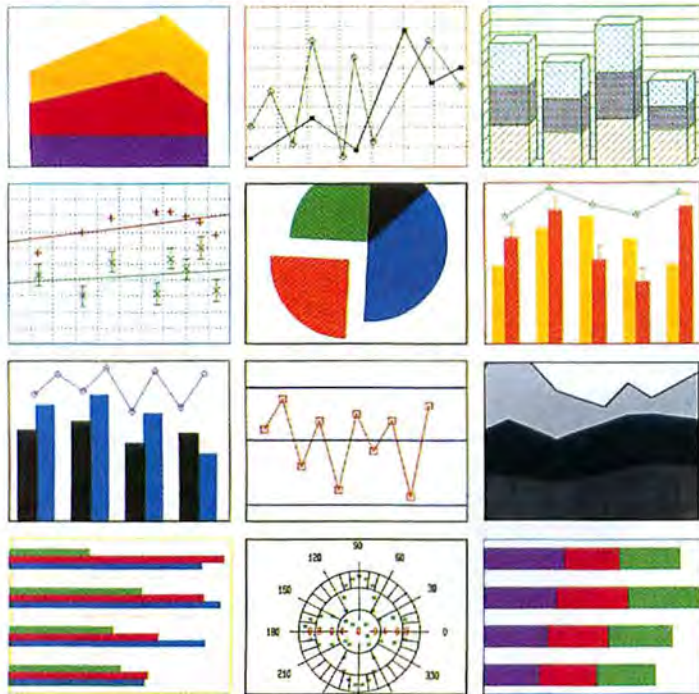
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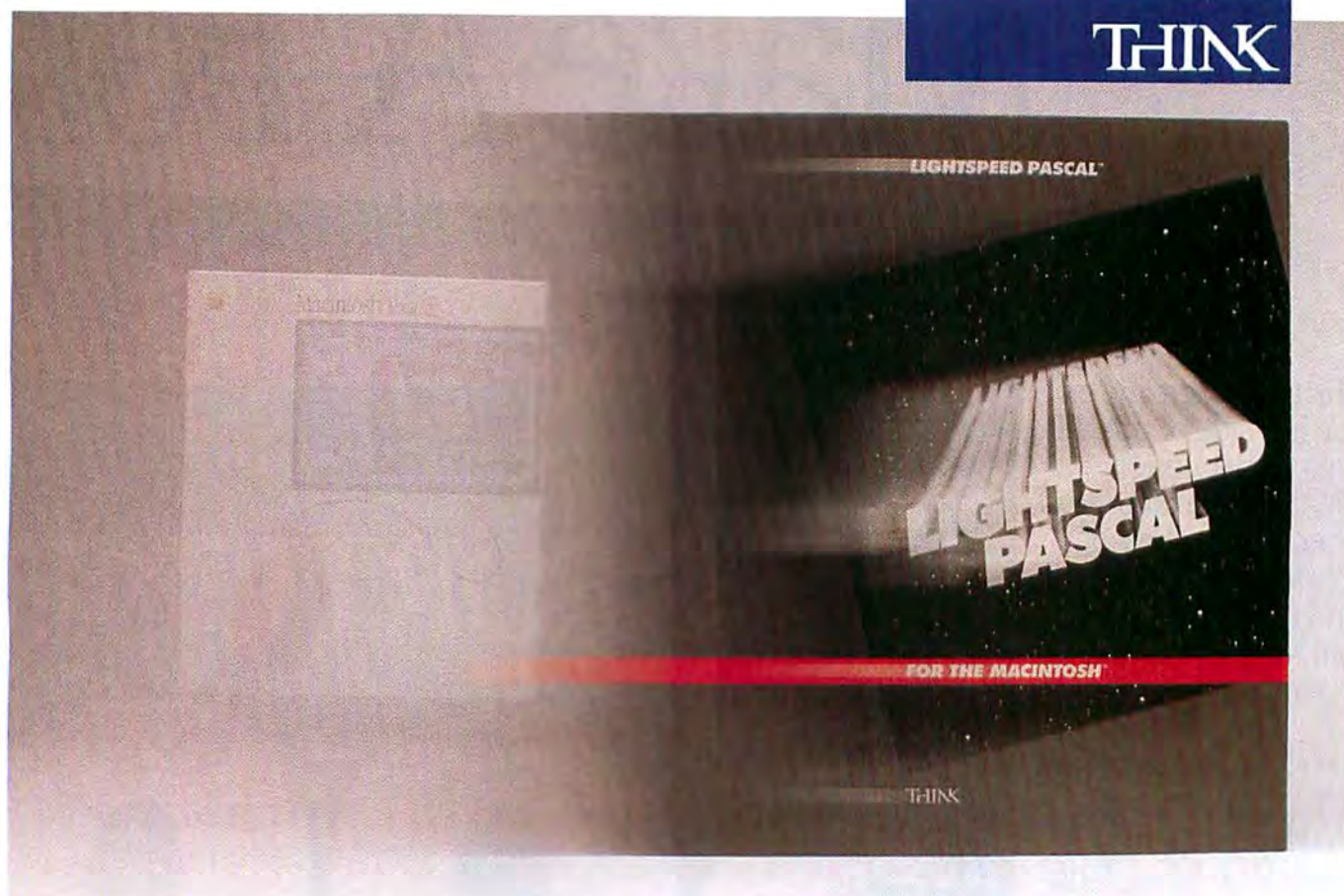
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THINK



LIGHTSPEED PASCAL™ THE FUTURE REPEATS ITSELF.

JANUARY 1984. (Cupertino, California.)—Apple introduces the Macintosh.™ At the press conference, six software developers, including Microsoft and Lotus, announce their commitment to the new machine. Among them is THINK Technologies, a start-up developer of advanced systems software.

THINK announces Macintosh Pascal. It is a breakthrough. For the first time, a practical interactive interpreter is available for Pascal. People can now learn to program in a whole new way. They can look inside their program and get immediate feedback. Incorporating the Mac interface in this programming environment, THINK creates a new future for the Macintosh in education.

Writing in The New York Times, Erik

Sandberg-Diment says "MacPascal alone might be reason enough for the college-bound science or engineering major to purchase" a Mac. The product becomes a standard in university computer science courses. Users are enthusiastic. But in time they demand even more from THINK.

AUGUST 1986. (Boston, Massachusetts.)—THINK introduces Lightspeed Pascal at MacWorld Expo. It is a breakthrough. It utilizes new compiling and linking technology previously available only with THINK's Lightspeed C. But it goes even further. Like Macintosh Pascal, it provides the same ability to look inside a program, but without the need for an interpreter. It offers blinding speed and the ability to build large pro-

grams. The response is overwhelming. In the first two weeks THINK sells thousands.

Lightspeed Pascal marks a turning point in programming the Mac. It has all the features that made Macintosh Pascal a standard. And much more. Now users can create real standalone "double-clickable" applications and desk accessories. THINK creates a new future for Macintosh programmers.

Lightspeed Pascal is priced at \$125. It is not copy-protected. The package includes a 600-page manual with extensive index. It provides complete Toolbox/OS support. It is compatible with Macintosh Pascal and Lisa Pascal.

The future is here. Order Lightspeed Pascal now.

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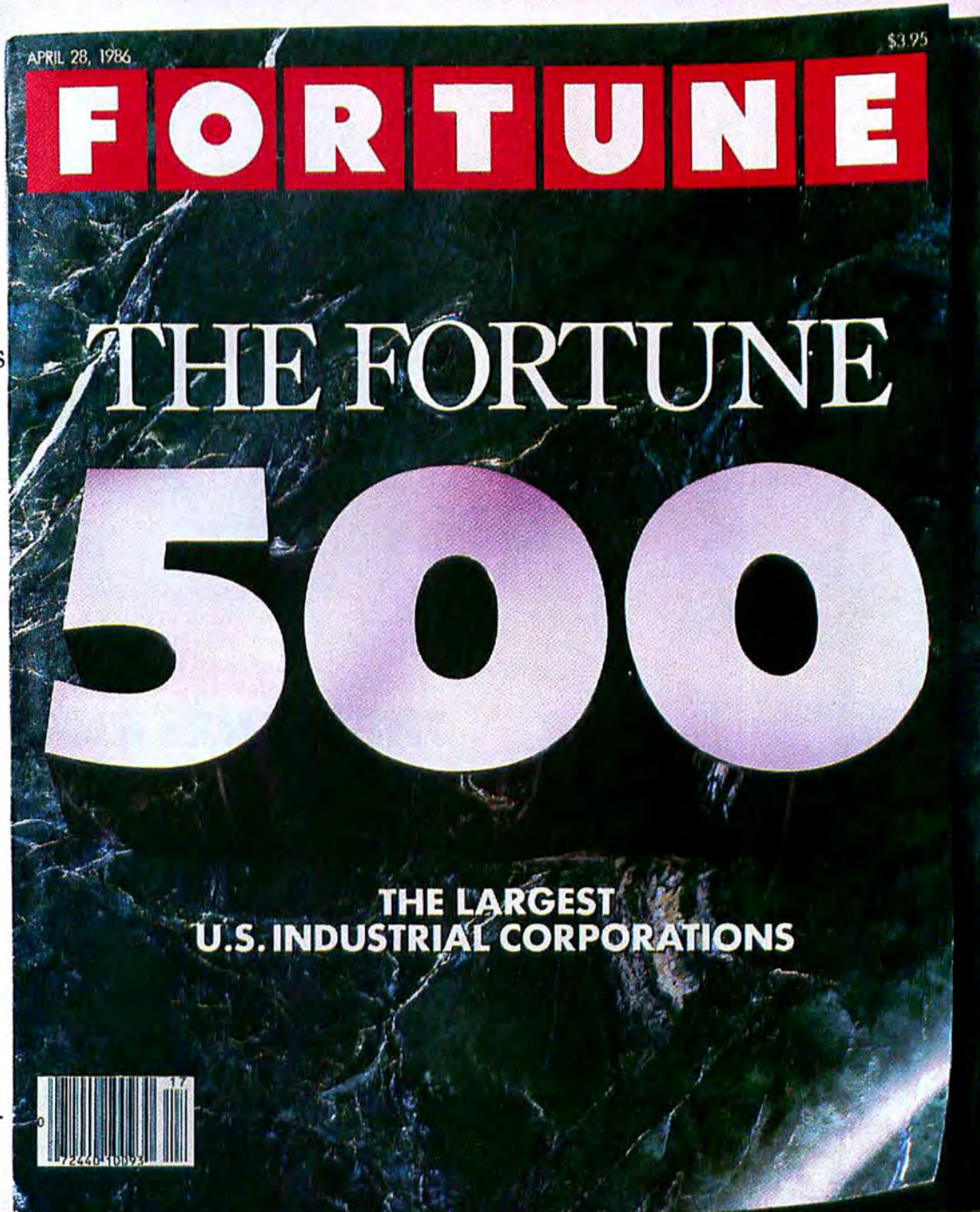
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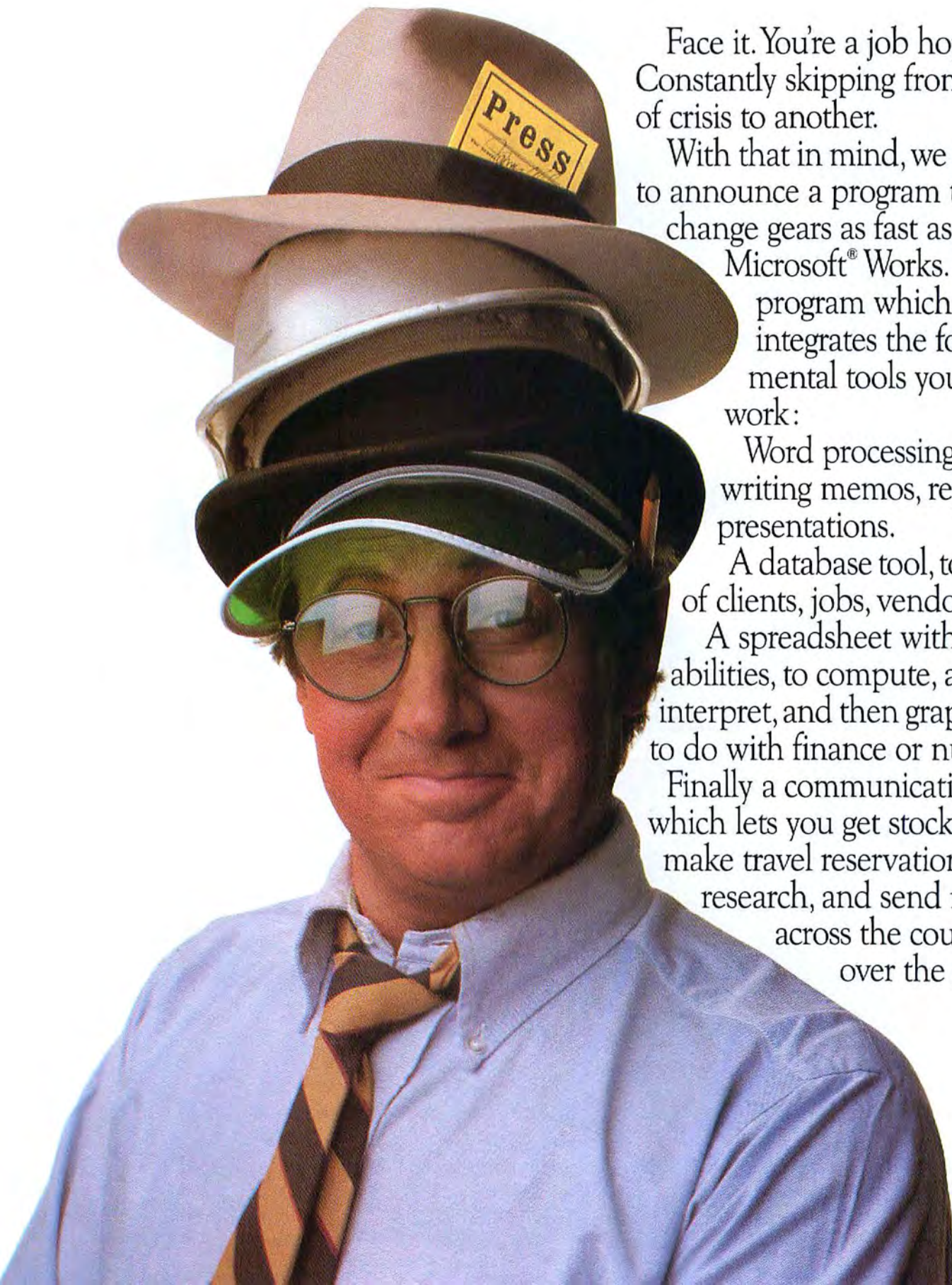
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A spreadsheet with charting abilities, to compute, analyze, interpret, and then graph anything to do with finance or numbers.

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Microsoft Works lets you juggle all these jobs, move swiftly and easily between them, while transferring and combining their information as you please. Because you do all these jobs with one, easy to learn, totally integrated program.

Quick study. Quick change.

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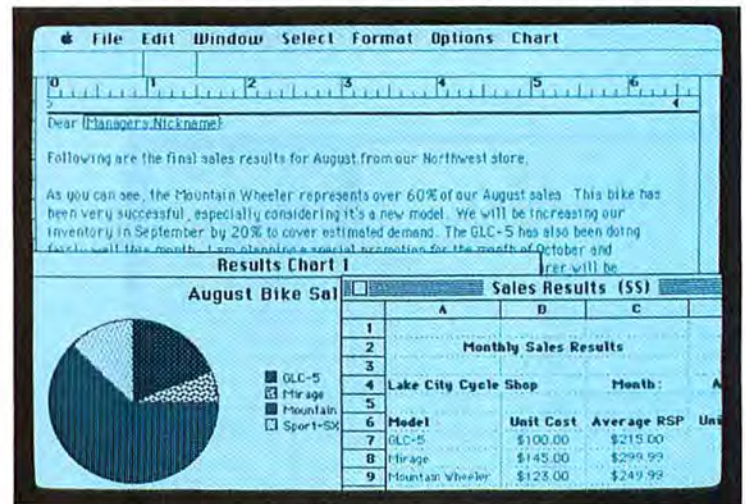
It's a snap. The overall program and each tool within runs Macintosh™ style. Which, as you probably know, is a natural, common sense, point-at-what-you-want system.

And Microsoft Works is seamlessly melded together. You can have all four tools on screen at once. Jump instantly from one to another. And later combine work done in each part of the program on a single printed page.

This easy exchange of data makes jobs go faster and easier. One practical example being mass

mailings of form letters where you need to combine names from the database with text written in the word processor.

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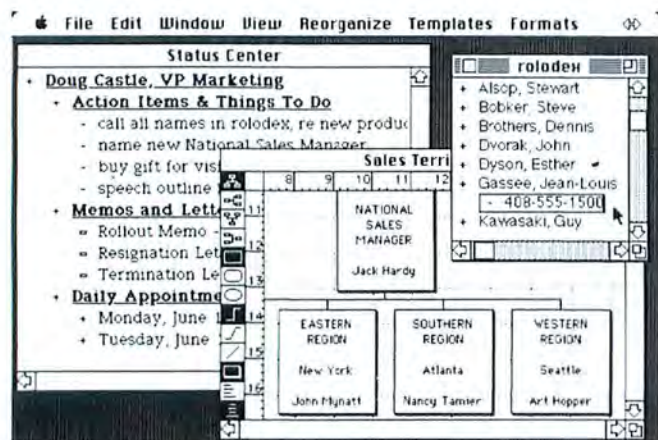
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What Summer Slump?

► Sales for Mac software took off in midsummer, with July sales more than doubling those of June, according to InfoCorp's nationwide survey of computer specialty stores. Howard Furer, InfoCorp's vice president of research, attributes the unseasonal surge to the burgeoning ranks of Mac owners, a trend that began with the introduction of the Mac Plus last January. Also in July, sales of Apple's own software products—for both the Mac and the Apple II—pushed the company to the top of the heap of software publishers, a position usually held by Lotus Development Corporation.

Desktop Publishing's First Import

► Also at Seybold, Micro Composition Systems (MCL), of Tel Aviv, introduced *MacPage*, a page-layout program that features hyphenation, vertical justification, leading control, and precise positioning of design elements. You can create templates, storing the layouts of document designs you use regularly. *MacPage* accepts graphics from *MacPaint* and *MacDraw* through the Clipboard. It works with Linotron typesetters, and the *Jerusalem Post* and other national publications in Israel now use the program. Once an American distributor is found, *MacPage* will be available here in Hebrew, English, and Arabic editions.

The Apple Programmer's and Developer's Association

► The Apple Programmer's and Developer's Association (APDA) got off to a big start during its introduction at the Macworld Expo in Boston last August. More than 1000 attendees signed up, according to Dick Hubert, president of A.P.P.L.E. Co-op, a 20,000-member Apple user organization that operates the APDA. Membership is \$20, and until the end of the year, it includes a copy of Scott Knaster's popular book on Mac programming. Members are entitled to order Apple development tools that Apple will no longer distribute directly. The premier APDA catalog includes over 150 books, technical documents, and software development tools from Apple and other sources. For an application call 206/251-6548 or write APDA, 290 S.W. 43rd St., Renton, WA 98055.

Turbo Pascal Comes to the Mac

► This month Borland International plans to ship its Macintosh version of Turbo Pascal, which has already sold more than 400,000 copies in the IBM edition. The Mac version provides a more powerful compiler and stronger linking capabilities, and it's available for \$99.95.

ComicWorks for the White-Collar Crowd

► Mindscape, publisher of MacroMind's *ComicWorks*, has released a business-oriented version of the program, called *GraphicWorks*. It works the same way as the comic-book-style original, with full text editing and the ability to freely mix graphics and text on a page, but the library of templates has a different spin: templates for ads, newsletter pages, purchase requisition forms, restaurant menus, annual reports, and the like, instead of Mike Saenz's socko comic art. It takes a 512K or bigger Mac to run the program, which comes with *PosterMaker*. *GraphicWorks* is available only by mail from Mindscape (800/221-9884, 800/942-7315 in Illinois; \$82.95 postpaid; the new templates alone are \$22.95 postpaid). *ComicWorks* is distributed through retail outlets.

Speaking of Upgrades

► Anecdotal evidence suggests that many of the Mac power-supply burnouts we've been hearing about may be caused by the additional load of powering upgrade add-ons. Closer to home, at *Macworld* we've been burning out the power supply/video control boards at quite a clip; our technical staff says the power supply was not designed to accommodate any extra load, so some overheating is unavoidable. The cautious upgrader might want to invest in a fan to keep the Mac cool inside.

Francs for the Memory

► Recent trade agreements are keeping the cost of memory upgrades high. The price of the 1-megabyte RAM chip has not fallen as expected, keeping the price of upgrades at an astronomical level (for example, Levco's 4MB Prodigy 4 costs \$6000). It looks as if most of us will stick with the cheaper 256K RAM upgrades for now.

PageMaker Prizes

► Aldus wants to see great designs on its desktop publishing software and is offering a trip to Venice as inspiration. The trip to the home of the corporation's Renaissance-era namesake is the prize in a *PageMaker* design contest that runs through December 1986. Each month starting last August, judges have been selecting three winning designs; the best designer of the 15 semifinalists goes to Venice for a week with a friend. For details contact Aldus Corporation, 411 First Ave. S #200, Seattle, WA 98104.

Apple's New Bus Sneaks out of the Bag?

► *Computer Design* reported in its August 1 issue that Apple has approached Texas Instruments about a bus for its new open-architecture Mac—TI's Nubus. The 32-bit syn-

(continues)

chronous bus, which would supply the signal for the open Mac's plug-in boards, was developed by Texas Instruments for use in its artificial intelligence workstations. The bus is also used by Lisp Machine of Cambridge, Massachusetts.

PageMaker's Progress

► Now that Aldus is launching an IBM PC version of its best-selling page makeup program, it's getting set to bring out a new edition on the Mac. Not coincidentally, the new 2.0 version will permit you to move Mac and IBM *PageMaker* files back and forth with ease. It also expands the headroom for documents, allowing up to 128 pages instead of the meager 16 that many users found limiting. More precise drawing tools will be included to facilitate forms design. Some other new features: tabloid paper size, interactive facing pages, up to 20 columns per page with page-by-page control of column placement, automatic hyphenation, and kerning.

The Mac of Araby

► This fall Apple plans to launch an Arabic version of the Mac, which reads right to left and allows users to calibrate the internal clock to the lunar calendar that varies regionally. The Arabic Mac comes with a custom keyboard, and a LaserWriter font is being developed to match. The localized machine will be sold only in the Middle East. Playing no favorites, Apple is also developing a Hebrew version of the computer.

Bug, Bug, Who's Got the Bug?

► Apple's new System 3.2 and Finder 5.3 have calmed many frayed nerves in the Macintosh community, but we continue to hear complaints about system hangs and bombs. The bug reports aren't numerous enough to establish a pattern, and because of the increasing complexity of Mac setups, it's hard to find a smoking gun. One summer computer camp ran into problems daily with its five to ten networked Macs and attendant printers, but the director couldn't pinpoint the cause of the bombs and crashes. Since unplugging from the network, the camp has had no further trouble.

More Word Processors on the Way

► While a flock of new word processors is already winging its way to dealers' shelves, we've learned of a few more intriguing writers' tools still in the nest. Both SSI, maker of the popular IBM program *WordPerfect*, and Microsoft are working on high-end products that ought to bring Mac word processing in line with the most sophisticated products available on the IBM PC. Lotus is also rumored to be developing a Mac word processor. *Writer Plus*, a French word processing program from Analyses Conseils Information, is scheduled for release in English in 1987. The program includes drawing tools for doing forms, multicolumn capability, indexing, and footnotes—along with a simple database manager and four-function auto-calculation of numbers. And Gabriel Miro, author of *Achbar*, the Hebrew-English bilingual word processor, is in search of a publisher

for his *MouseScript*. Miro's new baby includes color on the menu, some handy keyboard shortcuts for formatting, and two table formats—with vertical rules—that you can select from the ruler.

Public Domain Developer Awards

► The Boston Computer Society made awards to five more developers who have contributed significantly to the active public domain and freeware software exchange that goes on through user groups and on-line information services. The plaques and cash awards, given to honor authors' support of noncommercial distribution channels rather than to put a particular product on a pedestal, went to David Dunham (author of *Disk Info* and *Mini Writer*), David Betz (XLisp), Ken Winograd (*DAFile*, *DAFont*, *PRam*), Mike Morton (*DissBits*, *Vanlandingham*), and Loftus Becker (developer of countless function-key programs such as *DAKey*, *DateKey*, and *Other*).

At Last, an Optical Character Reader for the Mac

► In September Microtek announced its optical character reader for the IBM PC; expect a Mac version to appear within months. Microtek is known for its graphics scanners that convert illustrations and photographs to computer files. The OCR software works with the scanner to convert typewritten or printed text to Mac documents; the forthcoming Mac version is said to recognize several popular typewriter fonts.

Move Over PostScript

► The word is that Apple might implement an additional typesetting language to supplement Adobe's PostScript page-description language for some tasks. Other developers of desktop publishing software would welcome an alternative to Adobe's existing PostScript, which is laboriously slow at producing graphics.

Meanwhile, Adobe is working on a speedier PostScript controller based on the 68020 microprocessor, which is a step up from the chip used in today's Macs.

A New Entry in the Desktop Publishing Derby

► One of the most significant programs to hit desktop publishing was unveiled informally at the Seybold desktop publishing seminar in September. Take the core of *MacPaint*, *MacDraw*, *PageMaker*, and *MacWrite*, and you have the foundation of this new program, code-named SPUD. It allows you to create and manipulate both text and graphics; it can also import and edit bit-mapped and object-oriented graphics. The text editor includes familiar Mac word processor features plus discretionary hyphenation, an on-line spelling checker and thesaurus, and a search-and-replace feature that works within multiple documents. Text can be set to fill any shape, and you can wrap text around pictures with a click of the mouse. And it's fast, since it's written in assembler code (by Lance Lewis). SPUD is due out next year from Mac America in Yorba Linda, California, 714/779-2922. □

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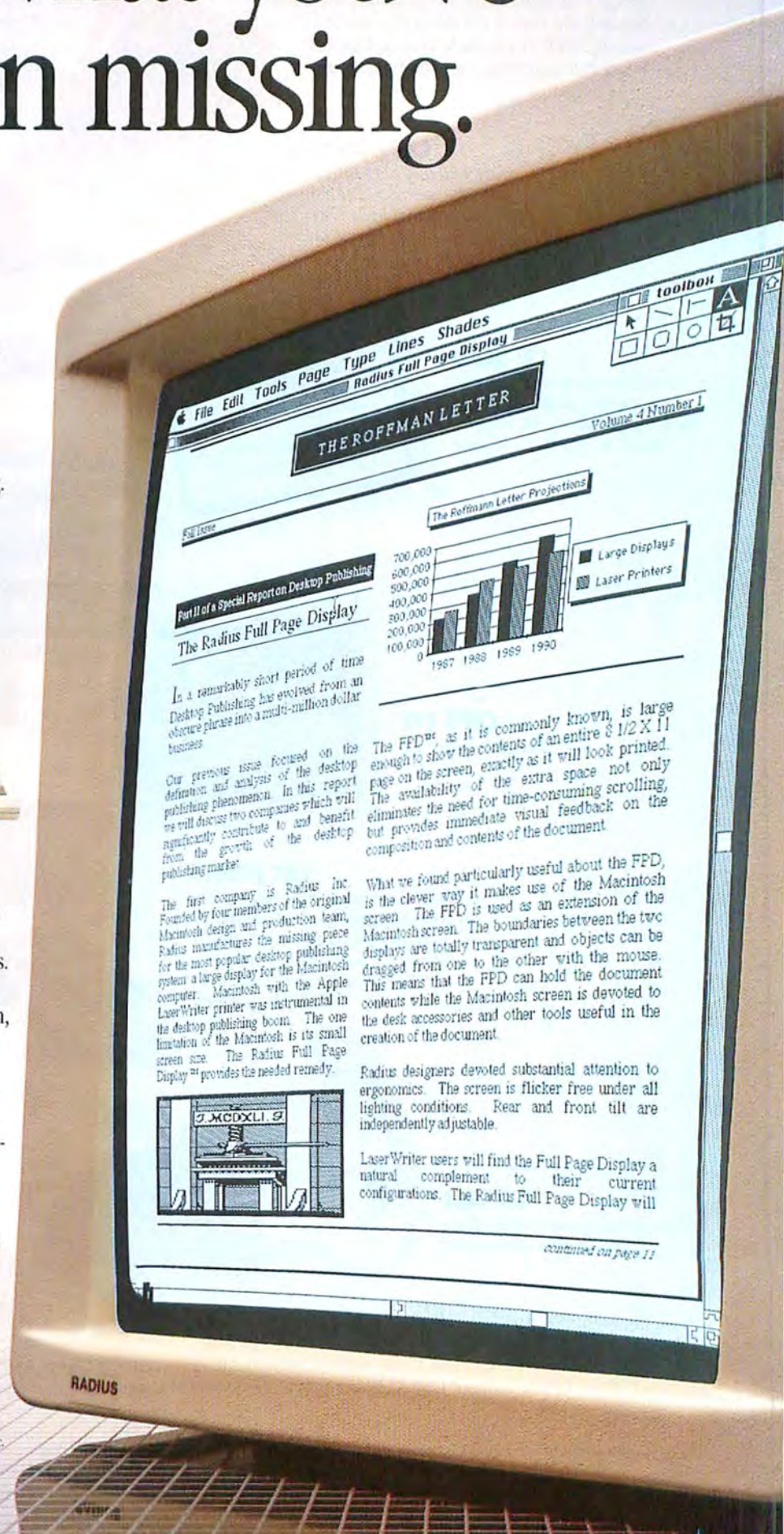
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Dear Colleague:

Where will you be in 3 years?
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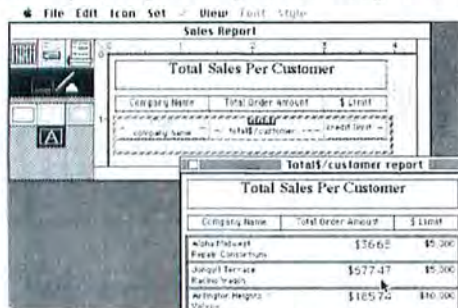
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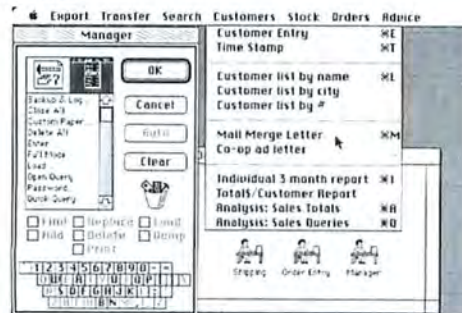
Everything built in

In MultiUser Helix, the multiuser capability—enabling more than one person to work with the same information base at the same time—is built into the software. All other systems require special hardware or extra software. They “force” a multiuser effect with programming tricks like “semaphores,” and rely on external “filesystems” to simulate multiple access to files. This results in a complicated, inflexible, slower, and more expensive system. In MultiUser Helix, the whole network functions like a human nervous system, with its own updating and feedback mechanisms as a natural part of the system. There is no reliance on external hardware devices, and no need to worry about programming interlocks and special volume configurations.



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Connect your Macintosh computers together with the AppleTalk network (the same cables that connect the Macintosh with the LaserWriter) and with MultiUser Helix all screens automatically update and show current results for any changes made on the network. MultiUser Helix handles all network control including record updating and record locking. Because everything is already built in there is no need to worry about special filesystem hardware or software. Best of all, MultiUser Helix works with any hard disk.



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Key Network Features

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- Can be used in conjunction with volume servers and file servers
- MultiUser Helix receives the same excellent support Odesta gives to the other members of the Helix family

Requirements

- Network host requires hard disk, with 1Mb memory recommended and AppleTalk Network
- Guest nodes work with the Macintosh Plus, 512E, or Macintosh 512 with external drive



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Coming Out of the PC Closet



Usually in this column I focus on issues largely relevant only to the personal computer community. Now, in a departure from my regular subject matter, I'd like to address an issue with much broader social significance. It's one, I believe, that's important enough to merit your attention and your involvement.

Recently, I received a letter from Governor Joe Frank Harris of Georgia inviting me to take part in a technology tour of the Atlanta area. He's looking for good press about that region's great technological opportunities. Of course, Georgia has some wonderful success stories. After all, it's the home of some major personal computer companies and industry leaders.

Unfortunately, Georgia, like a handful of other states, happens to be the home of an oppressive law whose spirit stifles the very progressiveness Governor Harris hopes to promote in his quest for high-tech immigrants to his state.

I'm referring to the Georgia state law, recently upheld by the U.S. Supreme Court, that outlaws sodomy (defined as oral and/or anal sex)—even when practiced by consenting adults in the privacy of their own homes.

This statute threatens the personal sexual freedom of everyone—heterosexuals and gays alike.

By threatening to imprison or punish offenders, this archaic law may violate constitutional rights, including the Eighth Amendment's ban against "cruel and unusual punishment" and the Fourth Amendment's guarantee of "the right of the people to be secure in their persons [and] houses."

You may well ask, what does a law against sodomy have to do with personal computers and high technology? The an-

swer is that the law conflicts with the very vision that compelled the growth of personal computers.

The original vision of the personal computer world was based on the principle of a progressive, laissez-faire capitalist society. One that allowed for more personal expression and gave people greater decision-making power. A society where people were judged by their contributions and not their lifestyles.

Therefore, I feel that the personal computer world should think twice about supporting high-tech development in states that lack a decent social climate for high tech to operate in.

In fact, it would behoove the state of Georgia and other states with similar laws to consider the sensibilities of those very individuals they are seeking to attract to their high-tech corridors.

The personal computer was created by renegade hobbyists who were committed to individualism. The PC promise—which thrives and is upheld by many of this industry's founders—is to preserve and enhance the power of the individual.

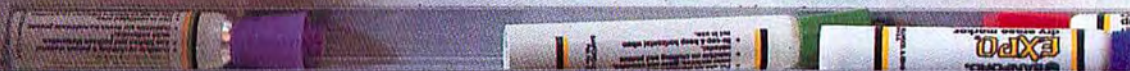
What that means is more freedom. Not less freedom.

Today, that same open spirit prevails in many personal computer companies where employees wear blue jeans and T-shirts to work. Where they have the freedom to come and go as they like, as long as they're really good at what they do. Their

■ A call to action!
*Oppression in
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THE POWER DESK

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value as employees directly relates to the value of their work.

The industry guardians of the original PC vision are careful to foster this creativity. In doing so, they allow for a more richly diverse world and society. In fact, personal computer technology is moving away from what had been predominantly white, upper-middle-class management, to the great benefit of our society as well as other societies around the world. This broad-mindedness is helping to create new jobs, new opportunities, and new markets every day.

Now, it's extremely important to recognize that gay people are among the foremost contributors to the creation, success,

and fulfillment of the personal computer vision.

Many programmers, designers, and engineers who happen to be gay have been the brains behind some of the most significant products that helped revolutionize our information-driven society.

How can people who are gay feel secure living in Georgia when an inhumane law hangs over their heads like the sword of Damocles?

In the meantime, I think we can take certain decisive steps to combat sexual apartheid in Georgia. Changing the law there would make it easier to reverse similar laws in other states.

PC users who are concerned about Georgia's sodomy law should use their PCs to create and distribute mailing lists of Georgians who are influential in the state legislature and the civil rights movement.

Perhaps a massive letter-writing campaign would unleash the power of the PC to foster an environment in Georgia that we can all support and enjoy. Atlanta is a wonderful place, after all. It's one of the most elegant and charming cities in the world.

Above all, as concerned citizens—not only of the personal computer community but of the world beyond the keyboard—we should come out of our closets and rally to the cause of justice and freedom by exorcising this distinctly user-unfriendly law.

I encourage concerned readers to begin the campaign by writing to

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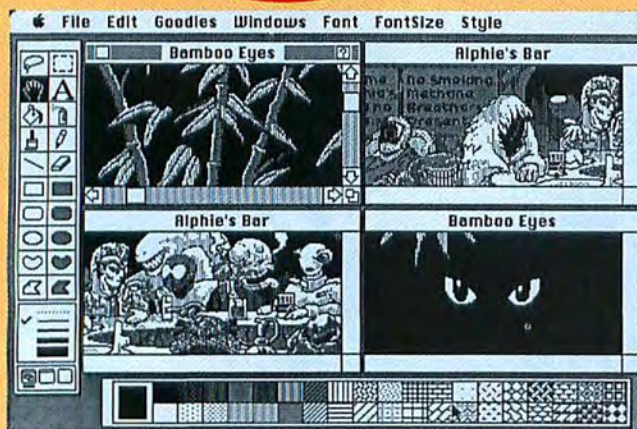
THESE EXPERTS

"As a painting program, *FullPaint* ranks at the top of the list..."
—Frank M. Tansey,
Review Board, InfoWorld.

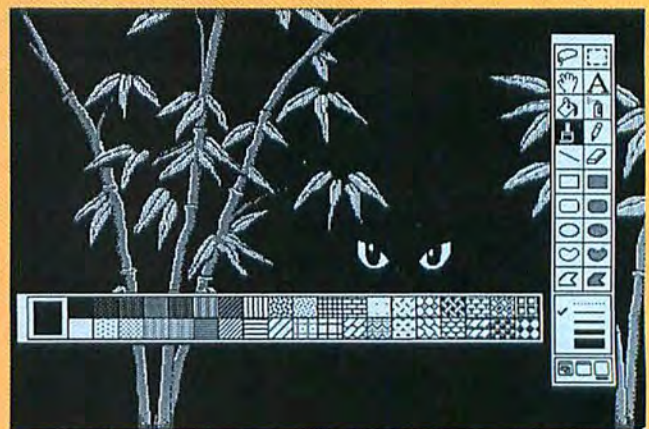
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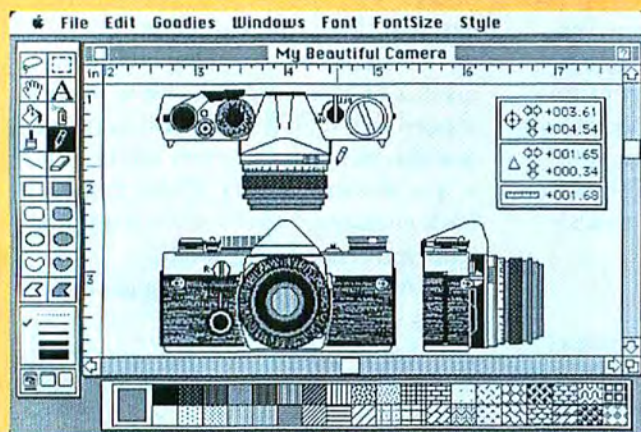
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—Ingram Update,
Ingram Software

"*FULLPAINT*, from Ann Arbor Softworks, Inc., is the most appropriately named new product that we've come across this year. It is an enhanced, extended MacPaint, which should now probably be more logically called Halfpaint."

—Computer Shoptalk

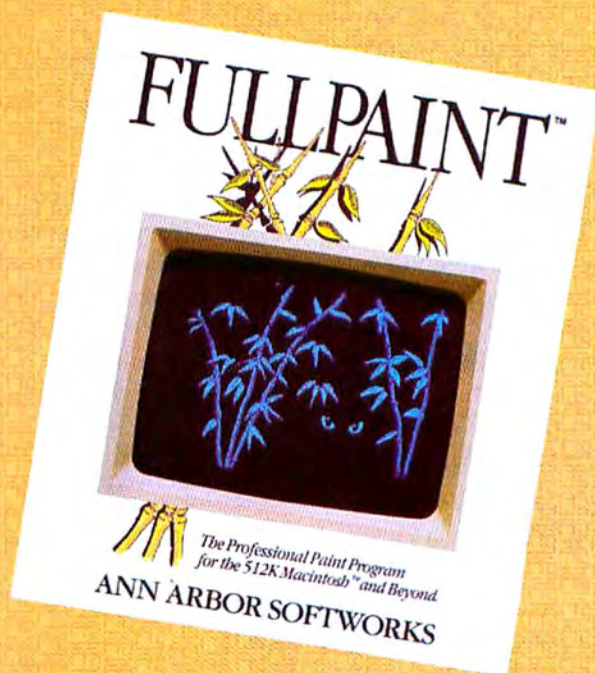
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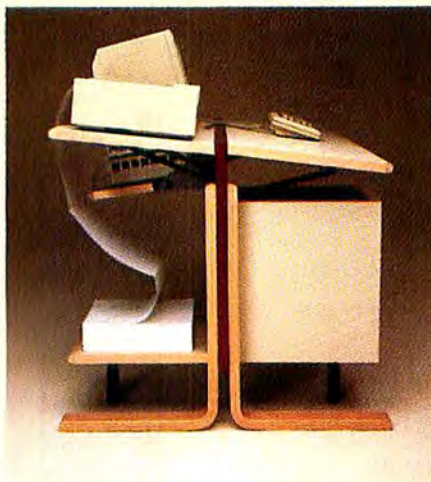
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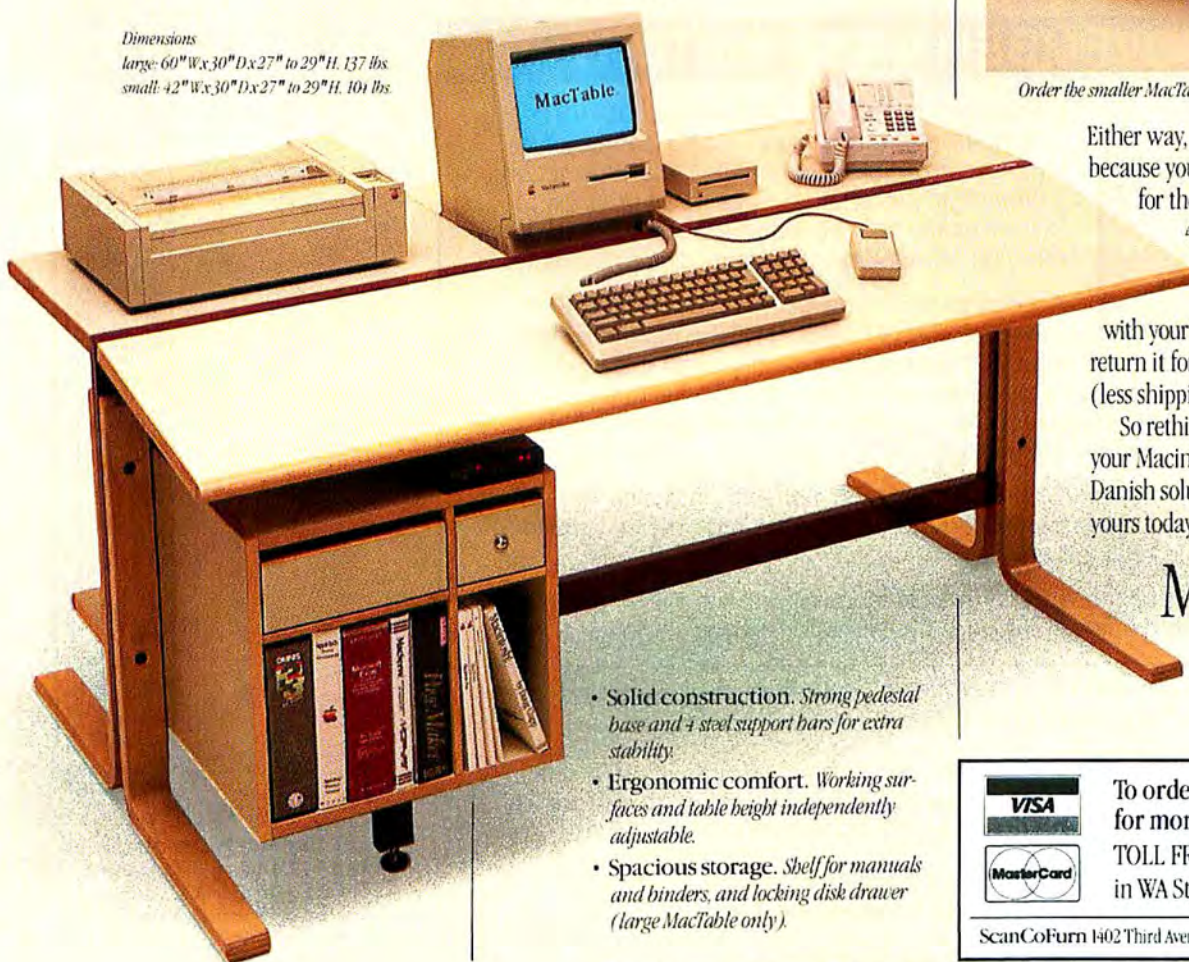
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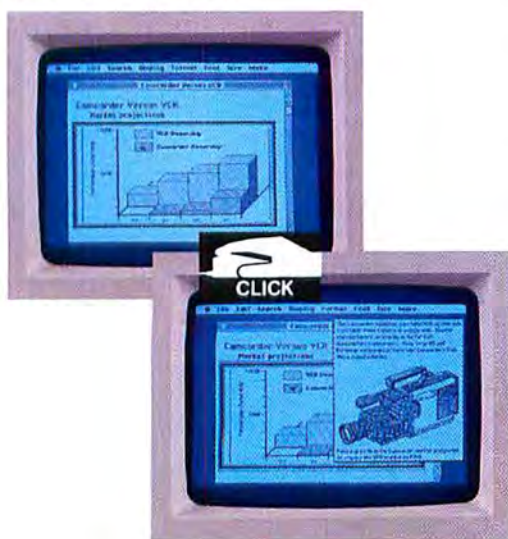
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Letters

Insights on bifocals and print spooling, a report on Mac Plus software compatibility, and more

You Asked for It

I own a 128K Mac and also work with IBM and Hewlett-Packard machines. Despite my experience, I often get lost when reading *Macworld*. For example, I don't understand exactly what the Finder is, nor do I have any idea what version I have. Where can I turn for some basic training? And is it possible to get information on new updates and software without belonging to a user group?

Dana Wannemacher
Estes Park, Colorado

By popular demand, this month we debut a column of fundamentals, *Getting Started*, written by Jim Heid, who edited *Open Window*. Also in this issue, we begin printing news of software upgrades in *Updates*.—Ed.



Corrections

"Mini and Mainframe Connections" in July's *Macworld* contained two incorrect phone numbers. The correct number for Mesa Graphics, maker of Tekalike, is 505/672-1998. The correct number for DPEX, maker of the Mac/2392 terminal emulator, is 408/734-5932.

In "Letter-Perfect Documents" in the July issue, EnterSet's toll-free number lacked the proper extension; the complete number for information about MacGAS is 800/621-0851 ext. 305.

In a letter in the July issue, Paul Briens reported that Copy II Mac couldn't copy Microsoft File version 1.02. Version 5.0 of Copy II Mac does the job.

David Bunnell's June column stated the wrong size for CD ROM disks. The Sony/Philips CD ROM disks are 120 millimeters, or 4¾ inches, in diameter.

Seek Another Point of View

In the July *Letters*, J. D. Malbrain asked for a furniture solution for Mac users who wear bifocals. I bought a desk with a pull-out shelf in front and put the keyboard on the shelf. The Mac goes back on the desk, positioned so that nothing lies in the no-man's-land between near and far that we bifocal wearers know so well.

Daniel E. Whitney
Arlington, Massachusetts

Or Make a Spectacle of Yourself

To the bifocal wearer who gets whiplash from craning to see the Mac screen: Don't raise the bridge, lower the water. Buy a pair of Foster Grant "reading glasses" with your correction, about \$12 at many drugstores. These full-vision glasses eliminate the need for craning. Caution: Chain them to the Mac so you don't stand up or try to

make a refrigerator run with these instead of your normal glasses. It's hard on the skull if you do.

Herbert M. Rosenthal
Anchorage, Alaska

Two suppliers of computing specs also offered to come to the rescue. Vision-Ease Corporation of St. Cloud, Minnesota (612/251-8782), manufactures Datalite lenses for video display terminal operators; the hard resin lenses absorb ultraviolet light. J. F. Optical in Ft. Lauderdale, Florida (305/491-2722), distributes MacGlasses—with a color filter that improves screen contrast and an antireflective coating that reduces glare.—Ed.

(continues)

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Ted Benhari is Public Information Officer at Dominican Hospital in Santa Cruz, CA. He is very much into Desktop Publishing. He produces numerous publications for the hospital, including "The Dominigram," a magazine for the general public, "The Scanner," a newsletter for employees, and a catalog promoting various classes at the hospital's Education Center. Ted likes having the ability to digitize

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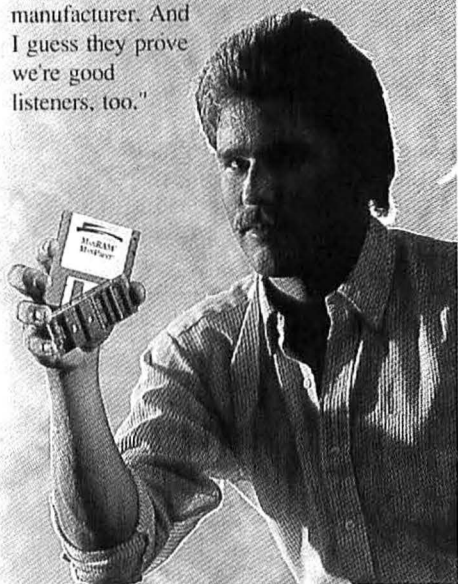
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John Foley
Executive Vice President & Co-Founder

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Prometheus Bound

Your review of the ProModem 1200 [Macware Reviews, April 1986] contributed to a costly mistake I made when I purchased the modem's optional communications buffer. Jim Heid's review stated that the communications buffer could also free the Mac for other jobs while handling printing. After trying to get my 256K buffer to work, I finally learned from Prometheus technicians that this buffer doesn't allow me to go on with other work because the Mac sends only one page at a time to the printer.

Cynthia D. Waddell
Clarksburg, Pennsylvania

Jim Heid clarifies the point: "The usefulness of the communications buffer during printing depends on the kind of printing you do. The Mac formats and sends MacWrite and Microsoft Word documents to the ImageWriter one page at a time, so there's not much to be gained from print spooling. But if you're printing MacPaint graphics and other documents that go directly to the ImageWriter, or if you're using a daisy wheel printer — which also accepts documents in a steady stream — the time you save with the buffer could be significant." Printing efficiency is only one use for the ProModem 1200 communications buffer; it was designed for use as an electronic mail buffer that answers calls to your modem and receives and prints out messages sent to you even if your Mac is turned off. —Ed.

Trouble in Paradise

I recently bought a Paradise Mac 20 hard disk, which I would highly recommend to anyone. The print spooling, however, is awfully slow. When printing a 20-page Word document, for example, the ImageWriter prints very slowly while the hard disk is spooling, and the screen is tied up until the 12th page has been printed, when I can finally do something else. The final 8 pages go swiftly. Printing with the spooler disabled seems to be more efficient for long documents.

Ivon Pires
Charlottesville, Virginia

As with the ProModem 1200, the efficiency of print spooling with a hard disk drive depends on what you're printing.

In this case the problem is compounded by the fact that the hard disk cannot send a document directly to the printer. Printing goes slowly because the Mac divides its attention between feeding the document to the hard disk and transmitting it back from the hard disk to the printer. No wonder it's faster without spooling. —Ed.

Game for a Plus?

You never tell me when a program won't work with my Mac Plus. Only after I brought the programs home did I find out that Fokker Triplane, Gato, and Psion's Chess don't reliably work on my machine. I would find your software reviews much more helpful if you would mark the programs that aren't Plus compatible.

Bob Manich
Palo Alto, California

In "A Change for the Plus" in April and in "Order out of Chaos" in May, we warned readers to beware of software incompatibilities when upgrading. New developments emerge weekly after the release of major new hardware like the Plus. This situation — combined with the complex interaction between application programs, desk accessories, and the buggy and patched-up Mac system software — made it literally impossible to produce a credible, comprehensive software compatibility checklist that would have been accurate by the time it reached print. For instance, less than a week after we received your letter, Spectrum HoloByte began shipping a new version of Gato for the Plus. (Read more about it in this issue's Updates.) Many compatibility problems will be solved by Apple's latest System, version 3.2. Some problems can be solved with a call to the vendor or dealer; a PBI Software representative said Fokker Triplane Flight Simulator does work with the Mac Plus, but not with the new Hierarchical File System — just be sure to leave the game's System Folder intact. And be aware of one idiosyncrasy with Gato: to find the Help screen, you must select the Scrapbook from the Apple menu.

Starting with this issue, the product information in reviews and in our new Where to Buy section includes hardware requirements. —Ed.

(continues)

■ "The Macintosh legacy has only just begun."

"You know, in the last two years, we've come up with a really impressive family of products for what was supposedly a closed machine."

"Right. And now Apple's coming out with an open architecture machine. The possibilities seem endless."

"I wish we could show people what we're developing right now."

■ "Remember how hard we worked on TheMax? It was our first memory product, and we wanted to make it right."

"Right. We even spent a lot of time deciding what color the resistors should be. But the engineering really stood out. Clean. Elegant."

"Don't forget reliable."

"We could have cut corners, I guess, but we were determined to produce the best possible product."

"We haven't changed that philosophy, either. The MaxPlus™ stands out in today's marketplace as a standard of fine engineering, fully compatible with Apple's standards."

"Sometimes the recommendations of our engineers are hard to take. They mean spending a little more time, a little more money. But in the long run, it's worth it."

■ "Then there's MaxPrint™ — a print spooler that works! No one could believe there was such a thing, let alone that we were giving it away with all our Max memory expansions."

"And you know, we're still doing that. But it has become so popular, we've made it available on its own. MaxPrint is selling bundled with MaxRAM™ — both programs for under \$50."

"Maybe that's why it's the best-selling print spooler."

■ "Desktop publishing is a perfect example of the new generation of Macintosh applications that require more memory to really perform. With our memory products, it takes less time to complete a project."

"Actually, it's less *waiting* time — more *working* time."

"You can get a lot more accomplished."

■ "Customer support is easy when you have good products. It's easy, for instance, to offer a full two-year warranty on all our products. We've developed a philosophy of going out of our way to keep our customers happy."

"What it boils down to is that when you have a problem you want a solution."

■ "When we developed the MaxPlus, we knew we had the best 2Mb Macintosh Plus expansion possible."

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"That means the Macintosh Plus could be more reliable *with* our product than without it."

"After all, what really matters here is performance."

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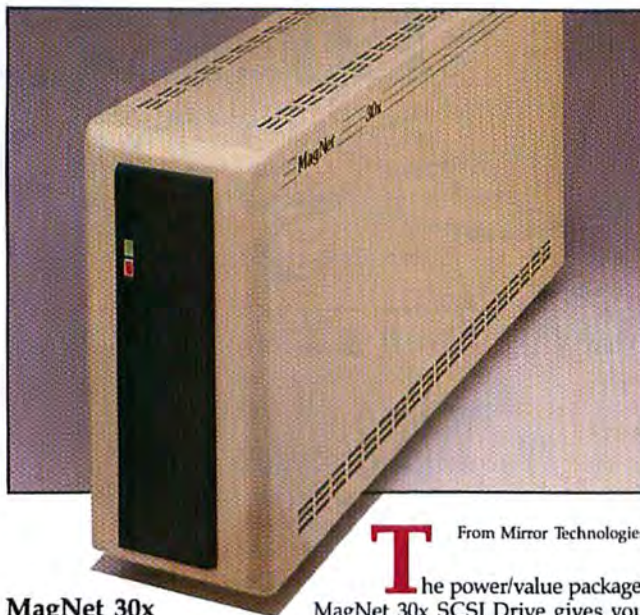
Radius Full Page Display

From Radius Inc. **\$1995**

Finally, a full-page display screen for the Mac! The Radius Full Page Display, or FPD, was designed for the Mac by four members of the original Mac team. Designed to work as a system with the Mac, it allows users to view a full 8 1/2" x 11" document at actual size while leaving the standard Mac display fully operational. Windows, tools, and desk accessories can be dragged with the mouse from one display to the other. The screen has high-contrast, high-focus display and a high scan rate for flicker-free display. Other features include user-selectable 16 point font menu and zoom boxes for all window-based applications.



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NOTE: The FPD requires manufacturer's installation of circuit board; upon receipt of FPD from IR, send your Mac computer to manufacturer in manufacturer-supplied box for speedy installation.
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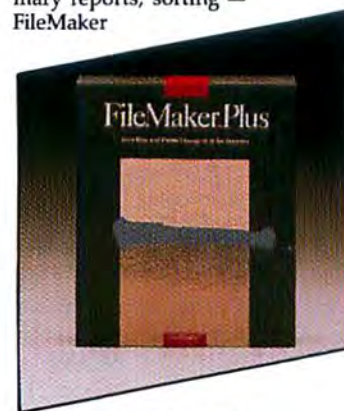
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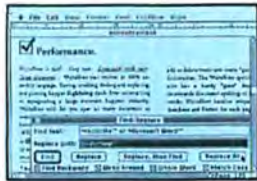
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next *VisiCalc* has already been invented for the Mac—by the folks at Aldus Corporation who came up with *PageMaker*.

Gary C. Van Handel
Highland, California

Executive Opinion

Gordon McComb missed the boat in his July review of *Executive Office*. The program is the best implementation of true integration we have seen on a personal computer. Its power cannot be measured by comparing it to *MacWrite* or *Excel*; we have used *Excel*, *Jazz*, and various combinations of applications "integrated" with *Switcher*, and there is no way they match the usefulness of *Executive Office*. It's perfect for managing small to mid-size offices; its simplicity and elegance make the program—like the Mac—a radical and wonderful departure from traditional computerdom.

As long as you compared the program with *Jazz* and *Excel*, what about comparing the support? We have received a number of letters directly from the programmer, Gary Crandall, including responses to our suggestions, some of which have been incorporated into the much more mature version 4.0. We feel Gary truly cares about his product and about us. No fee, no wait, no pain, no incompetent assistants—how much is that kind of service worth?

Steve K. Dubrow Eichel
Linda Dubrow Eichel
Philadelphia, Pennsylvania

Guaranteed Solution

I agree with David Bunnell's September column that software rental must be allowed to continue, but why does every opinion on the subject of software that fails to live up to its hyperbole miss an easy solution staring us in the face? Sell software with a 60-day money-back guarantee.

I suggest we all lean on the sellers, hard. Before you buy, ask if you can return it. If the answer's no, don't buy it. Off the top of my head, I can think of four things a dissatisfied buyer can't return: swimsuits, houses, cars, and software. Let's take software off the list.

William J. Reynolds
Sioux Falls, South Dakota

(continues)



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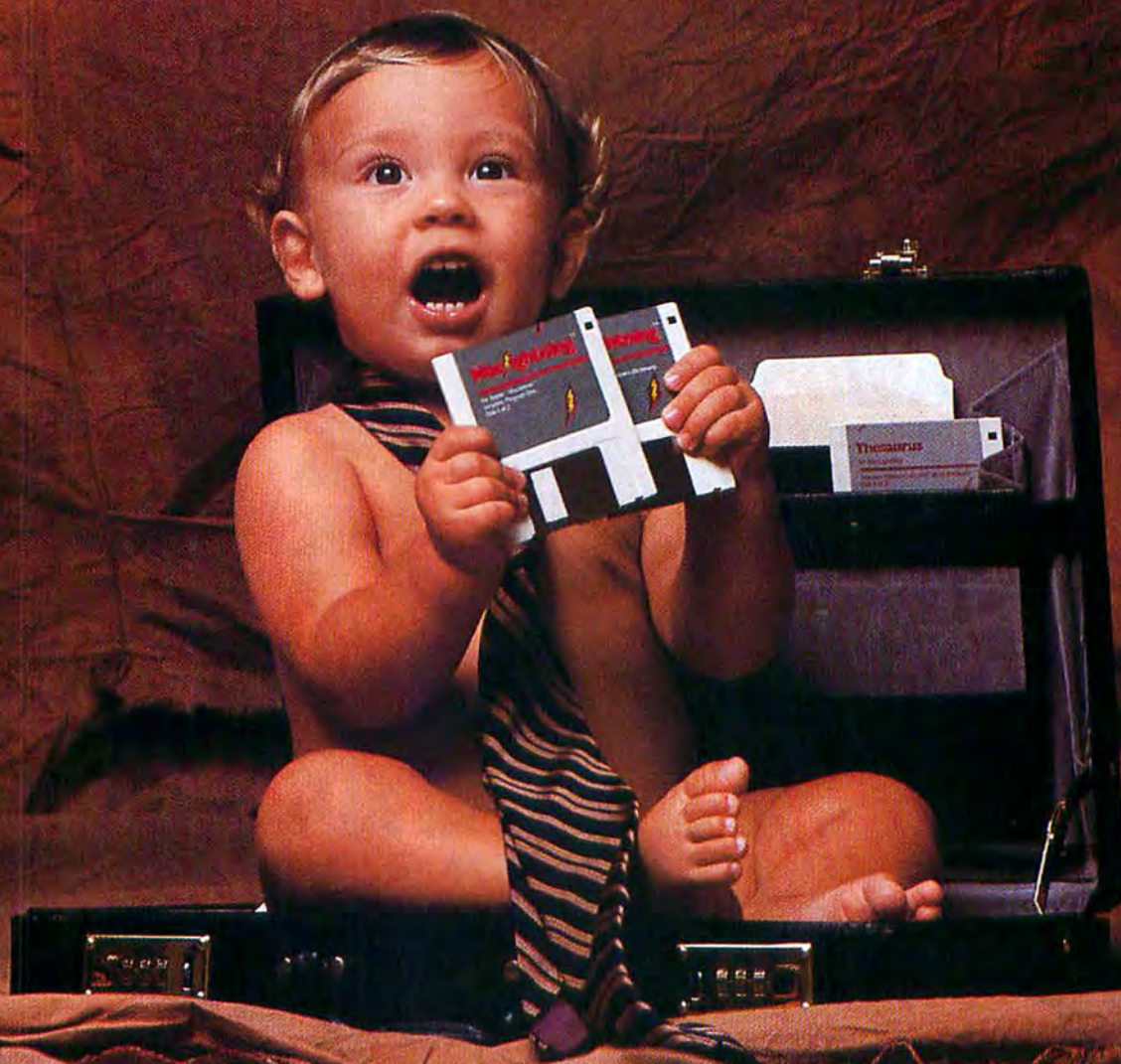
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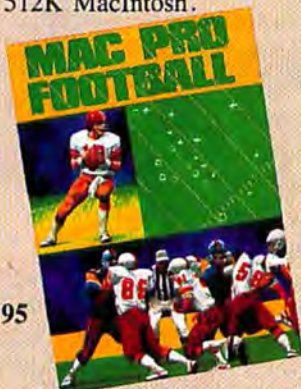
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Letters

ware manufacturing has evolved to the point where products are surprisingly reliable, but the software industry still seems to be drowning in its own wake. In March I purchased *MacLion*, produced by Computer Software Design; it wouldn't boot, so I returned it. Months later I learned that the company had gone out of business, taking my \$200 investment along with it. If selling programs is such a high-attrition vocation, why don't emerging companies show a little more consideration by setting aside funds to provide for those who support them in case a shutdown becomes necessary?

John F. Schafer
Lewisville, Kentucky

A Ray of Silicon Hope

Every month in Mac magazines, I note the call for software with a modest price, no copy protection, good telephone user support, and a fair upgrade policy.

Enter Silicon Beach with *Silicon Press*, a versatile graphics/text utility that can print in color. Yesterday I received a postcard inviting me to mail my master disk (never encumbered with copy protection) back for a free upgrade. This sensitive approach deserves the attention of the Mac community.

Warren Kelly
San Diego, California

More Applause for Support

After purchasing the *MDC II* disk-indexing program, I ran into some trouble, which I described when I sent in my registration card. To my surprise and gratitude, I received a helpful personal letter from Bob Kelleher, who was kind enough not to point out that I could have found the answer in the manual. Thanks, New Canaan Microcode.

P. C. MacCulloch
Toronto, Ontario
Canada

Regrets Only

You billed me for a subscription renewal at \$23.97, but the September issue offers new subscribers 12 issues plus a free computer clock for \$19.95. It sounds as if the staff member who came up with this one is a former Apple employee—they really know how to treat loyal customers, too.

W. A. Clark
Rosemead, California

We offer lower prices and incentives to introduce our product to new readers, as do many organizations that sell consumer products. Typical of most magazines', our renewal rate is higher because we assume that the value of our product has already been proven. \$23.97 still represents a significant savings over the newsstand price—\$47.40. If your subscription has lapsed, you can certainly send in the premium card and get the lower rate and the clock. —Ed.

Sleight of Hand

I purchased a copy of *Word Handler* from Advanced Logic Systems for \$29.95 plus a *MacWrite* disk as part of a special offer. I later decided to return the program because I felt it had some serious design problems. ALS sent back *Word Handler* and said my *MacWrite* disk would be replaced only if I paid \$25 in shipping and handling fees.

Word Handler does have better features than *MacWrite*, but that's no excuse for denying customers a reasonable avenue to return a product.

Gregory C. Swarts
Centralia, Washington

ALS changed the wording in its October advertisements to clarify the shipping and handling costs. The company reports that, to avoid bad feelings among the few users who have wanted to switch back, people who supply proof that they purchased *Word Handler* before October 1 can receive a *MacWrite* replacement for \$10 shipping and handling—less than half the actual cost to ALS. Contact ALS, *Word Handler/Mac Dept.*, 1283 Reamwood Ave., Sunnyvale, CA 94089, 408/747-1988, before December 31, 1986. —Ed.

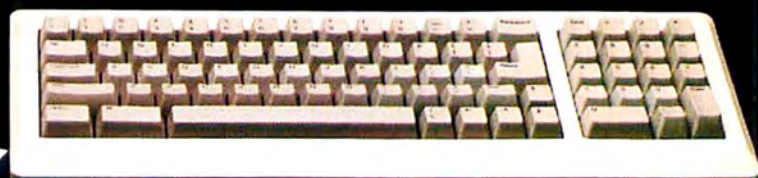
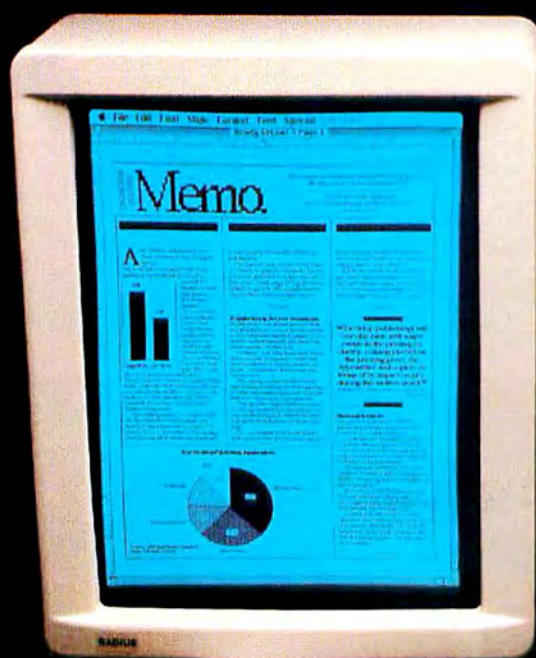
Sounds Right for the Pocketbook

Since "Is It Live or Is It Mac" appeared in the August issue, we have introduced several new versions of *Sound Designer* that work with lower-cost digital keyboards, such as the Prophet 2000 and the Mirage. Mac owners can now buy a complete *Sound Designer* system for about \$2000.

This is still a fair piece of change for most Mac owners, but it represents an ex-

(continues)

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An integral spelling checker identifies misspelled words and eliminates tedious proof-reading. Giving you more time to devote to the creative aspects of your work.

The added dimension.

Unlike word processors, Ready,Set,Go! lets you work with text and graphics on the *real* page. You can create routine—and not so routine—



paperwork with instant visual gratification.

Put your columns side by side. Draw lines and boxes. Add pictures . . . anywhere. And gain much more control over text formatting.

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Desktop publishing will never be the same again, thanks to

Ready,Set,Go!'s real-time hyphenation technology.

An ultra-sophisticated algorithm—developed by a team of MIT linguists—places hyphens in your text at *word wrap* speed. Its performance will simply astonish you.

Automatic text reflow is another desktop publishing milestone. Make a change anywhere in your document and watch the entire article update itself instantly.

Ever want to flow text around a picture? Only Ready,Set,Go! lets you move or change any specially-marked block and watch the surrounding text dynamically reflow to fit its new contours.

That's power!

Choose advanced text formatting—such as paragraph

spacing, indents, linespacing, kerning and other professional typographic features—using the familiar selection range.

These state of the art capabilities contribute to significantly better productivity and bottom line.

All around winner.

Although Ready,Set,Go! 3 represents an entirely new programming effort, one important characteristic remains: ease of use.

Ready,Set,Go! features the same easy-to-understand block architecture that earned it the highest score in *Software Digest's* recent test of desktop publishing programs.*

Anyone can learn Ready,Set,Go! in under 30 minutes. Power never gets in the way, yet is always on tap for those who need it.

We did optimize one feature. Speed. Something you're bound to appreciate when meeting tight deadlines.

Ready,Set,Go! fills the need for a heavy-duty production tool—without sacrificing the agility and intuitive response that makes desktop publishing fun.

* For a complete copy of the 52-page August 1986 report, send \$45 to Software Digest, One Winding Way, Philadelphia PA 19131

Five views.

Preview and edit in a choice of sizes including double size, actual size, half page and full page views. Or display facing pages to get the big picture.

Batch capability.

One command creates any number of pages—complete with linked text blocks.

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Custom rulers.

Show or hide rulers marked in inches, picas or centimeters.

H&J and kerning.

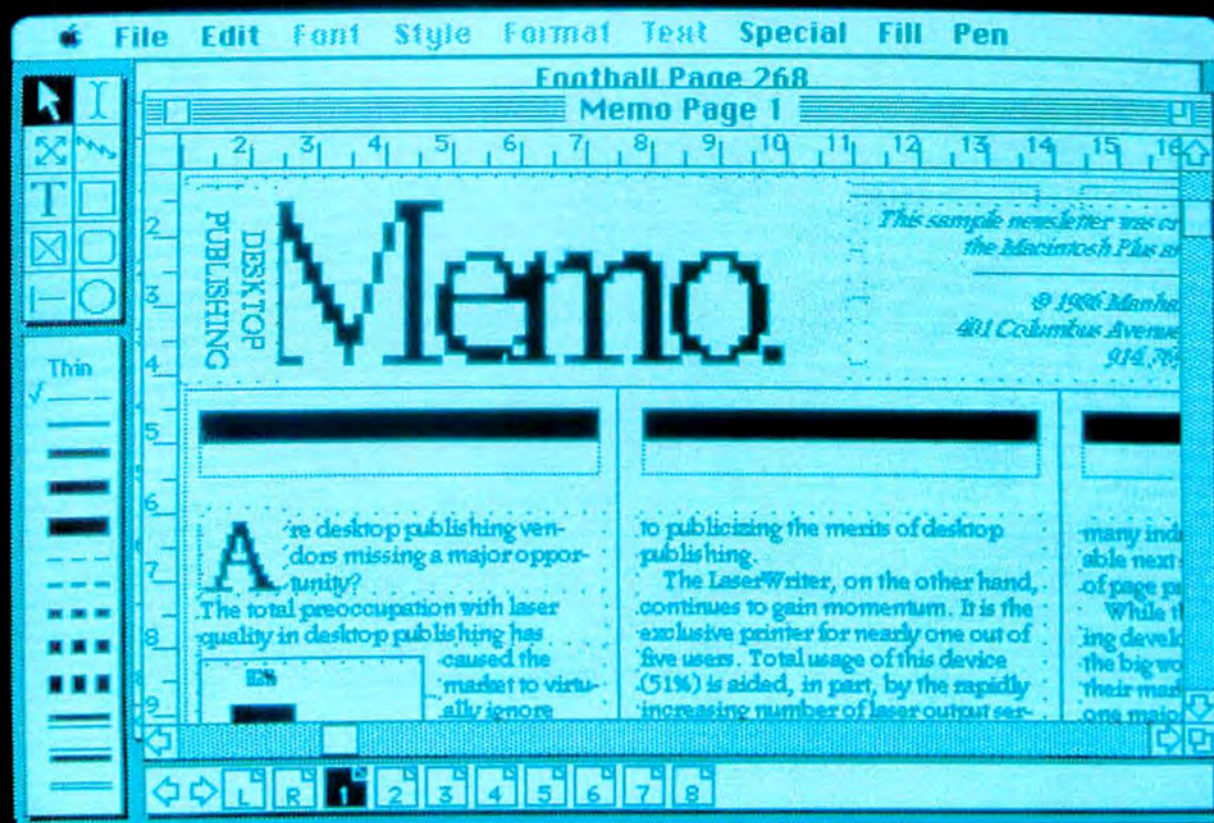
Real time hyphenation occurs automatically at word wrap speed! Letterspacing and kerning provide professional results.

Text linkage.

Use the linker tool to dynamically link and unlink text blocks throughout an entire document.

Picture cropping.

Import MacDraw and MacPaint™ pictures directly and crop them with the picture tool.

**Graphic toolbox.**

Draw solid or dashed lines, double lines, scotch rules, boxes, ovals and circles with the toolbox.

Master pages.

Create repeating headers and footers for odd or even pages—with or without automatic page numbering.

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Jump quickly between pages of a document by clicking page icons or use direct 'go to page' command.

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Open multiple documents simultaneously. Cut and paste text, graphics or even entire pages between windows.

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Use PostScript™ code directly in Ready, Set, Go! pages to create dazzling special effects.

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Search and replace, glossaries and a 60,000-word spelling checker are included.

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Text automatically reflows throughout the entire article as changes are made or new text is added.

Get Overpowering Proof.



Ready,Set,Go! 3 lets you achieve professional results with ease, speed and accuracy — from a memo to a 400 page book. *Football for Young Players and Parents* by Joe Namath and Bob Oates courtesy Simon & Schuster.



Learn desktop publishing while watching TV! In this video tutorial, award-winning graphic designers help you create better page designs with valuable tips and insights.

The tangible benefits.

Some software saves you time. Other programs do things a little better.

But no software has ever had the dramatic productivity impact of desktop publishing.

The reasons are simple: Ready,Set,Go! lets you look professional while saving you time and money. It also gives you more project control than you've ever had before.

In fact, the advantages of electronic publishing are well documented in formal studies. So when we say Ready,Set,Go!

saves you time and money, you can bank on it.

You can also bank on Ready,Set,Go!'s \$295 price.

Reputation predates PCs.

Manhattan Graphics began marketing desktop publishing software in April 1984—before the term was invented. A commercial printer since 1939, our printing and typesetting experience precedes computers.

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While words cannot adequately describe this revolu-

tionary program, our video demo can.

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See for yourself how Ready,Set,Go! 3 redefines the desktop publishing standard.

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Manhattan Graphics.
401 Columbus Avenue, Valhalla, NY 10595

Letters

cellent value for serious musicians. Computer music technology that cost \$30,000 or more a few years ago is now available for a fraction of the price. Like desktop publishing, it's another example of the Macintosh bringing powerful technology to a personal computer application.

*Peter Gotcher
President, Digidesign
Palo Alto, California*

Insight on Accounting

"The Accounting Software Buyer's Guide" [September 1986] is a valuable service to readers trying to sort out the differences among these 25 products. A tabular guide, however, can mislead the reader by comparing the programs to a set of common characteristics, possibly ending in a simplistic conclusion that the only differences are those indicated on the table.

In the case of the *Insight* accounting series, the reader does not learn of the package's Expert Report features, which bring an entirely new dimension to accounting. Going beyond recording transactions and preparing standard reports, they explain, analyze, and interpret the financial results of a company—a tremendous benefit to the business owner. Yet because they are not standard features, they are missing from the comparison.

Numerous standard accounting and operational features that many accountants and small-business owners would consider important were also excluded, such as audit trails, dunning statements, cash projections, sales analysis, multiple sales commission methods, cash and sales history, automatic pricing, financial ratio tracking, comparative financial statements, payment history, multiple finance charge methods, and multiple invoice types. All of these features are in *Insight*. Our 12 years of experience in automating small businesses suggests that almost all your readers would find some of these critical to automating their accounting.

*Stephen V. Burakoff
President, Layered, Inc.
Boston, Massachusetts*

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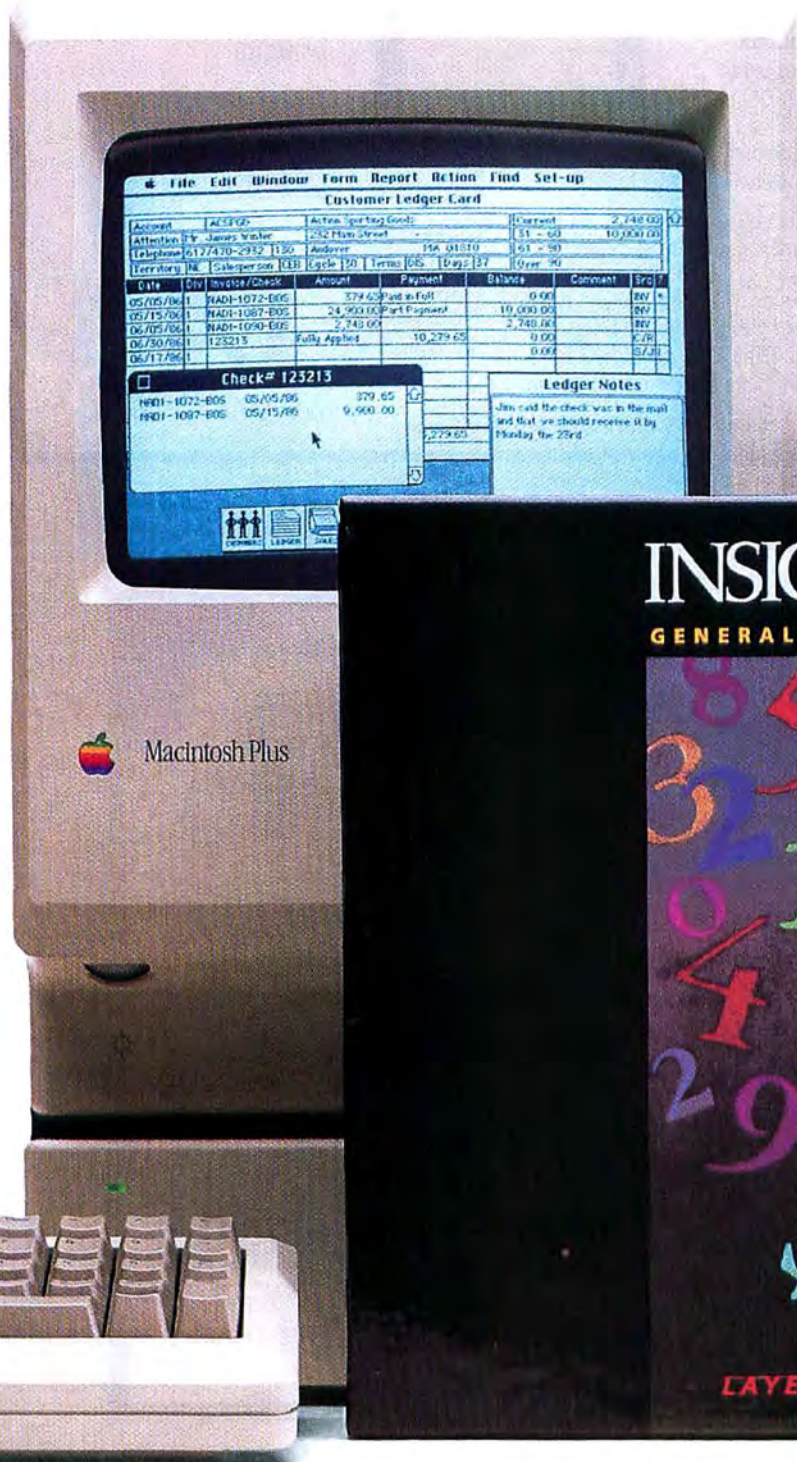
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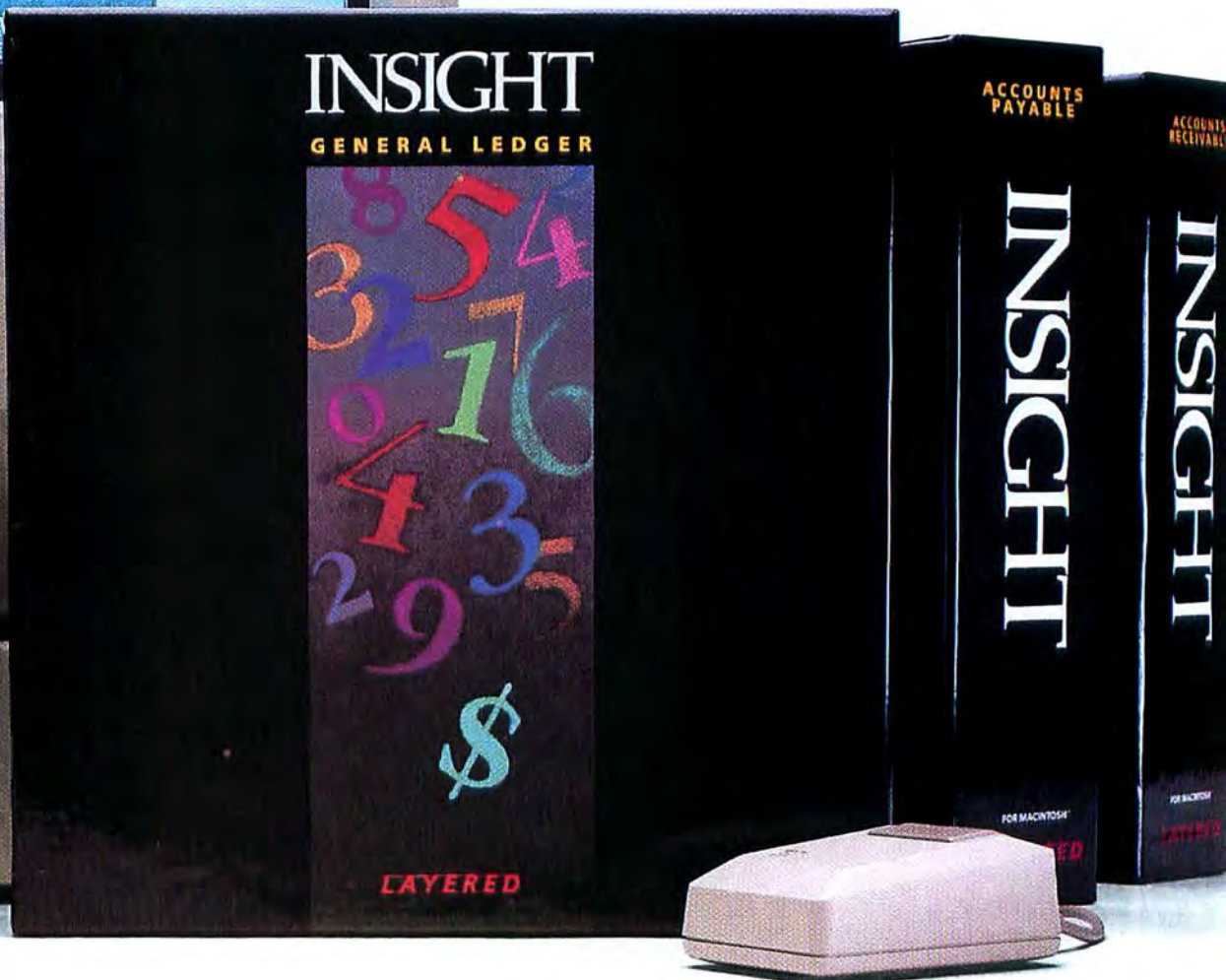
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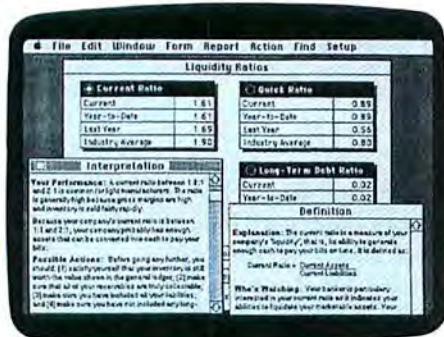
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A New Leaf

This issue brings substantial changes to *Macworld*—in both appearance and content. Our purpose? To keep you at the forefront as new technology, markets, and applications appear in the wake of Apple's expected product announcements in the year ahead.

One of *Macworld*'s most important shifts of emphasis occurs in the *Reviews* section, whose size has doubled to accommodate more product evaluations. We continue with the in-depth, objective reviews for which *Macworld* is known.

Features are united into a group of timely, more succinct articles. In addition to our hands-on, solution-oriented articles, you will find overviews, which compare pricing, compatibility, and trends for competitive products within important broad application categories.

Macworld View takes on a new identity as *Macworld News*. You'll find its news stories more product oriented, and they're shorter, so we can be the first to bring you even more stories. Another new department, *Mac Bulletin*, contains late-breaking news gathered just before the magazine goes to press.

In addition, you'll notice several changes in the departments lineup. Steven Levy, author of the best-selling book *Hackers*, continues his monthly observations on the Macintosh world. In *Quick Tips* (formerly *Get Info*), Lon Poole answers readers' questions. Jim Heid's new *Getting Started* column covers the fundamentals of Mac computing. *Insights* replaces the *Open Window* grab bag of hints with tips on a single subject or program

each month—this month, the Apple ImageWriter.

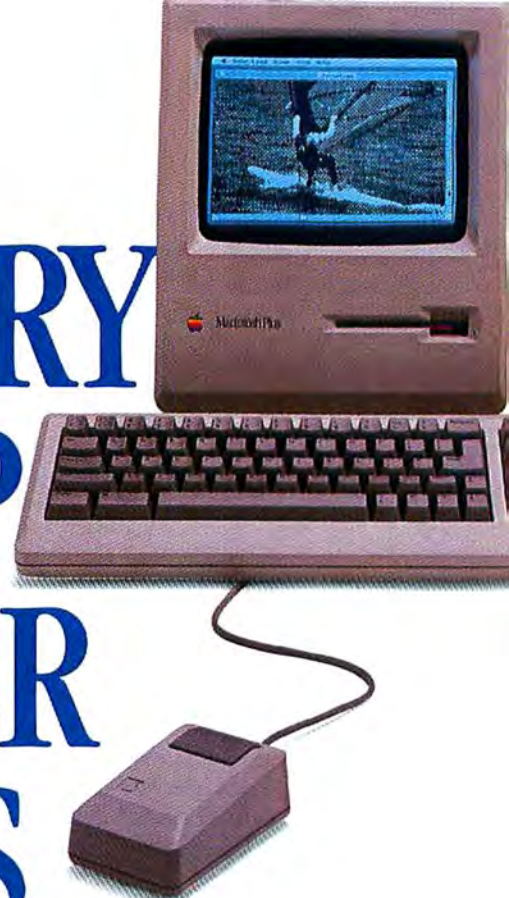
When you want buying information, simply consult *Where to Buy*, which consolidates in one section product information from all the features and reviews. *Updates* outlines new versions of existing products that we've received during the past month. *Best-Sellers*, on *Macworld*'s last page, is a single-reference source for the best-selling products nationwide. This new department is the first source to combine product sales information gathered from direct mail and retail dealer outlets.

We want to bring you a more useful and entertaining magazine. So write us, send us your tired, your weary, your aberrant hardware problems. We'll keep you informed on technology trends, but we don't want to stay so far out on the leading edge that we ignore the day-to-day issues: what's new, how does it work, why do I need it, when should I buy it, and where can I find it.

The more things change at *Macworld*, the better they get. After all, inflexible editorial formulas, like unchanging software, lead to early obsolescence. □



Changing the magazine involves a cast of thousands if we count the readers, whose feedback guides us. But it's easier to round up the editorial staff for a photo: Jerry Borrell and Charles Barrett (seated); David Usbijima, Adrian Mello, Dan Farber, Joe Matalazzoni, and Cathy Abes in the second row; Valerie Kuletz, Janet McCandless, Nancy Dunn, and Otto Waldorf in the back.



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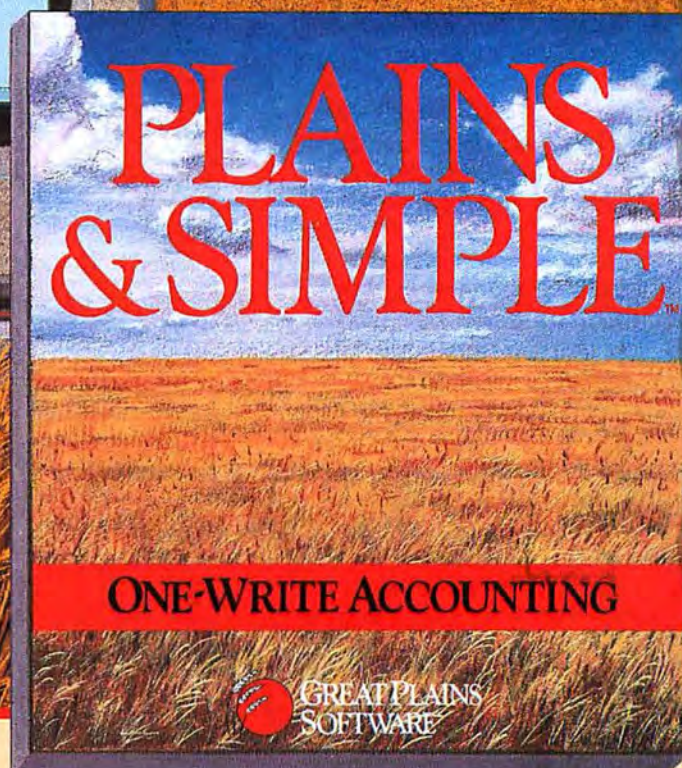
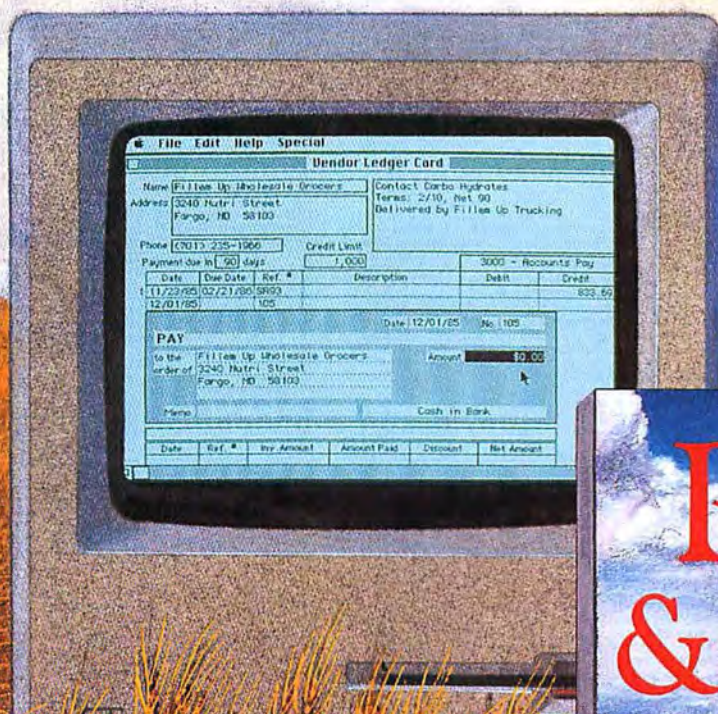
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Daniel Ben-Horin (*"Insights on the ImageWriter"*) is a San Francisco journalist and computer consultant who works with writers and nonprofit groups. His work has appeared in the New York Times, The Nation, Redbook, and Mother Jones.

Chuck Carroll ("The CAD Comparison") consults on CAD for a major computer dealer in northern Florida. He also hosts "Computer Talk," a Jacksonville, Florida, radio and TV program.

David L. Foster ("Both Sides Now") is a biochemist in the biology and medicine division of the Lawrence Berkeley Laboratory at the University of California, Berkeley.

Gordon McComb ("*Taming Your Hard Disk*") is a contributing editor of *Macworld* who has authored three books on the Mac, including *Macintosh Graphics*, published last year by New American Library.

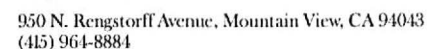
Kurt J. Schmucker ("Object Orientation") designs and teaches professional seminars about object-oriented programming. He wrote *Object-Oriented Programming for the Macintosh*, published this year by Hayden.

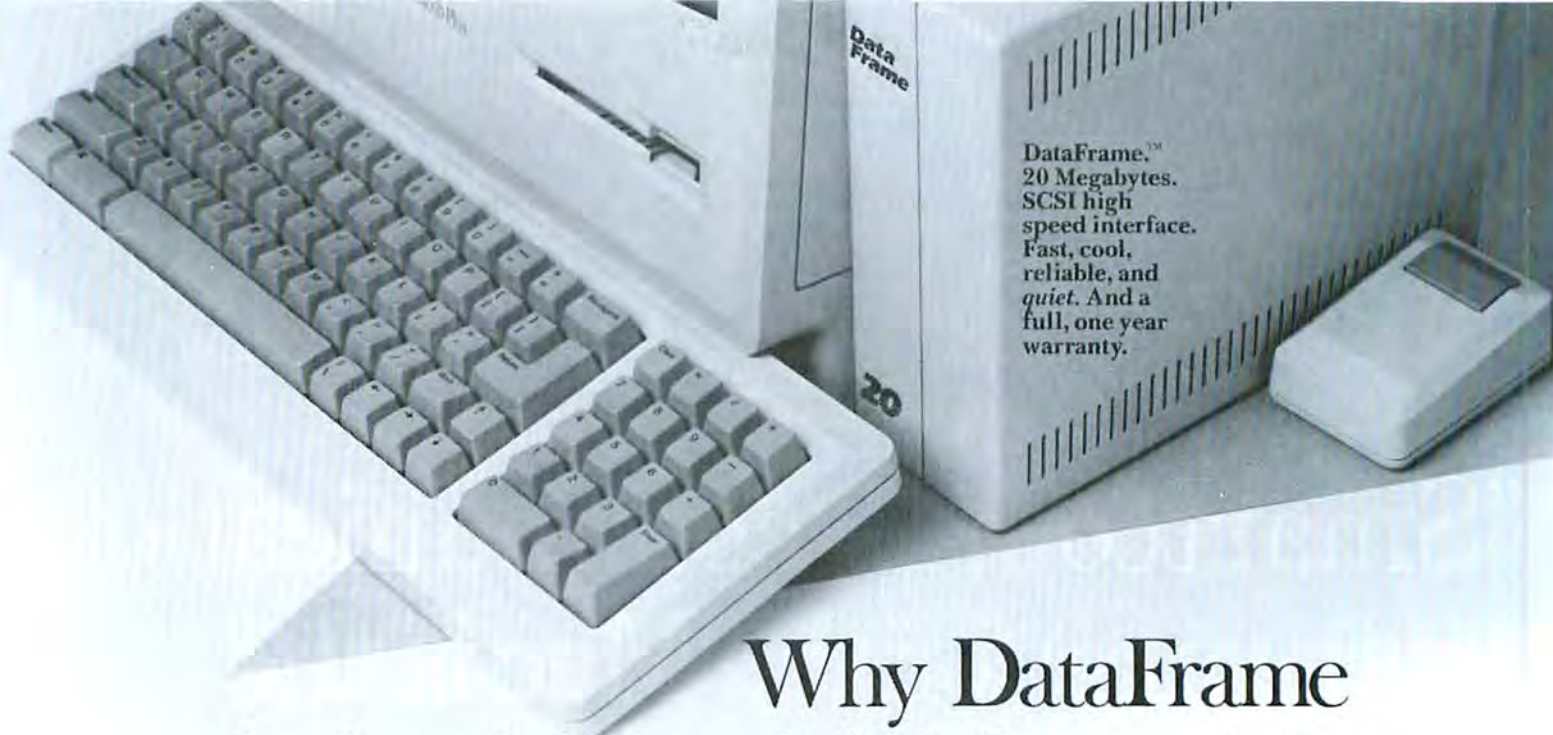
Charles Seiter (*"Insights on the Image-Writer"*) telecommutes from the woods of Willits, California, to his job with a Berkeley company that produces chemistry software. He has written books on Pascal and computerized financial planning published by Addison-Wesley, and his *Skeptical Consumer's Guide to Used Computers* was published by Ten Speed Press.

Terry A. Ward (*"The Statistics Standard"*) works as a programmer/analyst at the University of Northern Iowa. He has contributed to a wide variety of computer publications and has authored two books for Scott, Foresman and Co., *Applied Programming Techniques in C* and *Programming C on the Macintosh*. □

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Why DataFrame is the *right* hard disk for any Mac:

Because we looked carefully at what Users need in a hard disk system for the Mac, and made the right design decisions. Decisions that give you significant benefits over any other Mac hard disk. They are:

Decision: Floppy disk port or SCSI?

Hard disks that use the serial or floppy disk port, such as the Apple hard disk, are *slow*. The SCSI interface (introduced with the Macintosh Plus) is considerably faster. The DataFrame uses the SCSI interface, and consequently runs *much* faster than hard drives that use slower ports. Yes, even faster than non-SCSI internal drives. It really makes your Mac *fly*.



◀ (If you own a Mac 512, you can get DataFrame performance too, with our \$99 SCSI adapter.)

Decision: Internal drives versus external drives?

Internal drives save desktop space, but there are serious trade-offs. First, you lose your system while the drive is installed. Worse, you lose your system if the drive needs repair. (Internal drives have earned a not undeserved reputation for frequent breakdowns.)

Then there's heat—the enemy of reliability. Internal drives add heat to the system. You either use a fan—which means you listen to an annoying whine while you are working—or you use no fan, which means your system gets too hot.

DataFrame is external, so it adds no heat to the system. Because the drive is preformatted, you can take it right out of the box, plug it in, and be *working* in minutes. And if your hard disk should ever need service, you just unplug the DataFrame (you can *still*

use your Mac) and get a replacement *immediately* from your dealer.

Decision: Under-system or beside-system?

A drive under your Mac has the same heat problems as a drive inside your Mac. The drive must either have a fan (*noisy*) or it sits under your Mac like a little hotplate (*unacceptable*).

DataFrame sits *beside* the Mac, uses a vertical 'chimney' design to vent heat, needs no fan, and therefore stays cool *silently*.

What else?

SCSI means easy expansion—you can 'daisy chain' up to seven additional drives or other SCSI peripherals, using DataFrame's second SCSI port. Plus, DataFrame boots your system directly from disk, saving you time. And we used Apple's Hierarchical File System, so all 20 megabytes are available on line at all times. Most important, DataFrame is so reliable, we back it up with a full, one year unlimited warranty. That's confidence you can't even get from Apple.

The result of all these decisions:

DataFrame has been chosen by more professionals, more Macintosh software developers (including many in Apple Computer, Inc.), more dealers, and in fact, *more people* than any other SCSI Macintosh drive, *by far*.

So before you commit to *any* hard disk for your Macintosh, you owe it to yourself to see DataFrame in action. You'll find it at any of the hundreds of qualified SuperMac[™] dealers. They're listed next to this ad.

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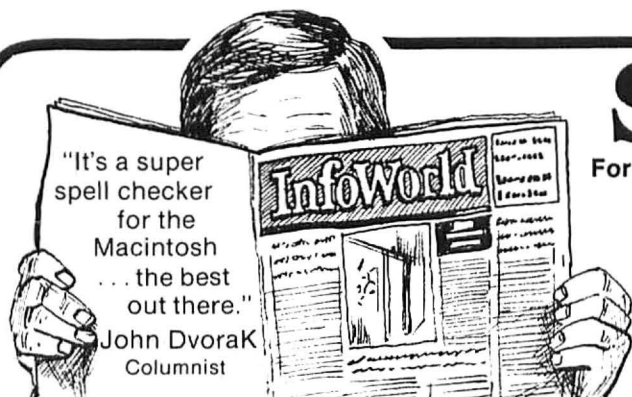
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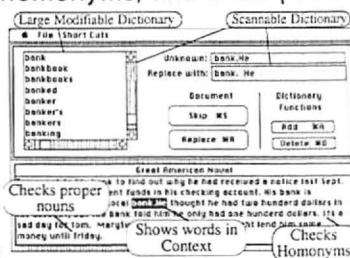
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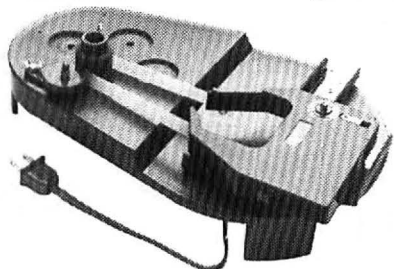
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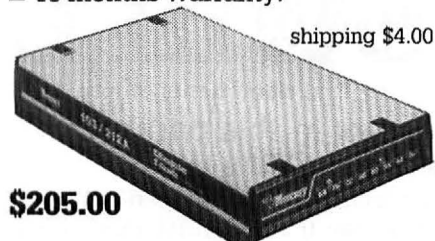
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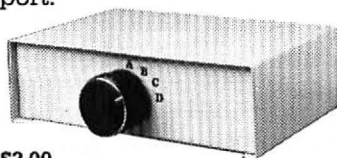
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pulses. The price was low enough to make
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enormous. ThinkTank 512 was \$245—a
weird price."

The "weird price" went against the
marketing maxim that applies equally to
software and supermarket pricing: custom-
ers gravitate to prices just below a round
figure. Just as most paperback books cost
\$3.95 or \$4.95, a remarkable percentage of
software costs \$195, \$295, or \$495. Oddly,
this phenomenon seems to hold true even
though the "street price" of software—what
most people actually pay—is around 40 to
45 percent lower than suggested retail.

In any case, ThinkTank 512 might
have been faster out of the gate if it had
originally sold for \$195, and Living Video-
text eventually lowered the price to that
amount. This seems logical; one would ex-
pect more people to buy a product at a
lower price. But Winer also guesses that
more copies might have been sold at
\$295—\$50 more than the original retail.

Generally, higher prices can result in
higher sales for two reasons. First, a higher
retail price means more money for the
dealers who sell the product. As Winer
bluntly puts it, "Dealers are not going to
sell the product unless there's a margin." If
the margin is high enough, there's real in-
centive for dealers to give the product bet-
ter display, train their salespeople to use it,
or bundle it with hardware. So imagine Liv-
ing Videotext's problem if it charged only
\$100 for *More*. Since software commonly
wholesales at half the retail price, dealers
would pay \$50. Remembering that soft-
ware is often discounted, we're looking at a
minimal dealer profit. At a 40 percent dis-
count—not uncommon—that's \$10 a unit.
What dealer will flip for that?

The second reason a higher price
helps sales is positioning. We'll get to that
in a minute. For now, let it suffice that a big
reason *More* costs \$295 is that it's more
powerful than the \$195 ThinkTank 512. If
Living Videotext charged less for its new
effort, wouldn't potential users assume that
More was a slimmed-down version of its
predecessor rather than an innovative
enhancement?

Now, \$295 is a lot of money. And
Winer admits that if Living Videotext were
not a recognized name—the leader in out-
lining software—the company might hesi-
tate to charge that much for an application
not as easily categorized as, say, a spread-

(continues)

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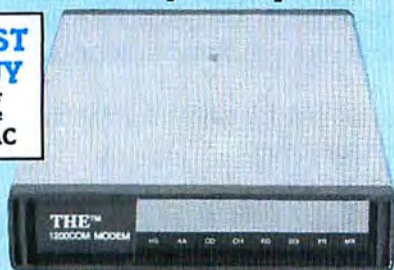
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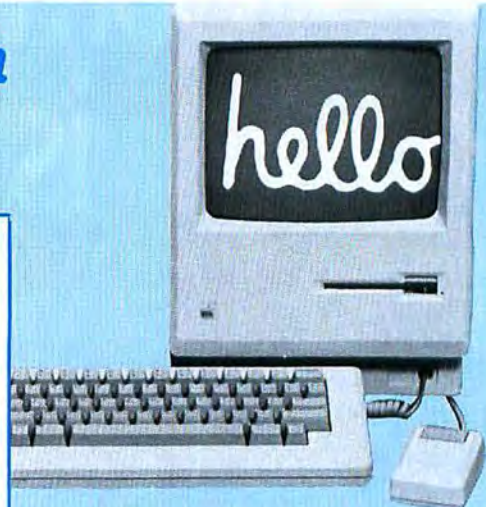
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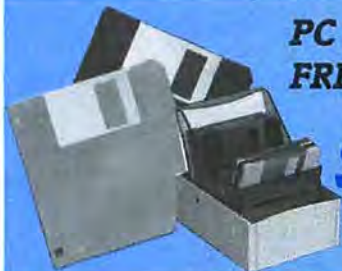


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Circle 582 on reader service card

Steven Levy

sheet. But as things stand, he says, "we want to stay in business a long time," and he is convinced not only that the price of *More* is fair, but that his customers will agree they're getting their money's worth.

Microsoft's Position

Microsoft, the pioneering microcomputer software publisher, has had more time and experience to come up with appropriate charges for software. So perhaps it was easier to set a context for pricing *Works*, which integrates word processing, spreadsheet, database, and communications functions. This package somewhat resembles the popular *AppleWorks*, a product for the Apple II family written by the same team that produced *Works*.

Interestingly, Microsoft's earlier experience with the Macintosh marketplace proved the essential factor in reaching the price point. According to Valerie Houtchens, Microsoft's group product manager for Mac software, "From the outset, we felt the Macintosh software buyer would be more price-sensitive than the rest of the world." In other words, Mac users wouldn't swallow the high prices charged for IBM-styled software like Lotus's *1-2-3* (\$495) or *Microsoft Word* for the IBM PC (\$395). Another good reason for keeping prices low was Microsoft's large investment in the success of the Macintosh. Could low software prices help establish a new computer? Maybe. So Microsoft priced its initial Mac offerings at a standard \$195, realizing that the street price would be about \$70 lower.

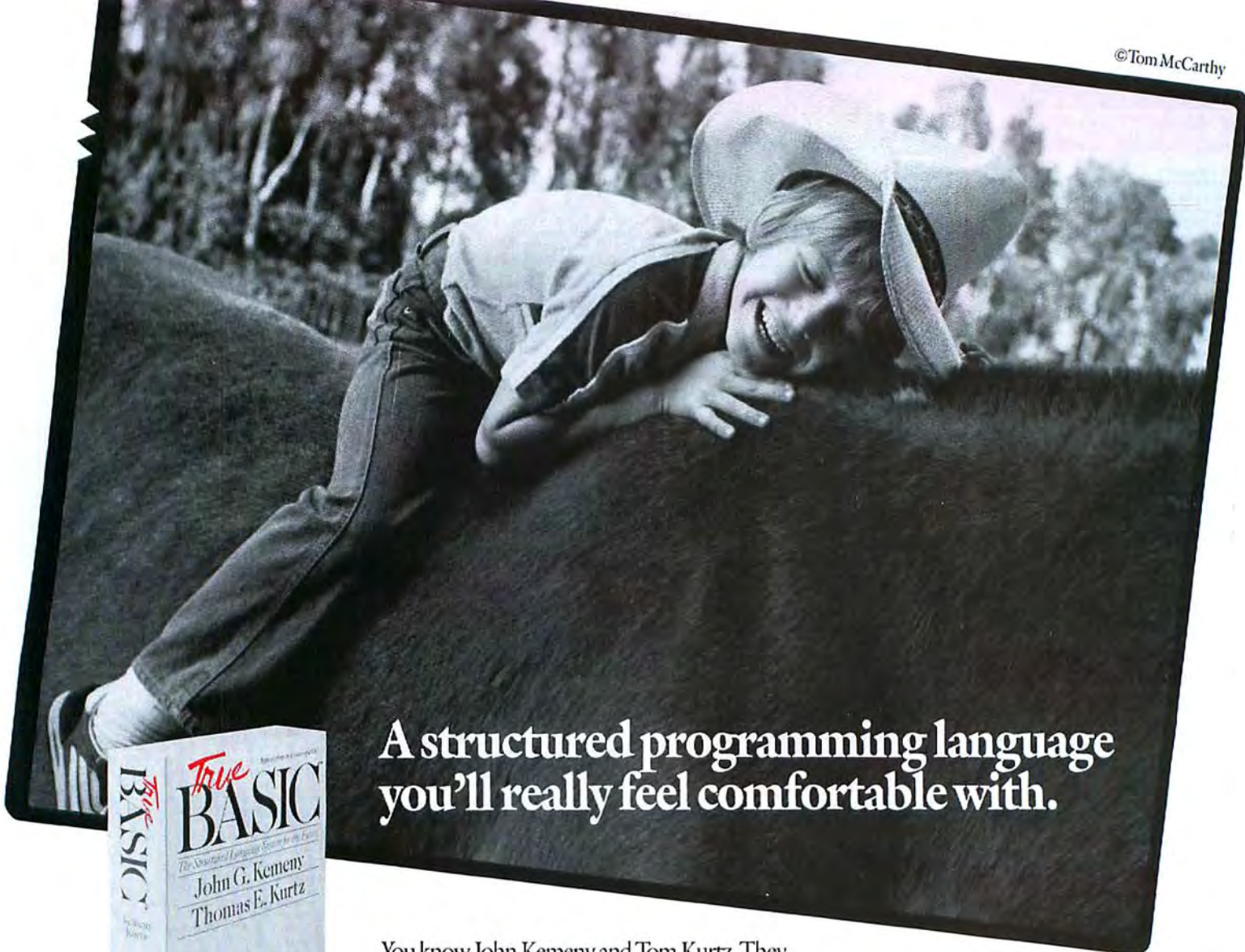
But as months went on, Microsoft concluded that the Macintosh user's tolerance of high software prices really wasn't much different from the IBM user's. The best-selling database programs, for instance, were not the lowest-priced ones. Also, price increases on certain products did not slow sales at all.

Positioning is the key, and Microsoft takes it very seriously.

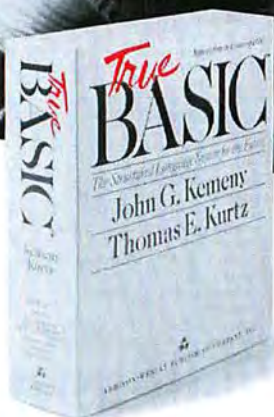
"One big thing in pricing is the whole concept of how a product is positioned," says Houtchens. "Take, for example, *Excel*. When [Microsoft chairman] Bill Gates said he wanted to build the world's greatest spreadsheet, everything from then on had to support that product position."

Especially the price. Since *Excel* was competing not only against Macintosh products (including Microsoft's own *Multiplan*) but also against products for the

(continues)



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Microsoft Excel 1.0	225.00
Multiplan to Excel Upgrade	150.00
Legissoft/Nolo Press	
WillWriter V2.0 (Includes Testimonial Trust)	32.00
Paladin SuperCrunch	179.00
Satori Software Bulk Mailer	79.00
Softtechnics/Batteries Included	
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Doug Clapp's Word Tools	45.00
Advanced Logic Systems	
Word Handler	59.00
Living Videotext	
More (Third Generation Idea Processing)	159.00
Think Tank 512	99.00
Mainstay Think Now	36.00
Microsoft Microsoft Word 1.05	111.00
MindWork Software MultiWrite	79.00
Symmetry	
Acta (Outline Word Processor in DA Format)	39.00
Target Software	
Voila! (Full Featured Desk Accessory Outliner)	53.00
T/Maker Company WriteNow	Call

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A.L.P. Systems	
MacProof V2.0 (Spelling, Style, & Grammar Checker)	129.00
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Mac Spell Right or The Right Word	49.00
Creighton Development MacSpell+	55.00
EnterSet, Inc MacGas	55.00
Hayden Software Hayden: Speller	26.00
Greene, Johnson Inc. Spellswell	45.00
Target Software	
MacLightning 2.0 w/Webster Dictionary	53.00
Additional Thesaurus Library	28.00
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Boston Software Publishers	
The MacPublisher II	135.00
Mac-Hy-Phen	69.00
MacIndexer	62.00
Manhattan Graphics	
ReadySetGo! (Version 2.1)	99.00
ReadySetGo! Desk Design	37.00
Orange Micro, Inc.	
Ragtime (Integrated Page Processing)	239.00

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Chang Labs	
Rags to Riches GL, AR, or AP	99.00
Rags to Riches Three Pack-GL/AR/AP	249.00
Continental/Arrays	
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Maccountant V2.0	99.00
Future Design Software	
Strictly Business Accounting System: Module 1 - General Ledger	199.00
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Peachtree	
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Sierra On-Line MacOneWrite GL or AR	
MacOneWrite Cash Disbursements	79.00

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Cricket Software Statworks	79.00
Northwest Analytical NWA StatPak	229.00
NWA Quality Analyst	299.00
StatSoft StatFast-2	75.00
Systat Systat (Version 3.0)	459.00

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Ann Arbor Softworks Full Paint (Un-Protected, includes ColorPrint)	59.00
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Casady Company	
Fluent Fonts (Two-Disk Set)	29.00
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World Class Fonts Volume I (Three Disk Set)	29.00
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LaserWorks (Version 1.2)	239.00
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DaVinci: Commercial Interiors	119.00
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Paste-Ease (Volumes I & II)	36.00
I/O Designs ColorPrint Software Only	25.00
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Mac The Knife Volume III	27.00
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Art A La Mac Vol. 1-People & Places	23.00
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Click Art Letters or Personal Graphics	29.00
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Apple Computer MacDraw	149.00
BrainPower DesignScope	129.00
Challenger Software Mac 3D	119.00
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Phoenix 3D Level One	27.00
Enabling Technologies Easy 3D	89.00
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MacDraft (Version 1.2)	199.00
MicroSpot MacPlot	119.00
MacPlot Professional	224.00
Vamp, Inc. McCad PCB	299.00
McCad Schematics	399.00

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Davidson & Associates Speed Reader II	37.00
Math Blaster	27.00
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First Byte Kid Talk or Speller Bee	42.00
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MacGolf (Version 2.0)	36.00
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Pslon Chess (3D & Multi-Lingual)	31.00
Q Ware, Inc. OrbQuest	35.00
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Enchanted Scepters	21.00
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Simon & Schuster	
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LoDown 20/20 Combo (20 MB Hard Disk w/20MB Tape)	1439.00
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Sierra XL (30MB Drive with 40MB Tape)	1859.00
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10MB Removable Cartridges for MacStor 10	135.00

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Signalman Lightning 2400 Baud	355.00
Hayes Microcomputing Interbridge	549.00
Smartmodem 1200	369.00

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Fuji 3 1/2" SS/DD Disks (box of 10)	18.00
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Underware Color Pens-Small	10.00
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A/B Box (Specify Mac or MacPlus)	65.00
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Kette Group	
MacNifty Joystick Converter	35.00
MacNifty Stereo Music System MNS-200	75.00
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MacNifty A/B Switch	25.00
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Kraft QuickStick III	49.00

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Moustrak MousePad 7" x 9" Size	39.00
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X-10 Powerhouse Computer Interface	65.00
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Microsoft Multitask: Of Mice and Menus	13.00
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IBM, the company felt comfortable with the relatively steep \$395 price tag. "If it were only \$295, maybe people wouldn't say it's the best spreadsheet in the world," explains Houtchens. "It's basic human behavior—people are willing to spend more if it's justified by quality." She offers an example: the popularity of Porsches.

On the other hand, Houtchens admits that "price can be a weapon." This was most evident in Microsoft's aggressive handling of *Word* in early 1986, around the time Apple stopped including *MacWrite* as part of the standard Macintosh purchase. Microsoft sold *Word* to dealers at half its normal wholesale price—but only if they guaranteed to bundle *Word* in 80 percent of all new Macintosh systems they sold. (The dealers themselves decided how much this should add to the system price.) This practice not only sold a lot of copies of the program but helped make a case for *Word* as the standard Mac word processor.

Works is designed for a different user than is either *Excel* or *Word*: the "breadth user" as opposed to the "depth user." This is the first-time user of a business com-

puter who, after years of vacillating, finally breaks down and buys a machine. Microsoft not only wants new Mac users to choose *Works* but hopes that those uncommitted to a particular computer will be sufficiently swayed by the synergistic combination of the Mac and *Works* to opt for the Mac.

So it compared its product against both Macintosh and non-Macintosh competitors: the pfs series of software packages that run on the IBM PC and compatibles; *Jazz* on the Macintosh (which Microsoft considered overpriced at its original \$595); and *AppleWorks* itself for the Apple II family. Since the Macintosh product has more functions and features than *AppleWorks* (which retails for \$245), it seemed only reasonable for *Works* to cost more than *AppleWorks*. (The intention was always to price *Works* higher than Microsoft's standard Macintosh application line, which still retails for \$195 each.) A price of \$295 also allows dealers a decent margin.

Why not charge more? For one thing, that might have blurred the distinction between *Works* and *Excel*, which is carefully positioned to convey a software equivalent of Porsche-ness. Also, Microsoft wanted to hedge against competing products under

development that might be released later at lower prices. All in all, it seemed eminently logical for Microsoft to charge just under \$300 for the newest addition to its family. Logical, but only to a point. Although in the context of competition and value these pricing considerations make sense, they are still wholly intangible. Houtchens and I had been talking for over an hour, and only at the end of the conversation, at my instigation, had factors like the price of materials and development been mentioned. Then I got the expected explanation—all reasonable—that Microsoft was an 1100-person company with certain overhead, payroll, and marketing costs, plus R & D expenses and shareholders to report to. It needed its share, too.

"Our mission," she concluded, "is to deliver quality software at a profit." I think Living Videotext would heartily agree. Profit is the reason that software products cost \$295. But quality is the reason people pay the price. □

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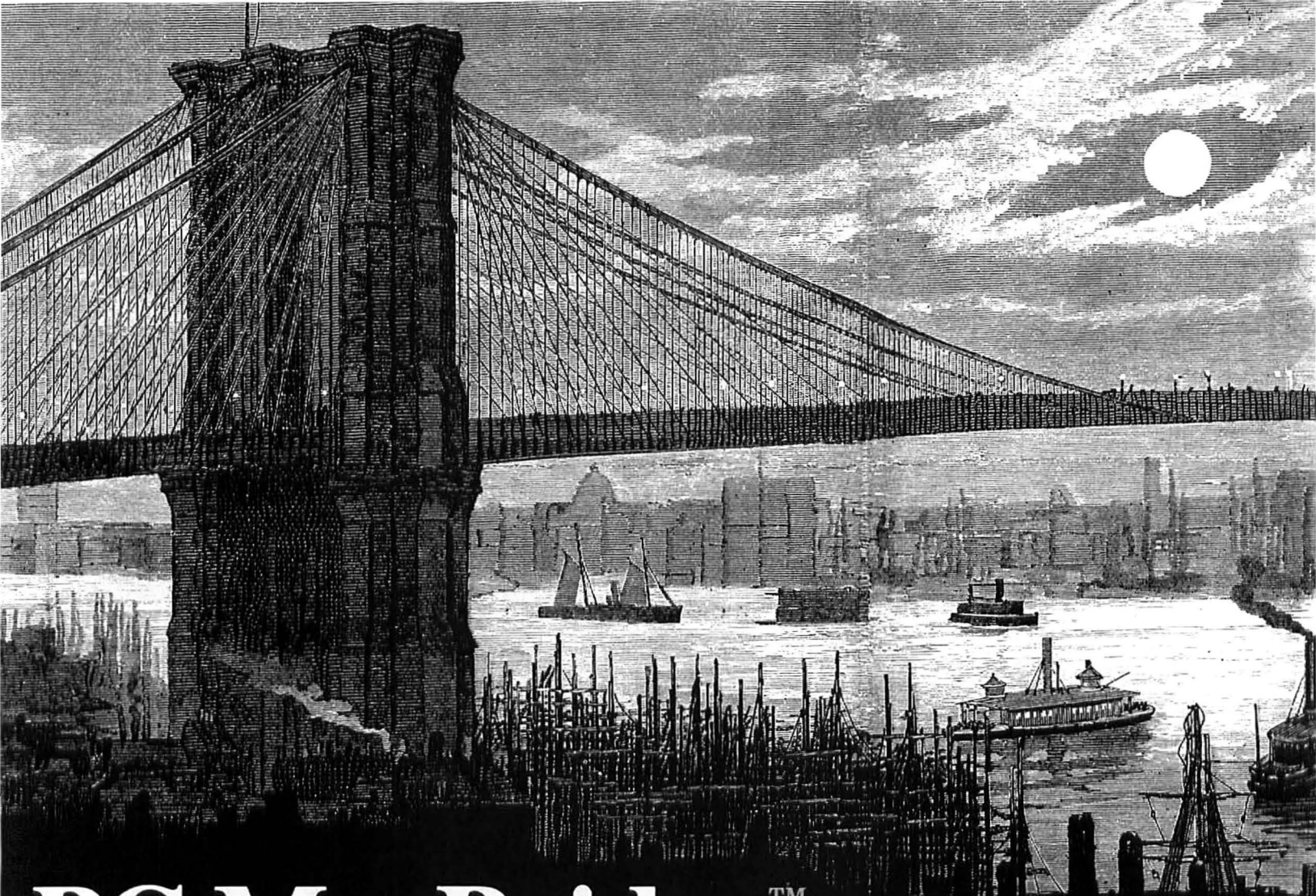
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Macworld News

by Daniel Farber

High Score



About an hour from Cambridge, Massachusetts, are three towns in an equilateral triangle roughly 5 miles apart that could easily be the Bermuda Triangle of Macintosh musicware. Amazing things are happening in this otherwise prosaic rural New England farmland. The points of the triangle are the towns of Harvard (home of Southworth Music Systems, manufacturer of *Total Music*), Ayer (birthplace of Mark of the Unicorn's *Performer*), and Littleton (where a new software company is making desktop music publishing a reality).

Can the desktop publishing analogy be applied to the music industry? So say Don Byrd and Kim Stickney of Advanced Music Notation Systems, whose first product, *SpaceGuide*, is a custom application written according to proprietary methods used by Paul Sadowski at his New York music engraving firm. The program generates spacing templates used in the production of publication-quality engravings for such composers as Leonard Bernstein, Elliott Carter, and John Cage.

Advanced Music Notation Systems' current venture, *High Score*, is a postprocessor that outputs PostScript for printing with a LaserWriter (300 dots per inch), Linotronic (1270 to 2540 dots per inch), or other PostScript-compatible device. Because it's a postprocessor, the program gives you the freedom to format music for pub-



Don Byrd (left) and Kim Stickney of Advanced Music Notation Systems have developed *High Score*, the PageMaker of the music industry.

lication-quality printing with the same power that *Page-Maker* provides for manipulating text and graphics. However, the problems intrinsic to formatting musical data are substantially greater than those of laying out a newsletter.

Byrd and Stickney are well equipped to solve the inherent complexities. Don Byrd's dissertation, "Music Notation by Computer" (1984), is considered a definitive treatise.

It's not yet clear how *High Score* will be packaged, that is, whether it will function as a generic postprocessor for MIDI data played on a synthesizer and captured via a wide variety of sequencer software packages, or whether it will be built in as a PostScript conversion back end to one or more pre-existing music products. In any

event, considering the music publishing industry's current use of computer technology (almost nil), the access to PostScript provided by *High Score* could revolutionize the industry with about the same impact movable type had on book publishing. For more information on *High Score*, contact Advanced Music Notation Systems, 31 Colonial Dr., Littleton, MA 01460.—Christopher Yavelow

Apple Supercomputer



Apple's supercomputer has been up and running since March of this year, and Apple engineers are beginning to tap the machine's resources. The \$15 mil-

lion Cray X-MP performs about 800 million calculations per second; compare that to the Mac's 600,000. This capability allows engineers to simulate and test designs using color animation and other graphic imaging techniques on computer screens and media such as videotape.

At Apple the Cray primarily simulates new user-interface concepts and aids in VLSI chip design, says Sam Holland, manager of advanced computer development at Apple. One of the main benefits is the reduction in development time. With a Cray, engineers can write code in very rough drafts (since space and memory aren't a problem) or use third-party software and perform tests that would take many months to program on a normal develop-

(continues)



Sam Holland leads the Cray team at Apple in developing future computers.

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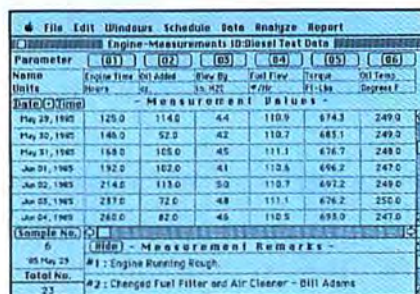
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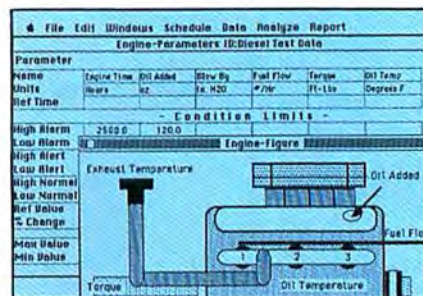
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Apple Supercomputer (continued)

ment system. In addition, engineers can spend more time testing ideas and improving designs without investing time and money in building prototype hardware.

Apple ordered its Cray in mid-November of last year and received it in March. Since that time the machine has proven very efficient. Apple chose UNIX V (Berkeley) as the base software for the system and controls the machine with minicomputers. The Cray is also connected to Macs on an Ethernet network.

Apple's developers send simulations computed on the Cray to an external monitor in real time, and they can program mouse and keyboard events into simulations in real time. In addition, animation sequences can be saved to a videotape for convenience. The Cray also performs test and measurement simulations such as thermal flow analysis and laminar flow (disk drives) for hardware designs.

About 200 engineers at Apple are using the Cray, whereas in most other Cray installations about 2000 engineers have time on the machine. Says Holland, "Some of the simulations are already pushing the Cray to its limits."

Multiuser Games



Maze Wars+ from MacroMind is a direct descendent of the original maze game at MIT in the early 1970s and is a more advanced version of a public domain Macintosh program developed by Burt Sloane. You can play the game off line against the computer or at 1200 bps with one other player. But the most fun is to play on an

AppleTalk network with four or five players.

Maze Wars+ is something like the video game *Pac-Man*: you try to avoid being zapped by the other players, and you accumulate points by zapping them. The game has four levels of mazes and several play options. For example, if you're in serious trouble, you can teleport: you move randomly to a new position, and the opponents' screens black out temporarily. You can even send messages that appear in a window back and forth during play. *Maze Wars+* has some interesting animation as well. When you shoot a missile down the hallway, you see it traveling toward the target. If your missile hits an opponent, you see an explosion; if you miss, a hole in the wall appears. You can create your own character in *VideoWorks* or use one of six characters supplied with the program. The \$49.95 game is available from MacroMind, 1028 W. Wolfram, Chicago, IL 60657, 312/871-0987.

PBI Software's *Strategic Conquest*, a war simulation, has been enhanced for multiuser play. Infinity Software, publisher of *GrandSlam Tennis*, is also planning a multiuser version of its game so players can match against each other

rather than the Macintosh. And Spectrum Holobyte will introduce *Falcon*, an F-16 dogfighting simulation that works on an AppleTalk network or with modems.

Scott Gillespie, software development manager at Reed College, is developing an AppleTalk network card game. *BetNet* lets you place bets and converse with other players by sending messages that appear at the top of the screen. Icons for each player appear on the card table, and you can look at your cards without letting the other players see them. Gillespie plans to create a developers' package to help programmers write network games for the Mac.

PressLink



For the past year, the newspapers of a major chain have been sharing the Macintosh-generated graphics that accompany breaking news and feature stories in their newspapers and on their national news wire. Knight-Ridder Graphics (KRG), the news graphics arm of the Knight-Ridder newspaper chain, is now expanding its distribution of *MacDraw* artwork

to newspapers across the country through a telecommunications network it calls *PressLink*.

KRG's Mac artists have already connected the chain's 28 newspapers—including the *Miami Herald*, the *Philadelphia Inquirer*, the *Detroit Free-Press*, and the *San Jose Mercury News*—with *Press-*

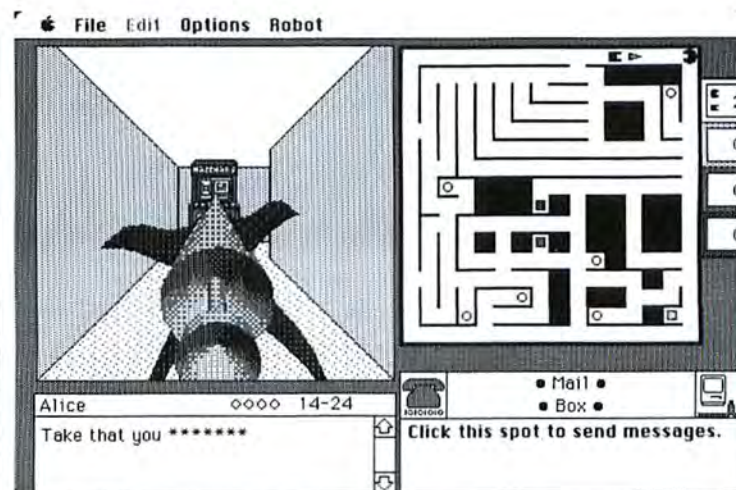


Roger Fidler of Knight-Ridder Graphics is one of the people who pioneered putting the Mac to work in the newsroom.

Link. The system is adapted from communications software developed by Apple Computer and General Electric Information Services. *PressLink* is an electronic graphics bulletin board that includes daily graphics for breaking news and features, a news graphics archive, and a continually expanding base-map library. Editors retrieve graphics created by KRG and then localize or customize them on their own Macintosh equipment.

PressLink features an electronic mail system that allows news artists and editors in distant cities to exchange text and graphics messages. Such electronic versions of the traditional morning editorial meeting can determine which of the newspaper chain's artists

(continues)



Multiuser games are what networks are meant for, say devoted game players. *Maze Wars+*, for instance, lets several players fight it out in real time, on four levels of mazes.

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PressLink (continued)

will respond to fast-breaking news events and how the wire-service text and graphics reports will coordinate.

Future newspaper clients will, in most cases, access *PressLink* with a local telephone call, paying about 50 cents per minute of connect time. Graphics subscription charges will cost the average newspaper up to \$100 or more, weekly. Newspapers with graphics staffs that contribute news graphics to the database will earn monetary credit, and KRG's coverage will expand to areas not covered by newspapers in the KRG chain.

"The demand for computer-generated news graphics is growing rapidly, but the number of artists who can produce such work is very low," says Roger Fidler, KRG's corporate director of graphics and newsroom technology. "By using the Macintosh and the *PressLink* network, we can increase productivity and meet (that) demand. . . . But this technology will not replace artists. It will reduce production steps and production costs, allowing the artists to create news graphics closer to deadline."

A recent industry survey estimates that up to 70 percent of America's more than 1700 dailies use the Macintosh, so it's likely that your hometown paper, if it doesn't already, will soon be using news graphics—created either locally or by long-distance connection with an artist like those at Knight-Ridder—with a little help from Apple Computer.—*Stuart Silverstone*

The Flat Mac



Since the Macintosh first appeared people have been asking for a laptop version. Recently, at the Boston Macworld Expo, Dyna-

LEE YOUNGBLOOD



Dynamac's adaptation transforms the Mac Plus into a convenient traveling companion.

mac showed a flat Mac that will soon be commercially available for between \$5000 and \$7000. The unit is 3¼ by 13¼ by 15¼ inches and weighs about 15 pounds, with a built-in 800K disk drive and from 2 to 4 megabytes of memory. Its electroluminescent screen has a screen-aspect ratio and contrast comparable to the Mac's. The machine includes a built-in modem, composite video output (22.5kHz), a port for an 800K external drive, a sleek black carrying case, and an optional 20MB internal hard disk. For more information, contact Dynamac, 1536 Cole Blvd. #252, Golden, CO 80401.

Trapeze



Data Tailor's *Trapeze*, a spreadsheet program designed for scientific/engineering and financial applications, uses free-form blocks to reference data rather than the usual rows and columns. Because references are linked to named blocks, rather than individual cells, formula references are preserved re-

gardless of editing operations. *Trapeze* permits you to perform approximately 150 functions on any given block of data on one or more linked worksheets. In addition to performing standard spreadsheet operations, with *Trapeze* you can create and analyze models with simultaneous equations, perform matrix operations, do curve fitting through a series of points, and develop single-function amortization tables. You can nest the results of functions within a block and have several levels of operation on any block of data. Each cell or block can contain a 255-character comment field.

Trapeze lets you combine text, spreadsheet, database, chart, and graphics data on one page. As in *MacDraw*, you can add pages to a worksheet and reduce or expand the pages in increments up to 200 percent. The program provides a set of graphing functions (rather than templates) to graph data in line, bar/column, pie, scatter, and polar charts. Since you can import graphics, creating forms with calculation, text, and graphics fields is easy. The program supports color on the ImageWriter II. For more information contact Data Tailor, 1300 S. University Dr. #409, Fort Worth, TX 76107, 817/332-8944.—*Janet McCandless*

LetraPage



MacPublisher has been sold by Boston Software to Letraset, a subsidiary of Esselte (a Fortune 500 Swedish conglomerate). Over 25 years ago Letraset introduced a form of typography known as transfer, or press-on, type.

Revised and renamed *LetraPage*, the new version follows the Macintosh user interface more closely, is easier to use, and contains more word processing features than *MacPublisher*. Among its advanced features are kerning and hyphenation. *LetraPage* opens documents directly from the main text and graphics applications, supports cursor keys, and reflows text automatically. The program is an improvement over *MacPublisher II*—thanks to the addition of a tool palette, horizontal and vertical scroll bars, more flexible text editing options, and a 1024-page limit. You can also specify colors for printing on the ImageWriter; create gray screens in 10 percent increments; and modify patterns, boxes, and line thicknesses. For more information contact Letraset, 40 Eisenhower Dr., Paramus, NJ 07652, 201/845-6100.



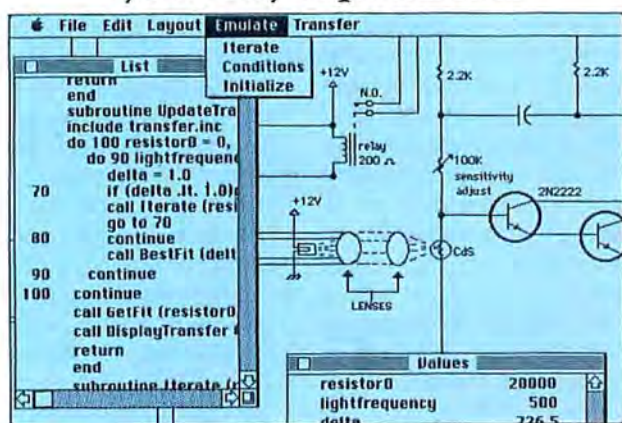
MacPublisher's new incarnation as LetraPage includes a tool palette and many new enhancements.

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Microsoft FORTRAN Compiler Version 2.2

Microsoft FORTRAN Compiler

- Full ANSI FORTRAN '77—the standard.
- Port mainframe and minicomputer applications with little or no change.
- Calculate with IEEE-standard floating-point numbers.
- Performs direct 32-bit integer arithmetic.
- Supports virtual arrays as large as available disk space.
- Compile up to 1600 lines per minute.
- Optionally compile into Apple's MDS assembly language.
- Structure your code using separately compiled modules, statement functions, block IF, block DO and SELECT CASE constructs.

Interactive Window-Oriented Source Debugger

- View your source file while debugging.
- Single-step through your program.
- Set source-level breakpoints to control execution.
- Examine and modify your variables.
- Search source code for labels or line numbers.
- Examine file status for all units.

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- Draw using powerful Macintosh graphics routines: points, rectangles, ovals, arcs, polygons and regions.

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- Build your own libraries of useful subprograms.
- Include over 200 procedure files per library.
- Mix FORTRAN and assembly language procedures.

Object Code Linker

- Dynamically link routines as needed while executing.
- Statically link subprograms for faster execution.

Other Productivity Tools

- Apple's source code editor—optimized for faster programming.
- Apple's resource compiler—takes advantage of special Macintosh capabilities.

System Requirements

- 128K Macintosh.
- One disk drive.

Microsoft® FORTRAN for the Macintosh.™

The High Performance Software.

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Many instructors are using the Macintosh as a teaching assistant. Harvard physics professor Eric Mazur animates the collision of two protons with VideoWorks.

Courseware Connection



The Macintosh is being used by scientists in teaching as well as in research. Eric Mazur, professor of applied physics at Harvard University, illustrates difficult concepts with *VideoWorks* on the Mac. Once he animated the collision of two protons. "I took a picture from a proton-proton collision in high-energy physics, digitized it with ThunderScan, and animated the two protons to show how the collision took place. Then I inserted an animation of two hands clapping. The whole class cracked up."

The Macintosh also supports a lot of specific courseware for students. At Philadelphia's Drexel University, a leader in this field, students can choose from programs that identify plants, minerals, and rocks; apply principles of structural geology to interpretation of geological maps; review the basics of groundwater hydrology; aid discussion of electromagnetic field theory; define fundamentals of seismology; and simulate chemical reactions in polymerization.

Intermediate chemistry classes at Dartmouth run software showing electron orbitals. At Stanford, one program reviews principles of sulfuric acid manufacture, and another simulates responses from a patient on a respirator. At the University of Wisconsin at Madison, an application displays how cell organelles produce and store the biochemicals needed to sustain life. These are just a sampling of the programs described in the quarterly *Wheels of the Mind*, available from Apple.

The Academic Courseware Exchange (4141 State St., Santa Barbara, CA 93110, 800/235-6919, 800/292-6640 in California), a cooperative venture of Apple and Kinko's copying centers, published a catalog of 30 courseware programs this summer. The Exchange seeks to distribute software at textbook prices; programs cost between \$8 and \$30. The first catalog includes programs such as *Tools for Writers*, which performs checks and diagnostic tests on text documents.—Dan McNeill and Paul Freiburger

Voila!



Target Software, publisher of *MacLightning*, a spelling checker and thesaurus, has added another powerful desk accessory to its product line. *Voila!* is a \$99.95 outline program, usable within applications, that lets you create up to 999 headlines and unlimited subheads and expanders containing text or graphics. The program automatically generates a table of contents, turns any text file into an outline, and lets you save or import *Voila!* outlines in *ThinkTank 512* or text format. With *Voila!* you can incorporate different fonts in your outlines, use the cursor keys, search and replace text, and sort items. For more information, contact Target Software, 14206 S.W. 136th St., Miami, FL 33186, 800/622-5483, 305/252-0892 in Florida

Ragtime

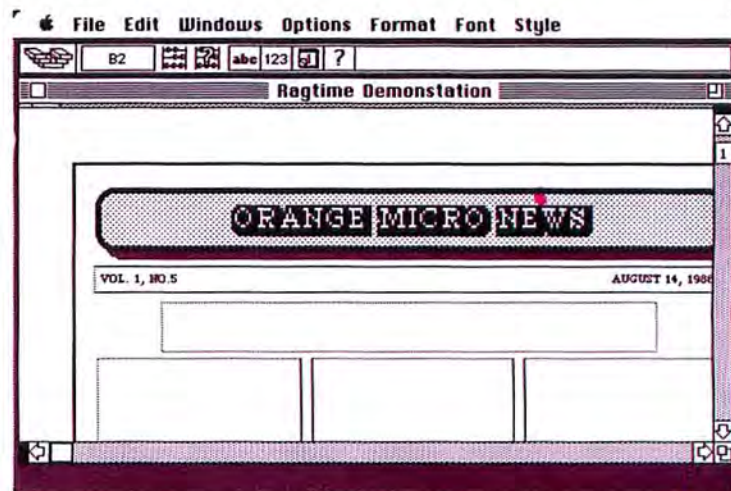


A new program from Orange Micro offers word processing, spreadsheets, forms generation, graphics, and page-layout capabilities in one integrated

environment. *Ragtime* lets you design a layout, enter data, and then edit the design and data interchangeably. To create documents, you select frames from a tool palette, rearrange and resize them on a page, and flow text from one frame to another automatically with "pipelines." You can nest a text frame within a graphics frame and group frames for easier page layout. With the Show Page option, a WYSIWYG editor lets you edit and rearrange multiple-page documents of up to 350 pages. A split-screen window allows you to view and edit up to nine pages at the same time.

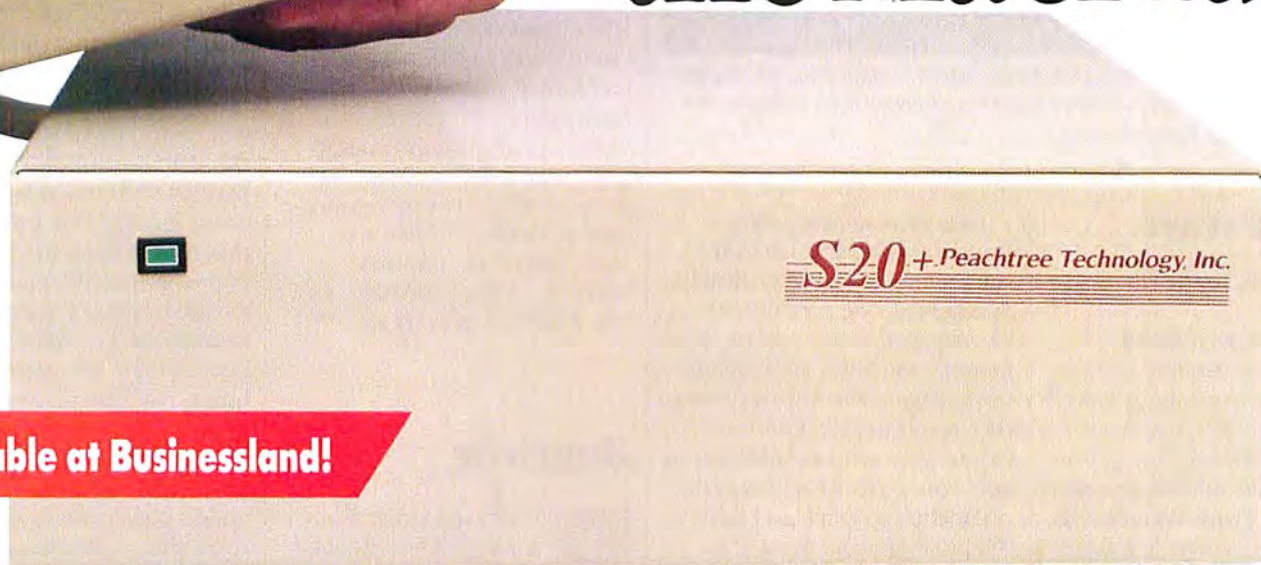
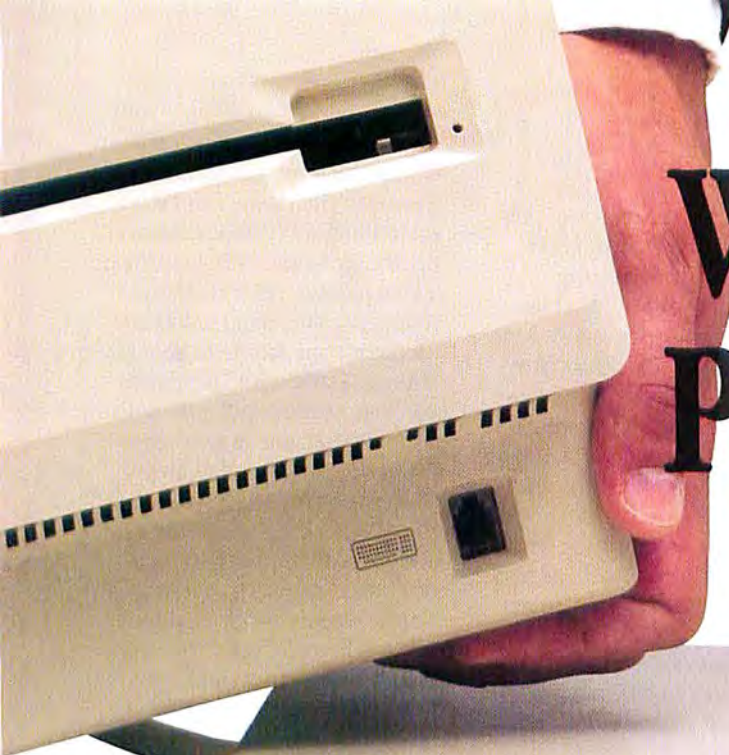
Ragtime provides a full range of text-editing capabilities, including superscripts, subscripts, justification, and expanded and condensed character spacing. The program provides leading in 1-point increments, but you cannot kern characters. You can import text from *Write* and *Microsoft Word* but not their formatting attributes. The spreadsheet program offers 55 standard functions. Although similar to Microsoft's *Multiplan*, *Ragtime* goes a step further by letting you extract and consolidate information from linked worksheets and mix text styles, sizes

(continues)



Ragtime brings a new twist to desktop publishing by integrating a spreadsheet that has 55 functions with text and graphics page-layout features.

Why did Apple Put the SCSI on the MacPlus?



Available at Businessland!

Introducing the New *S-20+* Hard Drive with SCSI interface!

Apple had the vision. By integrating the SCSI (small computer systems interface) on the back of the MacPlus personal computer, Apple engineers have provided the MacPlus user with the potential for fast, simple and expandable operations. **We took advantage of that vision.** Our S-20+ Hard Drive runs off the SCSI, not the floppy drive. This dynamic technological blend, offers you a communications vehicle which is:

FAST; Up to **ten times** the speed of the MacPlus floppy drive! Up to **six times** faster than other hard drives utilizing the floppy port! The SCSI-driven S-20+ provides rapid program loading and data transfer at 937,000 bytes per second. With the S-20+ and popular software such as Page Maker™, the MacPlus user can produce newsletters and other communications in no time.

EASY; Less than five minutes from box to operation! The S-20+ software allows the same simple operation of the icon as does the floppy drive for fast & easy file copying and manipulation.

MASS STORAGE CAPACITY; No manipulation of diskettes means increased efficiency and productivity! This 20 megabyte, formatted, external subsystem holds the equivalent of about 6,000 double-spaced pages or 25 floppy disks.

COMPACT; The MacPlus user can enjoy the benefits of the S-20+ without giving up valuable work space. Designed to complement the external styling of the Apple hardware, the S-20+ sits neatly under the MacPlus.

DAISY-CHAINABLE; The S-20+ comes with two SCSI interfaces which allow daisy-chaining of up to seven Peachtree Technology SCSI peripherals on the same bus.

Apple had the vision.

We took advantage of it.

For more information, call
Bill Daniel, Director of Sales,
at (404) 662-5158.



The New S-20+
(rear view)

Peachtree Technology, Inc.

3120 Crossing Park, Norcross, Georgia 30071, Telephone (404) 662-5158, Sales (404) 662-5556

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Circle 564 on reader service card

Ragtime (continued)

(up to 127-point), and fonts. With the spreadsheet and text-editing functions, you can develop single- or multiple-page forms that include cropped or scaled graphics. For more information, contact Orange Micro, 1400 N. Lakeview Ave., Anaheim, CA 92807, 714/779-2772. —Janet McCandless

Looking for LaserWriter Spoolers

By personal computer standards, LaserWriters are fast printers. Sharing one over an AppleTalk network, however, can turn into a high-tech version of the old sitcom gag in which a half-dozen kids and two harried parents vie for access to one bathroom.

At August's Macworld Expo in Boston, manufacturers introduced numerous versions of a product designed to reduce the wait. Called a *spooler*, this device intercepts PostScript code en route to the printer, stores it, and then returns control of the Mac to the user. The spooler then communicates with the printer at the printer's pace. Even on an AppleTalk network with numerous users, a spooler gives you the impression that the LaserWriter is yours alone.

Print spooling can be performed by either hardware or software. Software spoolers store incoming PostScript code on disk, then communicate with the LaserWriter in bursts while the Mac performs other tasks. A hardware spooler stashes PostScript code in its own memory and uses its own microprocessor to communicate with the printer.

Infosphere, Micah, General Computer, and Western Com-

puter have chosen the software route. Infosphere's *LaserServe* (\$125 per station) works on its own or with the Infosphere *MacServe* disk server software (see "Distributing the Network Load," *Macworld*, October 1986). Micah's *LaserSpool* comes with Micah hard disks in single- or multiuser versions, but will also be sold separately (\$149 and \$299, respectively) for use with any hard disk. General Computer and Western Computer are both supplying LaserWriter spoolers with their hard disks.

Developers of spooler software believe the Mac is fast enough to handle spooling while performing other tasks, but hardware manufacturers maintain that spooling software bogs down the Mac's performance. Dataspace's *LaserServer* comes with 2 megabytes of memory (expandable to 12), while Ergotron's *MacBuffer 1W* will house 1 or 2 megabytes of memory. Dataspace has ambitious plans for its unit, including an internal hard disk for holding downloadable PostScript fonts.

Whether to spool with hardware or software is more than just a philosophical question. Software spoolers do impose another task on an already hard-working microprocessor. Worse, they can have compatibility problems—initially, many of the new software spoolers do not work with Aldus's special LaserWriter prep file, Aldus Prep, leaving *PageMaker* users no choice but to wait their turn at the LaserWriter. Hardware spoolers have the edge in performance and compatibility, but their cavernous memories are cost-effective only for offices producing large volumes of graphically complex documents. Dataspace's *LaserServer* starts at \$2000; Ergotron's *MacBuffer 1W* at \$2295. —Jim Heid



This 17-inch, 1024-by-808-pixel display from E-Machines lets you display more than one page at a time.

The Big Picture

Joining the Radius Full Page Display and MegaScreen in the parade of large screens for the Mac is E-Machines' The Big Picture, a 17-inch diagonal monitor with 1024-by-808-pixel resolution. Retailing for \$1995, the monitor can simultaneously display more than one 8-by-10-inch page from programs such as *PageMaker* and *MacDraw*. The display controller, with 128K of video RAM, clips onto the Mac's 68000 microprocessor, and the video output cable extends out through the security cable slot. The monitor requires no software to run. When you connect it to the Mac, the screen image travels automatically to the large screen; disconnecting the large screen returns control to the Mac's screen. For more information, contact E-Machines, 7945 S.W. Mohawk St., Tualatin, OR 97062.

SCSI Decisions

Besides Apple, which has plans for its own SCSI hard disk, 18 manufacturers exhibited SCSI hard disk drives at the Mac-

world Expo in Boston. These included SuperMac's Data-Frame XP, a faster version of the 20- and 40-MB DataFrames, and Relax Technology's Hard 20 Plus, a low-cost drive that includes power-line filtering and surge suppression. Also available from Relax is the MacMate 20, an even lower-cost unit lacking power control features.

The FX/20, a 20-MB portable SCSI drive with a built-in carrying handle, was General Computer's entry. ProApp presented several products: the ProApp 10 and 20, both compatible with the Apple II and the Mac, and the ProApp 40S for the Mac Plus.

Five manufacturers displayed units that combine disk and tape drives in the same package. AST's AST-2000 includes a 20-MB hard disk and a 20-MB tape drive, while Micah's 60XT combines a 60-MB hard disk with a 50-MB tape, in addition to a 30-MB external drive. Mirror Technologies introduced the MagNet 40/40, a 40-MB hard disk and 40-MB tape, and LoDown offered the Combo 20/20 and 20/50. Western Computer entered the BigMack Twin Pack, a 20-MB disk and 20-MB

(continues)

UNLEASH THE COLOR IN YOUR MACINTOSH.



Color from your Macintosh? Yes, indeed.

The Macintosh is truly a remarkable machine, and now it's even more so. By attaching a Vermont Microsystems intelligent color monitor and using one of the new color graphics software programs, color will bloom from your Mac.

The color images are vivid and flicker-free. 256 colors can be displayed simultaneously from a palette of 4,096. Just connect either the VM-8860 13" monitor or the VM-8861 19" monitor to your Mac (512 or Plus versions), load the color graphics software and you've

turned your Mac into a real professional design workstation.

So, if you need to do business graphics, or are an artist who is tired of working in shades of gray, or you are a design engineer who loves the ease of using the Mac, a Vermont Microsystems intelligent monitor is what you need.

Believe what you see on this page. The image on the screen was produced using Visual Information, Inc. M.C.A.D. color graphics software and the VM-8861 intelligent color monitor. It was then transferred onto film using

the N.I.S.E. Rembrandt film recorder. The resultant photographic image was color separated for use in this ad. It is unretouched. To prove it we'll send you a copy of the slide. Just write to us requesting the Mac slide.

No more shades of gray for the Mac. Brilliant beyond belief, the Mac has become a true professional design station. So, get colorful with Vermont Microsystems and Apple.



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Circle 556 on reader service card

SCSI Decisions (continued)

tape drive, in the combined-disk-and-tape sweepstakes.

Several manufacturers expanded their offerings to include very-large-capacity drives. Peripheral Land's newly packaged series of drives range from 20- to 172-MB. Mirror Technologies spanned a 30- to 172-MB range with its MagNet series, and Rabbit Industries announced the Magic 20, 30, 65, and 200.

Veteran disk-drive manufacturer Personal Computer Peripherals introduced the MacBottom SCSI-21, and MDIdeas offered its HD-20. Newcomer Peachtree Technology unveiled its S-20+, and Trimar, its Generic-20. —David Ushijima

Getting the Draw on PostScript



Ever since Apple introduced the LaserWriter, PostScript enthusiasts have been tantalized by the promise of dazzling graphics and text effects. Up until now,

however, the full potential of the PostScript page-description language has lain dormant in the LaserWriter's powerful ROM routines. *Cricket Draw*, a new drawing program from Cricket Software (3508 Market St. #206, Philadelphia, PA 19104, 215/387-7955), promises to revitalize PostScript by letting users create such effects as single-degree text rotation, and color printing.

Like *MacDraw*, *Cricket Draw* is object oriented, but the Mac's screen resolution does not restrict the program's printed output. You can draw rectangles, polygons, ovals, radiating lines, bezier curves, arcs, diamonds, and freehand lines. You can also create text blocks similar to those produced with *MacWrite*, mixing fonts, styles, and tabs within blocks. One of the program's most remarkable capabilities places text along circles and other invisible paths.

Cricket Draw lets you treat objects and text with a number of effects: shadows, reflections, rotations, tilting, and gray-scale fountains. For further control, the PostScript code generated by drawing actions automatically appears in an editing window; you can customize the

code with a built-in editor and a number of utilities. You can save the PostScript code on disk or communicate the code via AppleTalk, serial port, or the SCSI port. —Adrian Mello

Lightspeed Pascal



Think Technologies, the creator of *LightspeedC*, has announced its latest offering, *Lightspeed Pascal*. The *Lightspeed Pascal* development system, based on the same engine that powers *LightspeedC*, combines the automatic formatting and debugging capabilities of Apple's Mac Pascal—originally developed by Think—with the compilation and link speed of *LightspeedC*. The \$125 list price includes three disks and a 608-page user guide and reference manual. Eric Gould, director of marketing for programming systems at Think, explains, "We see *Lightspeed Pascal* as the natural progression of Mac Pascal. We've retained all of the debugging features, while allowing programmers to produce double-clickable [stand-alone] applications."

Lightspeed Pascal lets programmers take advantage of all the Macintosh Toolbox and operating system trap calls, open multiple source files, create segments, and build libraries. This compiler is compatible with Lisa Pascal, Mac Pascal, and the American National Standards Institute Pascal standard. The editor automatically checks syntax, indents lines, and boldfaces reserved words.

Lightspeed Pascal shines when it comes to debugging. It is the first Macintosh Pascal compiler that lets programmers debug at the source code level. You can execute Pascal expressions immediately by typ-

ing them in the Instant window. Variables appear in the Observe window. And programmers can monitor running programs or step through them one line at a time. More advanced programmers can use *LightsBug*, a low-level debugger. Such outstanding debugging facilities combined with *Lightspeed Pascal*'s compilation speed promise to increase the productivity of any Pascal programmer. —Fred A. Huxham

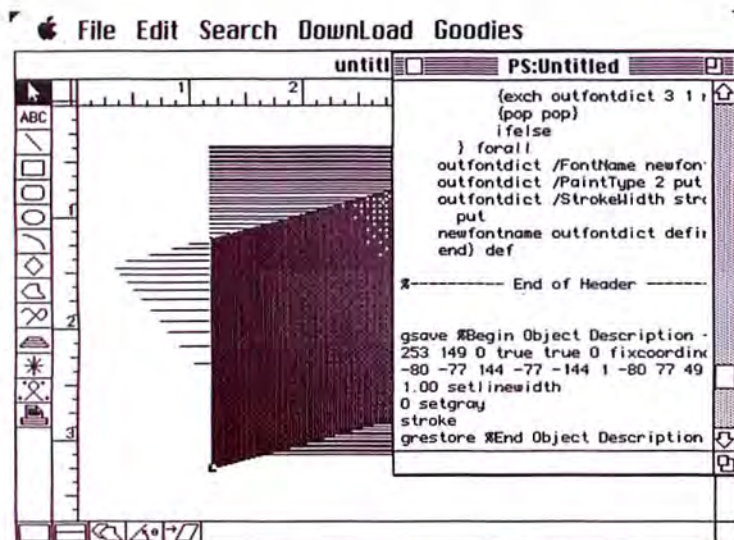
Hypertext for the Macintosh



OWL International has developed the first hypertext system for the Macintosh. Called *Guide*, it displays information hierarchically rather than linearly, similar to an outline processor. Buttons and other types of visual cues are embedded in *Guide* texts. Activating those elements opens the next level down in the hierarchical structure. The new information displayed on screen can also contain buttons that open windows on other levels of information.

Hypertext systems are ideal for setting up CD ROM databases of information. Clicking on a headline reveals the article; clicking on a particular name or word displays a pop-up window that adds another piece of information. *Guide* allows an infinite number of nested levels. The program is also a practical authoring system for information that lends itself to a hierarchical structure.

Guide also comes with a read-only version for installation as a desk accessory. *Guide* will cost \$99.95 through November 15; thereafter, \$134.95. For more information contact OWL International, Inc., 10900 N.E. Eighth St. #900, Bellevue, WA 98004, 206/451-2286.



Cricket Draw allows you to rotate text, display gray-scale fountains, and create other effects. The editor lets PostScript programmers modify the code before printing.



All-Out Downhill Action!

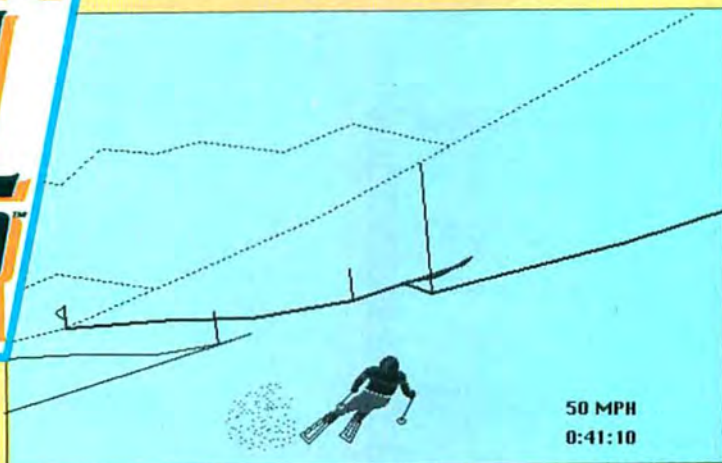
DOWN HILL RACER™

Braced against the grey chill of dawn stands the world's ultimate racer. Sleek, lean and tuned to a fine edge, you alone must challenge the mountain's awesome domain.

With speed as your ally and time as your enemy you'll attack every inch of twisted terrain and in the end...ski faster in less time than it

thrill and excitement of world-class competition. Choose from four of the toughest race courses in the world, pick your own

level of courage and pit raw nerves against the cold steel edge of international ski racing. While some people may be content just playing winter games on the mountain, *Downhill Racer™* lets you be KING of the mountain!



takes most people to breathe! *Downhill Racer™* puts you on the cutting edge of hi-tech racing, with all of the



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Circle 37 on reader service card

Cloak and Dagger



More than anywhere else in the federal government, the Macintosh is being used by intelligence agencies and the military. Although not many details are available, some analysts think the Mac penetrated the military and intelligence communities because they want to stay on the cutting edge of technology.

Intelligence agencies that use the Mac—such as the Defense Intelligence Agency, the Institute for Defense Analysis, the National Security Council, and the National Security Agency—use as many as 50 to 200 Macs and 25 LaserWriters for compiling and analyzing information but typically refuse interviews, even about the Mac. They're even more sensitive about the so-called Tempest Mac, which, for security reasons, has been shielded with lead and given a modified board design and

terface, its format consistency among software packages, its superior typefaces and reproduction quality, and the ease with which new users can be trained.

Another reason for the Mac's popularity among intelligence agencies may be these departments' exemption from the procurement procedures that other federal agencies must follow. It's difficult to procure the Mac through normal federal purchasing channels, which many claim favor the DOS standard.

Going through these channels, requests for expensive printing products, such as the LaserWriter, must be approved by the Government Printing Office Joint Committee on Printing unless the device is termed a "high-quality computer printer." "[Federal] regulations haven't kept up with the new developments in inexpensive technology," says Gordon Stubbs of the Public Health Service, chairman of Washington Apple Pi's FedSig user group.

Partly due to this oversight, the Mac has yet to penetrate the federal government to anywhere near the same degree as MS-DOS units have. This may explain why Apple Computer is moving its government marketing office to the Virginia suburbs to augment its main distributor of Apple products to government agencies.

While the Mac must still overcome imbalances favoring the MS-DOS environment, it can only be a matter of time before use of the Mac within the federal government becomes widespread. Stories already abound about high-level officials pushing for Mac purchases by their departments or even carting in Macs from home. But whether covertly or through regular channels, the Mac is steadily infiltrating the federal government.—Stuart Silverstone



The Mac has found favor among intelligence-gathering agencies.

power supply to suppress electronic emanations that allow eavesdroppers to capture text and data files.

Off the record, Mac-enthusiast "spooks" admit a preference for the Mac system because of its flexibility, its easy-to-use in-

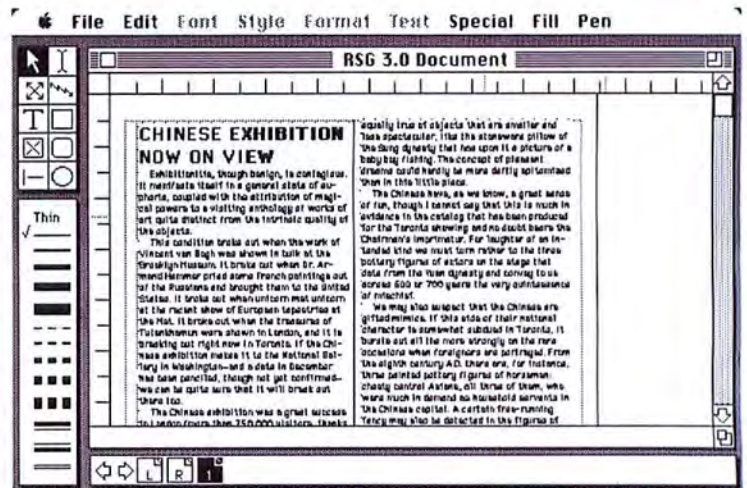
The Version-Number Game



According to sources at Apple, 40 to 50 percent of Macintosh owners are using an early version of the System, 1.1g, on their 512K or 128K Macintoshes. Many software packages are still shipped with that version. Other Mac owners receive official upgrades from their Apple dealers (the current versions are System 3.2 and Finder 5.3). And a multitude of Mac enthusiasts are constantly on the lookout for the latest versions of the Mac system software. This can be dangerous because many of

test version number.

The first number changes when major new features are added. The second number represents incremental additions and bug fixes. The letter is either *d* for developmental, *a* for alpha-test version, or *b* for beta-test version. The last number is the release number of the developmental, alpha, or beta version. When software has finished its testing cycle and the code is frozen, the last two digits are dropped, as with System 3.2. To find out what version you have, check the Get Info window on the System and the About the Finder box (from the Apple menu). Stick with the two-digit versions to play it safe.



ReadySetGo 3.0 offers such new features as real-time hyphenation, manual kerning, and full text editing.

the "current" versions of system software available through user groups and the Mac underground are unofficial and may prove incompatible with application programs or result in lost data.

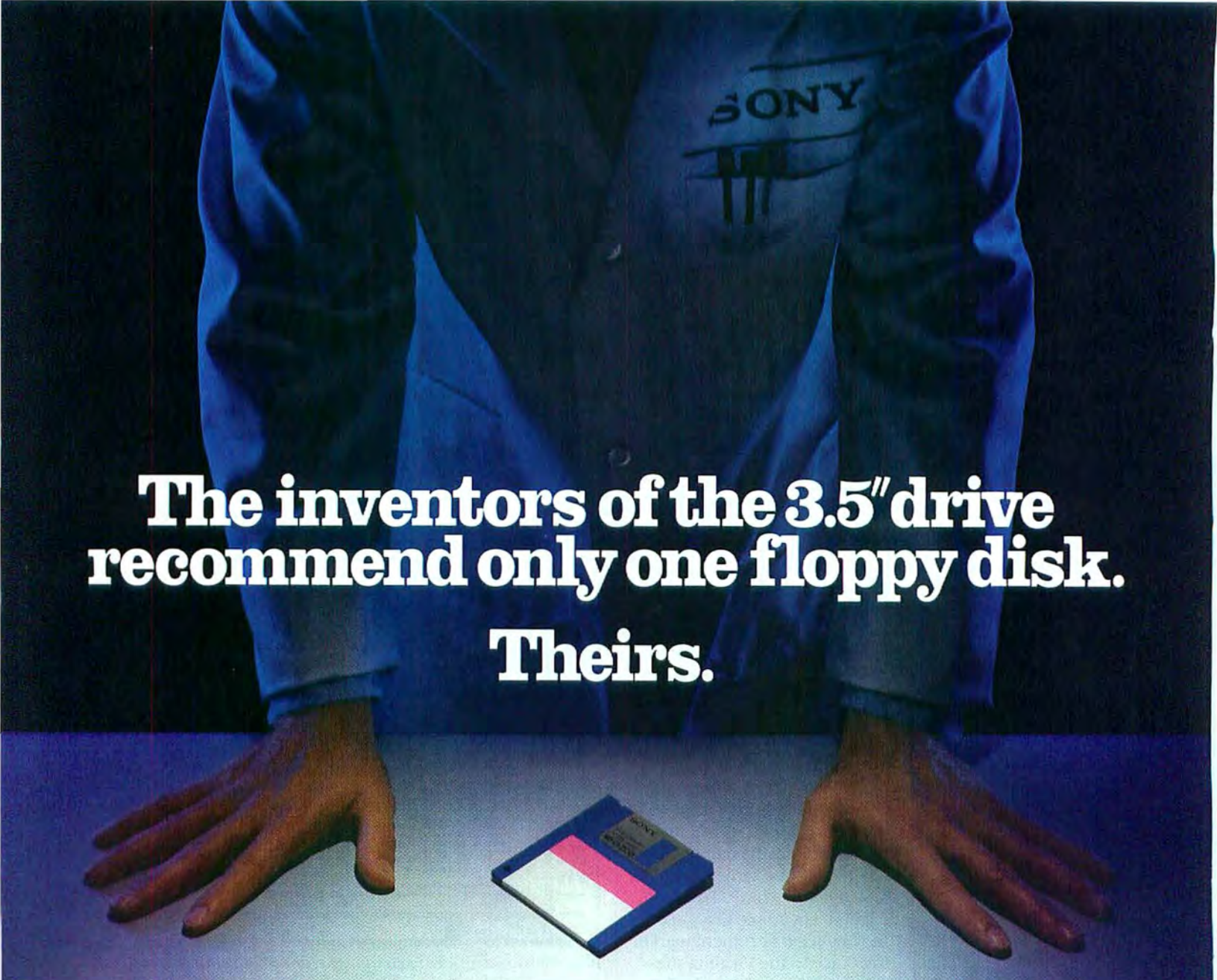
Knowing how to interpret Apple's version-number scheme will help you better understand the status—and volatility—of a particular version. Since December 1985, Apple has used a four-character code, (for example, System 3.2b3) for pre-release software. The first two numbers represent the ultimate version number, and the letter and third number indicate the

The New ReadySetGo



Manhattan Graphics' *ReadySetGo* has undergone a major revision that combines desktop publishing and word processing in one product. You'll find a glossary; a built-in 60,000-word spell-checker; search-and-replace, multilevel Undo, and tab functions; plus the standard cut-and-paste editing options. You can open several docu-

(continues)



The inventors of the 3.5" drive recommend only one floppy disk. Theirs.

If your computer has 3.5" drives, it has a little bit of Sony. Because Sony invented the 3.5" drive technology that has taken floppy disk memory all the way to two megabytes.

So nobody knows better than Sony how important high standards are for producing 3.5" floppy disks. But then, Sony invented those, too, as well as the most demanding methods for making 3.5" disks.

Such as the Sony Vivax™ magnetic medium, with the high coercive force necessary to suppress the "noise" that can cause disk error. And the Sony DDL™ binder system for incredibly even dispersion of magnetic particles on the disk surface. Then there's Sony's burnishing expertise that eliminates microscopic projections as small as 1/1,000,000th of a millimeter.

But the best reason to trust only Sony is your irreplaceable data. After all, you'll be storing six times the information on a disk that's one-third smaller than a 5.25" floppy. That's why we recommend only one floppy disk for our 3.5" drives. The Sony.

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Circle 255 on reader service card

The New ReadySetGo (continued)

ments at once, reflow text and graphics automatically throughout a document, and read in *MacPaint*, *MacWrite*, and *Microsoft Word* directly. In addition, the \$295 program offers real-time hyphenation and manual kerning, lets you include PostScript-formatted material, has a 2001-page capacity, and supports batch page creation with global, local, or no-text block-linkage options. For more information, contact Manhattan Graphics, 401 Columbus Ave., Valhalla, NY 10595.

Speaking Typesetting's Language

 In 1977, Stanford University professor Donald Knuth decided to spend a year developing a programming language for typesetting to produce *The Art of Programming*, his series of equation-riddled volumes regarded as the bible of computer science. Eight years later, TEX (pronounced "tech") was completed. Today, this program runs on mainframes and minicomputers in over 600 universities, aerospace corporations, government agencies, and commercial publishers.

Now, Toronto-based FTL Systems brings TEX to the Macintosh Plus as well. Scheduled for distribution later this year, *MacTEX* is designed for demanding publishing applications that make what-you-see-is-what-you-get (WYSIWYG) products like *PageMaker* head for the hills.

With code-oriented publishing programs like *MacTEX*, you get more precise control over printed output than with WYSIWYG products. Rather than laying out a page by dragging text and graphics around

the screen, you specify a document's characteristics by embedding commands in the text. *MacTEX* also provides features that users of most WYSIWYG products can only dream of—automatic kerning and hyphenation, support for ligatures, creation of publications with no length or column limitations, automatic table of contents and index generation, and direct support of all 248 PostScript commands for adding special type effects or rotating and scaling graphics. A full-screen "preview" feature shows you what the final product will look like.

With more than 1100 commands to learn and a price tag of \$750, *MacTEX* isn't about to replace *PageMaker*, *LetraPage*, or *ReadySetGo*. But for large publications or those containing mathematical equations and other typesetter's nightmares, *MacTEX* promises to turn the Mac into a typesetting system with power that only a few dedicated systems can match. For more information, contact FTL Systems, Inc., 234 Eglinton Ave. E #205, Toronto, Ontario M4P 1K5 Canada, 416/487-2142. —Jim Heid

Of Bulls and Bears

 Over the course of the year, the stock market has charted record volume. It's no surprise then that investors have also shown record interest in stock market programs. One new program, *Market Pro*, a \$395 package from Pro Plus Software, combines three major components for playing the market—portfolio management, technical analysis, and fundamental analysis.

The portfolio manager records your transactions and portfolio activities as well as



TED RUSSELL

Market Pro combines stock market portfolio management, technical analysis, and fundamental analysis in one package; it also has a module for downloading stock information.

calculating rates of return, analyzing cash flow, and projecting income based on possible portfolio changes. Technical analysis creates graphs that let you evaluate changing market trends. Fundamental analysis lets you examine financial information—earnings, sales, assets, debts—that determines the company's profitability and performance. Fundamental analysis also helps you find stocks that satisfy your portfolio requirements by searching an on-line database for publicly owned stocks that meet specific financial parameters.

Market Pro has built-in communications for automatically logging on to and downloading information from the I. P. Sharp and Dow Jones News/Retrieval services. Pro Plus plans to complement the program with an individual module for commodity analysis. For more information contact Pro Plus Software, Inc., 2830 E. Brown Rd. #C-12, Mesa, AZ 85203, 800/992-2919, 602/830-8835 in Arizona. —Adrian Mello

HabaWord

 Haba Systems has introduced *HabaWord*, one of the new generation of Macintosh word processors. *HabaWord* handles up to three columns of text, allows several documents to be open at once, and divides windows into four sections so you can view different parts of a document simultaneously. The program lets you see the layout of up to four pages at once in a reduced view and includes mail merge and a glossary for abbreviating commonly used words and phrases. You can import *Microsoft Word*, *MacWrite*, *MacPaint*, *SuperPaint*, and *MacDraw* documents directly into *HabaWord* documents. Haba normally prices the program at \$199.95 but is offering it at \$69.95 for a limited time to people who provide proof of ownership of either *Microsoft Word* or *MacWrite*. For more information contact Haba Systems, Inc., 6711 Valjean Ave., Van Nuys, CA 91406, 800/408-4222, 800/467-4222 in California. □

Mac marvels,

SOFTWARE

Affinity Microsystems

Tempo (power user's macro utility) \$59.

Altsys

Fontastic (create your own fonts) 27.

Ann Arbor

FullPaint (open four documents at once) 55.

Arrays

Home Accountant (req. external drive) 52.

ATI

Teach Yourself Multiplan 39.

Jazz or Excel Training 39.

Batteries Included

The Mac BatteryPak (9 desk accessories) 27.

Home Pak (telecommunications, filer) 29.

Time Link (time management system) 29.

Borland International

Sidekick w/Phonelink 59.

Reflex (information management analysis) 59.

BPI Systems

General Accounting (full-featured) 239.

BrainPower

Think Fast (improves recall) 23.

Chipwits (educational, robot simulation) 26.

StatView (statistics package) 52.

Designscope (electronic circuit design) 129.

StatView 512+ (req. external drive, 512k) 179.

Broderbund

Print Shop (create cards and memos) 49.

Geometry (over 350 problems!) 69.

CAMDE

Nutricalc (diet & nutrition analysis) 49.

Casady Company

Fluent Fonts (two-disk set) 29.

Fluent Laser Fonts each 49.

Central Point Software

Copy II Mac (includes MacTools) 20.

Challenger Software

Mac3D (3D graphics, CAD features) 115.

Chang Labs

Rags to Riches Ledger 105.

Rags to Riches Receivables (req. 512k) 105.

Rags to Riches Payables (req. 512k) 105.

Rags to Riches Three Pak 259.

Inventory Control 229.

Professional Billing 229.

Cortland

TopDesk (7 new desk accessories) 35.

Creighton Development

MacSpell+ (spell checker, req. 512k) 55.

Cricket Software

Statworks (statistical package) 79.

Cricket Graph (multiple windows) 129.

DataViz

MacLink (transfer Mac/IBM data) 89.

Desktop Graphics

DrawArt (MacDraw artwork, req. 512k) 29.

DrawForms (requires MacDraw) 30.

Digital, etc.

Turbo Mac accountant (w/video tape) 299.

Dow Jones

Straight Talk (access News/Retrieval) 59.

Spreadsheet Link 62.

Market Manager PLUS 125.

Dreams of the Phoenix

Day Keeper Calendar 27.

Phoenix 3D (3D graphics) 27.

Quick & Dirty Utilities Vol. 1 or Vol. 2 27.

Twelve-C Financial Desk Accessory 27.

Dubl-Click Software

World-Class Fonts! Vol. One \$29.

World-Class Fonts! Vol. Two 29.

Calculator Construction Set 39.

EDO Communications

Laserworks (requires 512k, Laserwriter) 229.

Electronic Arts

Financial Cookbook (financial formulas) 32.

Deluxe Music Construction Set 32.

Enabling Technologies

Easy3D (create solid 3D objects) special

Enterset

Quickpaint (find MacPaint files fast) 27.

Quickset (icon-driven desk accessories) 27.

Quickword (word processing tool) 32.

MacGAS (spell checker, 512k, ext. drive) 55.

1st Byte

First Shapes (preschool learning tool) 32.

Speller Bee (spelling-learning tool) 42.

KidTalk (reading-writing instruction) 42.

MathTalk (elementary math problems) 42.

Smoothtalker (speech synthesis) 52.

Forethought

Factfinder (free-form info organizer) 79.

FileMaker (custom forms & reports) 99.

FileMaker Plus (feature-packed database) 179.

Fortnum/Southern

Macnooga Choo-Choo (train set, 512k) 21.

MacChemistry 89.

FWB Software

Hard Disk Backup (protect hard disk info) 39.

Hard Disk Partition (speeds up hard disk) 39.

Hard Disk Util (program backup) 57.

Great Wave Software

KidsTime (educational, ages 3-8) 29.

ConcertWare+ (music composition) 39.

Classical Selections 12.

Early Music 12.

Hayden Software

I Know It's Here Somewhere (filer) 20.

Hayden:Speller (for Word & MacWrite) 27.

MusicWorks (songs for your Mac) 46.

DaVinci Building Blocks (req. MacPaint) 46.

Home Design (home planning tool) 49.

Score Improvement System for the SAT 58.

VideoWorks & MusicWorks Bundle 58.

DaVinci Commercial Interiors 114.

Ideaform

MacLabeler (print disk labels) 29.

Industrial Computations

Powermath (equation solving tool) 52.

Infosphere

MacServe (network software) call

Innovative Data Design

Paste-Ease (requires MacPaint) 35.

MacDraft (new updated version, 512k) 139.

Kensington

Graphic Accents (req. MacPaint) 29.

Type Fonts for Text (16 new fonts) 29.

Type Fonts for Headlines (req. 512k) 42.

Layered

Notes...For Excel (tips & templates) 42.

Notes...For Jazz (on-line help DA) 42.

Front Desk (scheduling & organizer) 77.

Legisoft/Nolo Press

WillWriter 2.0 (prepare your own will) 27.

Linguist's Software

Tech (1000 different symbols) 59.

FOREIGN LANGUAGE FONTS

MacCyrillic 39.

SuperFrench/German/Spanish \$39.

MacHieroglyphics, MacKana/Basic Kanji,

MacSemitic/Coptic/Devanagari, MacKorean,

MacArabic, MacGreek, MacHebrew each 59.

LaserGreek 79.

MacGreek/Hebrew/Phonetics 89.

Living Videotext

ThinkTank 512k (outline processor) 99.

More (outlines, windows, & tree charts) 179.

MacroMind

M.U.D. (Art Grabber+, CheapPaint) 29.

Magnum

Natural Sound Effects 27.

Natural Sound Cable & Editor Disk 89.

McPic - Volume 1 (req. MacPaint) 28.

McPic - Volume 2 (req. MacPaint) 28.

The Slide Show Magician 1.3 34.

Manhattan Graphics

Desk Design (2 volume set) 37.

ReadySetGo (page processor, 512k) 99.

Microsoft

Flight Simulator (the Mac takes flight) 32.

Learning Multiplan and Chart (2 disks) 39.

Chart 1.0 (42 chart styles) 72.

Logo 1.0 (windows, Turtle graphics) 75.

Basic 2.1 (Basic language interpreter) 89.

Multiplan 1.1 (63 columns by 255 rows) 105.

File 1.04 (flexible data manager) 111.

Word 1.05 (word processor, mail merge) 111.

Multiplan to Excel Upgrade 150.

Fortran 2.1 (compiler) 169.

Excel 1.0 (power spreadsheet) 225.

Miles Computing

Mac the Ripper (2 disks, req. MacPaint) 27.

Mindscape

The Luchser Profile (personality profile) 24.

The Perfect Score: SAT 47.

ComicWorks (create your own comics) 49.

Monogram

Forecast (tax planning) 41.

Dollars & Sense (home, small business) 81.

Nevins Microsystems

Turbocharger (disk cache, req. 512k) 39.

New Canaan MicroCode

Mac Disk Catalog II (requires 512k) 32.

Odesta

Helix (req. 512k, external drive) 105.

Double Helix (relational, custom menus) 279.

Palantir

MacType (supports Dvorak keyboard) 26.

MathFlash (math flash card drills) 26.

WordPlay (crossword puzzles) 26.

Inventory Control (cost, sales & GP) 69.

inTalk (communication to emulation) 79.

PBI Software

Icon Switcher (customized icons) 14.

Icon Fun & Games Library (req. MacPaint) 14.

Icon Business Library (req. MacPaint) 14.

HFS Locator (DA organizer for HFS) 27.

Hard Disk Backup (supports MFS, HFS) 29.

Peachtree

Back to Basics GL, AP, or AR each 89.

Polarware

Graphics Magician (animation) 39.

ProVUE Development

OverVUE 2.0 (power-packed database) 149.

Mail Manager Template 29.

Personal Finance Template 29.

QED Information Sciences

Typing Made Easy (instruction) 36.

We'd like to think you're even stranger.

A walk on the weird side.

Back in prehistoric Mac times (early 1985) we held a contest to unearth strange-but-true Mac stories. Winners received \$500 worth of Mac add-ons and software, and became stars of a series of MacConnection advertisements.

The response was overwhelming. Our customers were using their Macs to run detective agencies, back up heavy metal bands, even to help explore the frozen tundra for remains of old expeditions.

The odd get even.

Well, it's time to find out what new heights of eccentricity you've achieved. Has your Mac saved your life during a terrorist attack? Have you used a Mac to predict how many times per episode of Miami Vice Don Johnson will say the word "pal"? Have you used a Mac to create a mutant life form that will save the planet from radioactive fallout?



We're looking for adventure, romance, mystery, the occult. Mac applications that are so fascinating, far-fetched, or far-out that your fellow Mac fanatics will froth at the follicles, and feel all fuzzy around their foreheads. Oh yes.

We're talking serious strangeness here.

Send along any relevant snapshots, drawings, and/or newspaper clippings with your entry. Don't forget to enclose your name, address and phone number. And keep a copy for yourself—everything you send us becomes the property of MacConnection.

What do I win?

\$500 worth of free add-ons and software and instant fame! All entries must be received by December 31, 1986.

The totally subjective decision of our judges is final. Good luck! And remember, whether you win or not, we at MacConnection are always here to fulfill your wildest Mac dreams.

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The Graphic Mac

by Jerry Borrell

The open-architecture Mac that Apple plans to unveil next spring will support color and improved black-and-white graphics capabilities. But how far will Apple and third-party vendors go to improve the Mac's graphics? While there is a need in business applications for the 16-color computer graphics common to the IBM PC and its compatibles, the time to introduce a new machine with such limited capability has passed. Any new Macintosh should be able to support color or black-and-white displays that rival photographic quality.

During the past year several developers have provided introductory color solutions for the Mac. In the graphic arts arena, Computer Friends and Dunn Instruments have introduced two-dimensional color paint programs, *ColorPaint* and *Dunn Color*, respectively. Both products communicate with a graphics subsystem external to the Mac to drive color displays. In the field of computer-aided design (CAD), Bridgeport's *EZ-Draft* and Visual Data Enterprises' *Dimension* add color by communicating with Vermont Micro-

systems' (VMI) color monitor, which incorporates a graphics subsystem.

The application areas targeted by these developers—CAD and graphic arts—are among the most rapidly growing markets. As the Macintosh adds more sophisticated members, however, its continued success in these areas will depend upon stronger graphics performance.

Providing better graphics on an open-architecture Mac will not be easy, as the computer must support a variety of display devices and applications remaining compatible with existing Macintosh software and hardware. A look at current technology shed some light on the issues facing developers of graphics.

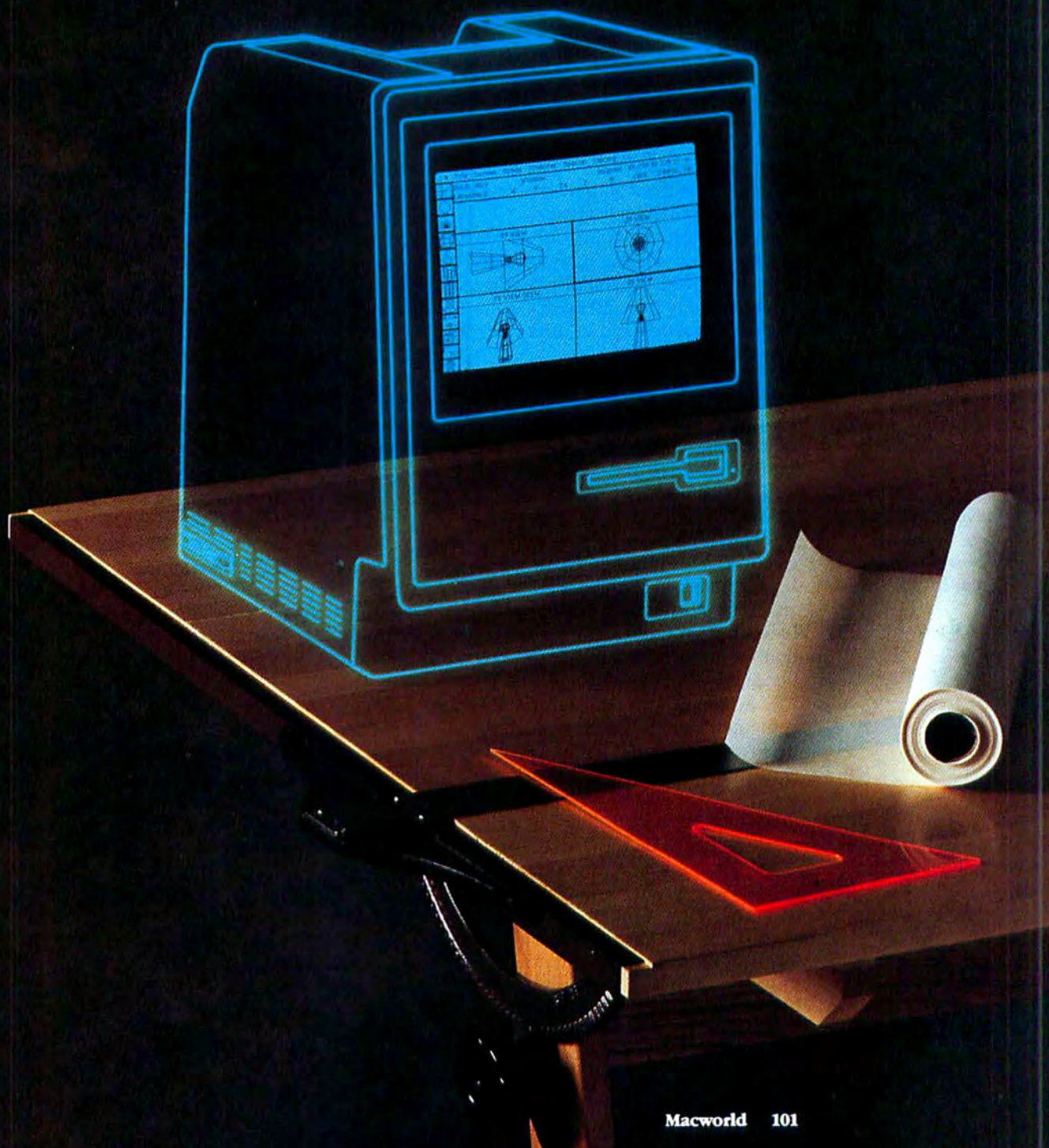
The Background Picture

Developers of graphics programs take advantage of QuickDraw, the library of relatively powerful graphics operations contained in the Mac's ROM. QuickDraw contains basic graphics primitives such as circles, and squares. In addition, QuickDraw incorporates higher-level functions that handle operations such as moving a block of pixels. Together with portions of the Mac's operating system (the tool kit, the window manager, and so on), QuickDraw gives the Mac a much richer graphics development environment than that of other personal computers. A similar environment was not developed for the IBM PC until years after its announcement.

The Mac has two other advantages in computer graphics. First, it supports a relatively high resolution of 340 by 512 picture elements, or *pixels*. The small screen and white phosphor enhance the perceived quality of this display. The addition of color



*State-of-the-art
graphic products
foreshadow a
bright future for
the Macintosh*



tensions to the QuickDraw library provides another advantage. While these extensions are minimal, they allow developers to implement color more easily.

Offsetting these advantages, Apple made several trade-offs in its approach to graphics. Most significantly, the Macintosh's central processing unit (CPU) handles all graphics operations. These include the desktop functions associated with the Macintosh interface (such as the *raster* operations), as well as the floating-point calculations required for software graphics operations.

Compared to the IBM PC's 8086 processor, the Macintosh's 68000 is an effective processor of graphics data. Because it handles so many operations simultaneously, however, the Mac's CPU is a potential performance bottleneck—particularly since computer graphics require such large amounts of data.

To surmount this limitation, developers with their eyes on the possibilities created by the new open Mac will likely introduce three types of add-on products: secondary processors suited to graphics operations and memory manipulation (see "Graphics Gold"), floating-point or other processors to assist in the math operations needed for 3-D and interactive graphics, and products that combine both approaches for advanced graphics applications.

The key to a graphics future for the Mac, however, is support for so-called gray-scale and color graphics. Only with these capabilities can the Mac maintain a picture quality that will keep it viable for applications in design, science, and the arts.



Paint Palette

Options on the main palette of Computer Friends' ColorPaint allow the user to vary each pixel's hue (primary color), value (the mixture of primary and secondary colors), and chroma (the intensity or gray level of the color).

Understanding Gray Scale

Both black-and-white photography and television are gray-scale technologies, which means they represent pictures with different shades of gray. In contrast, the Mac currently produces only "simulated" gray.

In television, a broadcast analog signal is transmitted as a radio frequency wave and received by the TV set. The amplified broadcast signal directs the flow of electrons from the TV's electron gun onto an electron-sensitive surface of phosphors on the glass screen. The amount of current directed to the electron gun varies for each pixel, creating different levels of illumination—or levels of gray. Theoretically, an infinite number of grays can be achieved.

Achieving gray scale is more complex on a digital computer display than on a television screen. To effectively re-create photographic-quality images on black-and-white computer monitors, the computer must be able to display at least 256 shades of gray. This means that it must be able to store 256 binary values for every picture element on the display screen. Multiple values of memory for a pixel are stored in bit maps, or *bit planes* (see "Bit Planes Explained"). The bit map is just that, a mapping of the binary values assigned to every pixel, organized into Cartesian coordinates (*x* and *y*) for the rows and columns of pixels. The Macintosh, for example, has a single bit plane that may represent either 1 or 0 in binary values for each pixel. In other words, the Mac's pixels may be either on or off—no

gray scale is involved. To represent 256 different digital values, then, a computer must support 8 individual bit planes (2 to the 8 th power equals 256).

When the Mac was designed, the memory needed for multiple bit-plane storage was prohibitively expensive. Instead, Apple's hardware and software engineers applied a technique, common in computer graphics, called *dithering*. Dithering is similar to making halftones, which printers use to reproduce photographs on paper. Halftone images are composed of black dots of varying densities and sizes. In a similar way, the Mac combines black and white pixels to create patterns that approximate gray scale.

Today, semiconductor memory is relatively cheap. Moreover, demand for photographic-quality computer displays is on the rise—in business, the graphic arts, design, publishing, and for medical uses such as radiography. Sun Microsystems' 3/160 GS workstation has eight bit planes of memory and a resolution of 1152 by 900 pixels. The images it produces can be quite dramatic (see "The Shades of Things to Come").

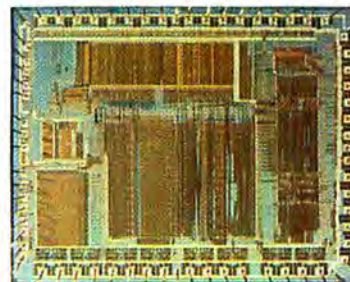
Color Me Confused

Color graphics present additional complexities; approximating color photography on a computer display requires at least twice as many memory planes as does black and white, and a more expensive display device—an RGB monitor. Most color graphics systems fall into one of two categories: those with 8 or fewer memory planes and those with 16, 24, or 32 memory planes. The two types differ in their cost and in suitable applications.

Four-plane systems, for example, support only 16 colors and are suitable for business and CAD applications, especially drafting. Eight-plane systems yield 256 colors—the minimum configuration for professional applications requiring more sophisticated rendering. Graphics systems with 16 or more memory planes, on the other hand, are used for such demanding image-processing applications as the manipulation of satellite photographs.

In some cases, the distinction between 8- and 16-bit-plane applications is somewhat tenuous, since sophisticated rendering techniques such as "ray casting" have been applied to systems with only eight planes.

(continues)

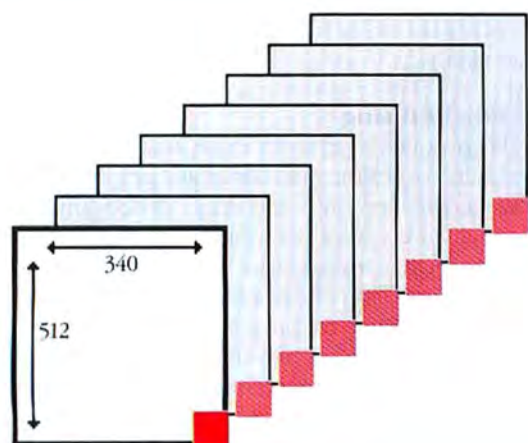


Graphics Gold

The 34010 from Texas Instruments is one of several in a new generation of microprocessors specially designed to handle graphics operations. It will be among those supplied on peripheral boards for the open bus of the new Mac.

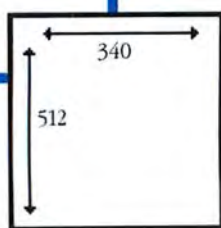
Bit Planes Explained

Producing true gray shades and color for future Macs will require additional planes of memory organized into "conceptual," or logical, bit maps that correspond to pixels of a display screen.



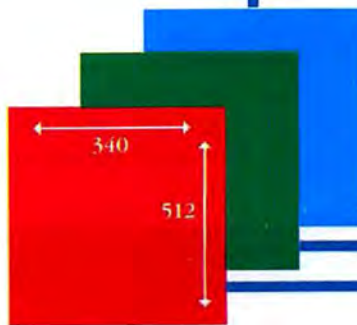
The systems discussed in this article have eight bit planes. Each pixel can, by permutation, have up to 256 different values, the minimum needed for photographic-quality display.

The Mac's display consists of rows and columns of picture elements, or pixels, 340 horizontal and 512 vertical. Digital values that correspond to the on or off state for each pixel are stored in RAM. This storage is often called a bit map or a bit plane. Because the Mac has only one bit plane, the screen can display only two shades—black and white. The Mac simulates gray scale by means of *dithering*, a process of combining groups of pixels into patterns.



High-performance graphics systems have additional RAM memory, called lookup tables, where the values of each picture element are stored before display. Sun's gray-scale workstation has a single-plane lookup table, while color systems often have separate planes for red, green, and blue values.

Digital-to-analog converters translate the digital values of lookup tables to analog signals that direct the power sent to electron guns.



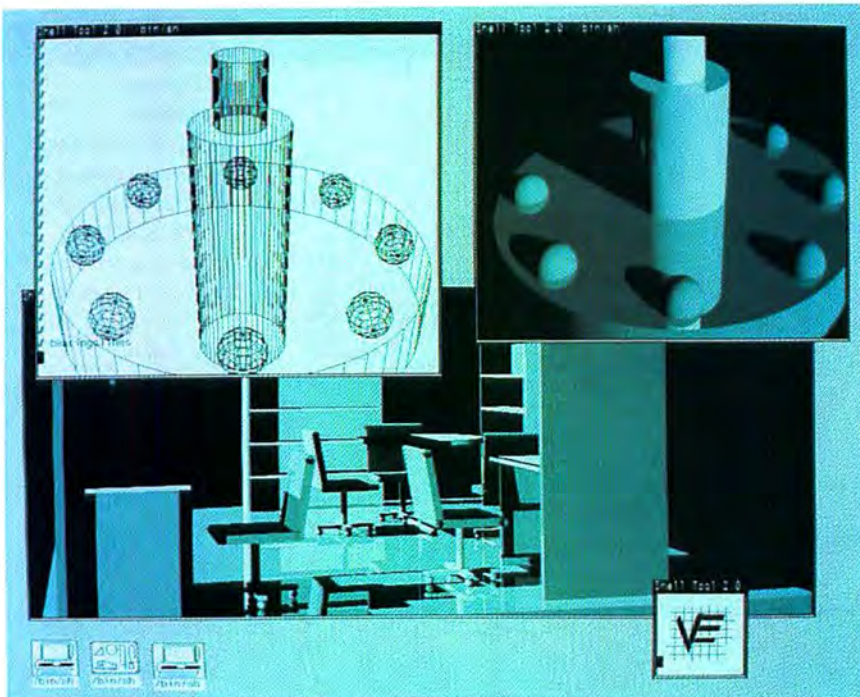
The separate electron guns of the color, or RGB, monitor are driven by the red, green, and blue signals from the color lookup tables.



The electron gun creates shades of gray by varying the amount of power directed to the screen.

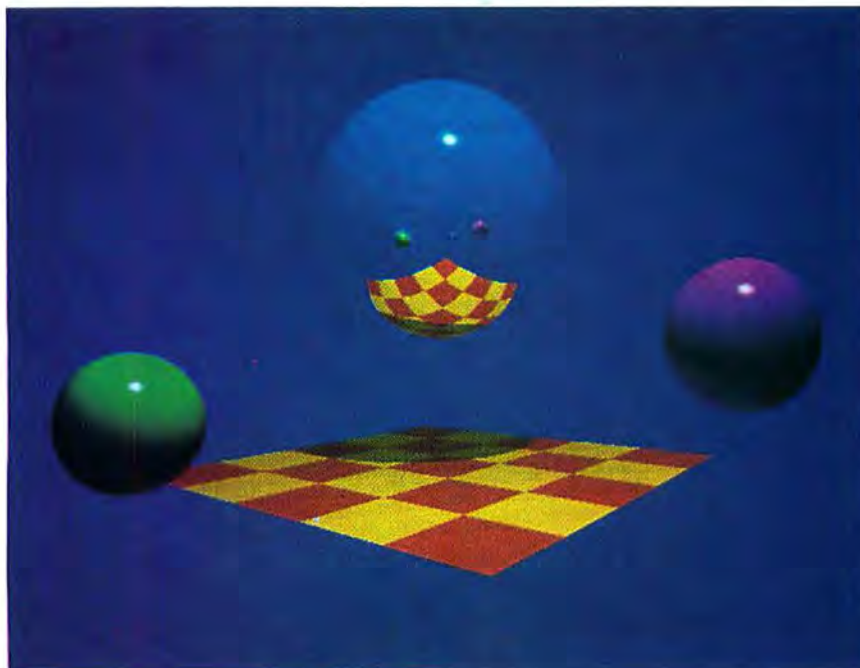


Each color in the triads of red, green, and blue phosphor receives varying amounts of illumination, creating different combinations of color on the monitor screen.



The Shades of Things to Come

The Sun Microsystems 3/160 GS has eight planes of memory allowing 256 shades of gray and nearly photographic quality displays. Gray scale is demanded in applications such as electronic publishing, medicine, photography, and design.



New Dimensions

This ray-cast image was generated with the Dimension software from VDE. It is one of the first Mac-produced images comparable to those generated with minicomputers. The program transmits data to a Vermont Microsystems RGB monitor, which can display 256 images at once out of a color palette of 16 million colors.

Dunn Color and *ColorPaint*, for example, both support eight planes, which is adequate for computer graphics techniques such as two-dimensional painting. However, more advanced rendering techniques suffer, producing the color banding illustrated in "New Dimensions."

Pixel Editing

Techniques used to produce images may be divided into two categories: computer graphics—also known as pixel editing—and image processing. Pixel editing includes color painting, geometry input, and bit block moves. Image processing involves changes of contrast, correction of distortions, application of filters to an image, and image presentation operations such as rotation and perspective changes.

Of the pixel-editing techniques, color painting is the most common. Professional-quality paint software allows you to control three aspects of color for every pixel: *hue* (selection of a primary color), *value* (the mixture of hues to form tertiary colors), and *chroma* (the brightness or grayness of a color) (see "Paint Palette" on page 102). Unlike image processing, in which mathematical formulas are applied to pixels with similar binary values, painting requires a close interaction between designer and display (see "Colorful Brushwork").

Paint software allows for geometry input (circle, arc, polygon). However, geometry manipulation (scaling or moving of primitives) presents special problems, requiring the program to recognize geometric primitives organized into the bit map's rows and columns. A circle in *MacPaint*, for example, cannot be re-scaled once it has been drawn, since the program treats it merely as a collection of pixels. While geometry manipulation is common on minicomputer-based CAD systems, to date only *SuperPaint*, from Silicon Beach, offers this capability on the Macintosh.

Image Processing on the Mac?

Image processing refers to the enhancement, analysis, and manipulation of pictorial data. Typical applications are found in medicine, the military, and industry. The Sun workstation mentioned earlier, for example, is used by radiologists to enhance portions of X-ray images that are difficult to distinguish. The ThunderScan, an image digitizer for the Macintosh, has limited image-processing capability, allowing the user to manipulate contrast and other aspects of a digitized black-and-white image.

Desktop publishing will be one of the major beneficiaries of image processing on the Mac. As 8-bit-plane, gray-scale graphics subsystems become available on the open Mac, type fonts will improve dramatically. Now, type is only displayed as a representation, even in the WYSIWYG systems. Gray-scale techniques can be applied to pixels along the edges of fonts to blur the edges, making type features such as serifs appear more crisp.



A Graphic Comparison

The 24-bit image on the left was created using Numerical Design's Rendition software. It took 90 minutes to generate on an IBM PC AT and contains over 8000 colors. The image on the right was produced with only eight bit planes. The banding you see demonstrates the effect of limiting the color palette to 256 colors.

The Shift to Image Synthesis

As computer graphics have become more complex, the distinction has narrowed between a photographic image and an image created by an artist or a designer. This area, in which computer graphics and image processing overlap, is known as image synthesis. A variety of image processing and computer graphics techniques are used in image synthesis.

The most conspicuous overlap is in rendering images—through shading or other approaches such as fractals, ray casting, and texture maps. Two of these rendering techniques are available on the Mac today. The first, shading, is used to fill geometric shapes with a color. Designers apply shading to individual objects within a scene. In "flat" shading, common on the IBM PC, a geometric shape is filled with a single color. In "smooth" shading, color is interpolated across two or more points of an object. This interpolation, or calculation, is made relative to a mathematically defined light source and results in a shift of color intensity from light to dark. If you apply smooth shading to a circle, for instance, it takes on the three-dimensional appearance of a sphere.

In ray casting, the second technique currently available on the Mac, the graphics program calculates colors for each picture element in a scene. As the name suggests, the equations used in ray casting calculate a value for every point in a picture individually, as if that point were at the end of a ray projected from the eye of a hypothetical viewer. Unlike flat shading, ray casting may be used to render many types of objects with different surfaces in a single scene. Ray casting produces realistic images but is calculation-intensive. The image in "New Dimensions," for example, required over 18 hours of calculations on a 512K Mac.

Interactive Computer Graphics

Many computer graphics applications demand that the user manipulate geometry interactively (in real time). Mechanical design applications are a case in point. In the past, computer graphics systems without interactive capability have offered multiple views of the drafting process. More recently, low-cost 2-D and

3-D CAD systems have appeared that allow the designer to rotate, scale, pan, zoom, and drag objects in real time, much as the Mac mouse moves the cursor.

Two-dimensional applications such as paint systems have a limited need for interactivity, unless they are used in broadcasting or animation production. Three-dimensional mechanical design and drafting, molecular modeling, and other applications require interactive capabilities. Although these are not yet available on the Mac, floating-point processors and geometry-specific processors will be offered on peripheral boards for the open Mac's new bus.

Vote with Your Dollars

The open Mac comes at a time when it's technologically possible to produce the displays shown here. VDE's package demonstrates the possibilities by allowing 3-D wire-frame design, preview rendering on the Mac, and rendering with a ray-cast approach in color. VDE, Computer Friends, and Dunn have even adhered faithfully to the Mac interface, keeping the feel of the Mac. It is now up to third-party hardware developers to carry on, and VMI is likely to be one of the first. We, the buyers, make up the final part of this trilogy. If we support these vendors with our purchases, we can ensure that the Mac remains a graphics leader. □



Colorful Brushwork

Dunn Instruments' Dunn Color offers a wide variety of brush functions and on-screen editing of the color palette.



Both Sides Now

by David L. Foster

*Double your
pleasure—and
productivity.
Reviews of seven
double-sided disk
drives for the Mac.*

If you're currently using single-sided disks, deciding whether to upgrade to an 800K, double-sided drive may be like deciding to buy a computer in the first place: before you buy it, you're not sure whether you need it—but once you have it, you can never go back.

Mac Plus owners, who may be considering a second double-sided drive, already appreciate the advantages of the 800K model. Like many of the drives reviewed in this article, Apple's 800K drives are considerably quieter than their 400K predecessors, transforming the song of the disk drive into a whisper. The new drives are faster, too, which means less time spent staring at the Mac's wristwatch.

More important, the extra 400K of storage on a double-sided disk enables you

to organize your programs and files more sensibly. The fact is that many of today's memory-hungry programs, such as *Excel* or *PageMaker*, can cause major inconveniences by not fitting on a single-sided disk along with a System Folder. *PageMaker*, for example, needs to access the System every time it loads part of a file. Because of this, you can easily end up swapping disks 20 times to load a large *PageMaker* file. With an 800K drive, you simply put your System and application on one disk, your data on the other, and load.

Of course, hard disk drives offer plenty of room, but they cost at least twice as much as floppy disk drives. And since they're also larger, heavier, and more frag-



ile, they're more difficult to transport. If your need for additional space is modest, an external 800K floppy disk drive provides the extra room in a portable package that can accompany your Mac wherever you go.

Test-Driving the Drives

For this review I compared Apple's double-sided drive to offerings from six third-party manufacturers: DataSpace Corporation, Haba Systems, Microtech International, Mirror Technologies, P.K.I., and Warp Nine Engineering.

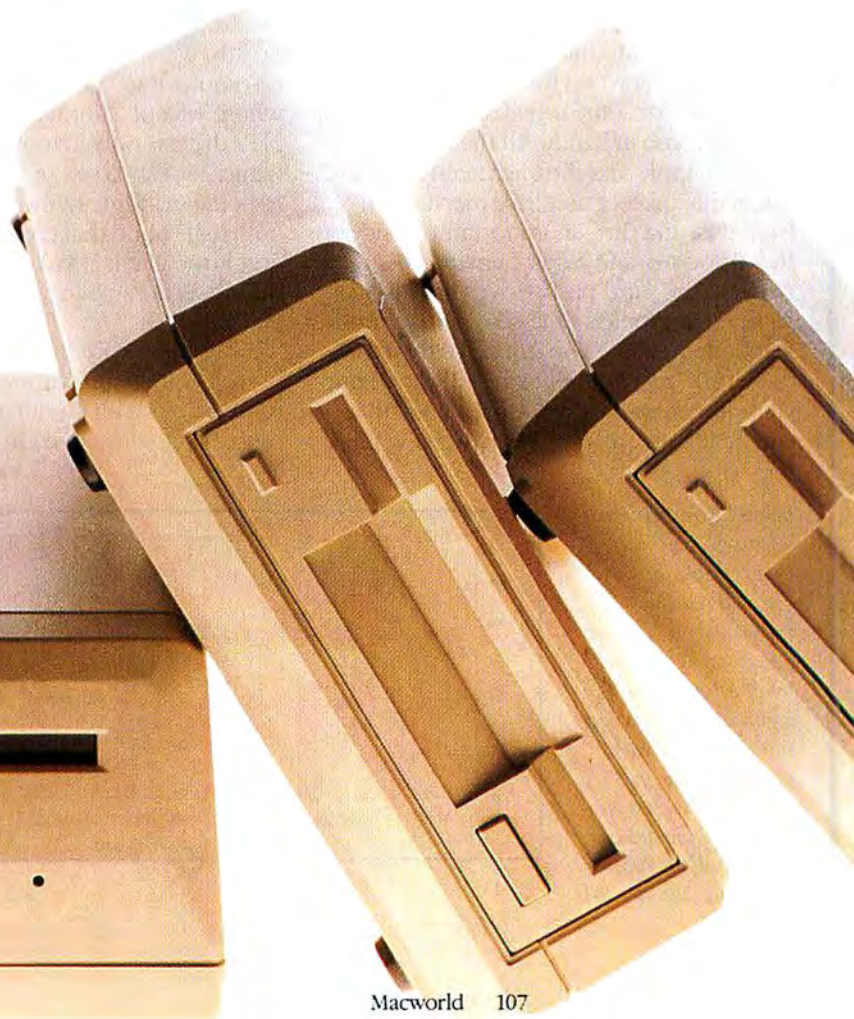
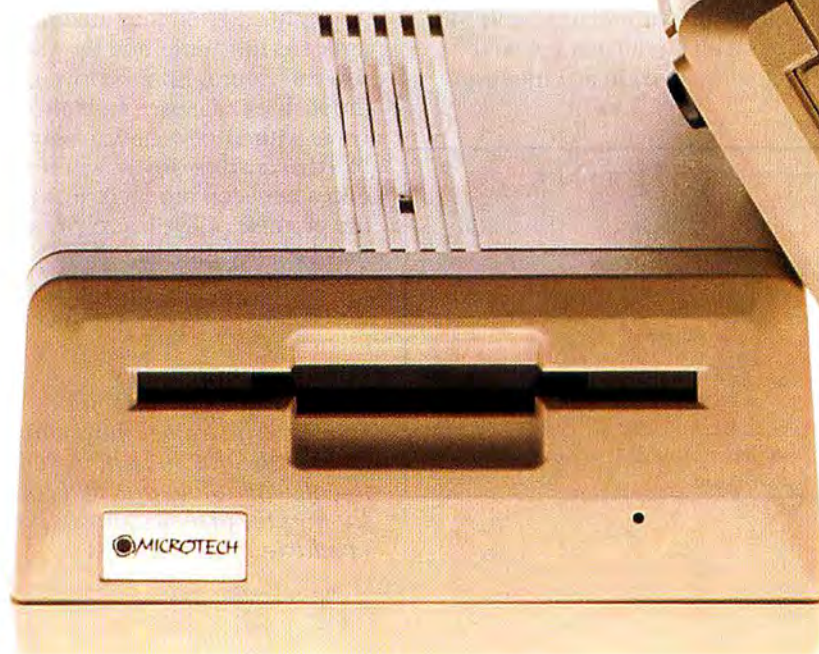
To determine the drives' speeds, I first measured how long it took each one to initialize a double-sided disk on both sides using the Finder's Erase Disk command. Apple's drive was faster at this task than the third-party drives—but by only about 10 percent (see "Drive Speed Comparison").

As a second test, I ran a Microsoft BASIC program that wrote and then read a 64K data file to and from an 800K floppy. Although the Apple drive was the fastest, the differences between all the drives were slight. Finally, I measured the time re-

quired to load a 700K data file from a double-sided disk into *OverVue*. Apple's drive finished first once more, but again its margin of victory was less than 10 percent. In actual day-to-day use, I wasn't able to discern any differences in speed.

In terms of appearance and overall size, Apple's drive is first class. Its Sony-manufactured works are enclosed in a sturdy, low-profile case that's surprisingly compact. The Chinon-manufactured drives in the DataSpace, Haba, and P.K.I. units are housed in identical casings that are lighter yet significantly bulkier than Apple's. Mirror and Warp Nine, on the other hand, put

Contestants in the double-sided drive derby (left to right): the Habadisk 800K; Mirror Technologies' Magnum 800; the Phaser 800, from Warp Nine Engineering; the Microtech Mac535; the DataSpace DS800; P.K.I.'s McD 800; and, above, the Apple drive.



Double-Sided Drives—Timing Tests and Features

	Apple	DataSpace	Haba	Microtech	Mirror	P.K.I.	Warp Nine
Initialize 800K disk (seconds)	54.6	61	61	58.3	62	61	62
Read/write test (seconds)	26.9	27.5	28.7	28.8	28.7	27.5	27.4
Load OverVue file (seconds)	31.4	32.6	33.7	33.4	32.8	33	33
Length of cable (centimeters)	45	54	54	57	58	54	50
Eject button	no	yes	yes	no	yes	yes	yes
Weight (kilograms)	1.29	1.14	1.14	1.25	1.56	1.14	1.52
Noise level	low	low	high	high	moderate	high	low
Warranty	90 days	1 year	90 days	1 year	1 year	6 months	90 days ¹

¹ Plus 30-day money-back guarantee; extended 1-year warranty \$29

their Chinon drives in metal cases that are as compact as Apple's but significantly heavier. Microtech's Copal-manufactured drive comes in a plastic case that's the largest of all these models, closely matching the size of Apple's 400K floppy drive.

Except for Microtech's, all the third-party drives offer features that the Apple drive lacks. Apple and Microtech drives require that you insert a bent paper clip or a similar tool to manually eject disks. The other drives provide an eject button on the front panel. Most of the time, of course, you should let the Mac take care of ejecting your disks. But when the Mac hangs or won't eject for some other reason, the eject buttons come in handy. All the drives except the Apple and the Microtech also have doors that protect the drive mechanism from dust and dirt, an important consideration if you work in a dusty environment. Finally, all the third-party drives have longer cables than Apple's unit, so you have more freedom in where you can place them.

If you're a 512K owner and plan to purchase the Apple drive, I recommend that you first make sure you have the new 128K

ROM in your Macintosh. Otherwise, you'll need a specially modified System file to use the Apple drive. Even with the modified System, you won't be able to start your Macintosh from a disk inserted in the external drive. All the other drives work with either the old or new ROM without special software.

The Noise Factor

Although the performance differences between the drives I evaluated were small, the amount of noise each generated varied greatly. Warp Nine's drive, the Phaser 800, is so quiet it would be unobtrusive anywhere except a library on Friday night. Apple's drive is only marginally louder, a delight after two years of listening to the irksome grinding of the old drives. The only real sound that comes from the Apple unit is the clank it makes when the unique disk-insertion mechanism has sucked in a disk.

DataSpace's drive is as quiet as Apple's, and it comes without the clank. Mirror's drive is a bit louder, but it would probably go unnoticed in an office en-

vironment. The Microtech drive makes enough noise to be mildly irritating, while the drives from Haba and P.K.I. are definitely obtrusive. Unless Haba and P.K.I. turn down this racket, I can recommend their drives only for use in an industrial setting. If DataSpace achieves an acceptable noise level with an otherwise identical drive mechanism and case, I see no reason why Haba and P.K.I. cannot.

The Winners Are ...

You pay a premium for Apple's 800K external disk drive, but you get fast performance in a sturdy, compact package. (In fact, the Apple drive is so compact, it's too bad it wasn't positioned in the empty space adjoining the Mac's internal drive.) Although the internal 800K drive that comes with Apple's ROM/disk drive upgrade is a good deal, Apple's external drive is definitely pricey.

The drives from DataSpace, Mirror, and Warp Nine are less expensive than the Apple. In addition they are quiet and nearly as fast as the Apple, and they come with several features Apple's drive lacks. In addition, the DataSpace and Mirror drives come with a one-year warranty. In a market like that for disk drives, where the differences between products aren't that great, the promise of a year's cost-free operation may be a deciding factor. □

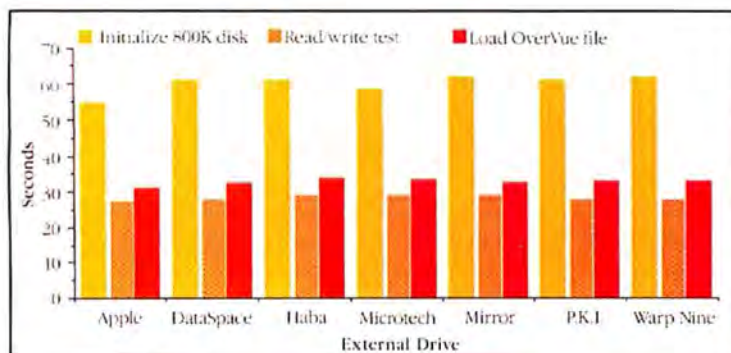
See *Where to Buy* for product details.

Late-Breaking News

Because of supply difficulties, Haba Systems is no longer marketing the HabaDisk 800K. It is, however, honoring all warranties and will continue to support the drive as long as parts are available.

Speed Comparison

As this graph shows, times for the file-loading and read/write tests varied by only a few seconds. Since a lot of information is written to disk during initialization, the greater time differences for that test suggest the Apple drive is faster than the others at writing data to disk.



The Statistics Standard

When it comes to high-powered statistics, Stat80 is the program to beat

by Terry A. Ward

When you can measure what you are speaking about and express it in numbers, you know something about it.
—Lord Kelvin

Lord Kelvin, the nineteenth-century scientist credited with the absolute temperature scale, reminds us with this quotation how important the ability to quantify is to understanding our world. Whether the numbers are the gross national product or your team's batting average, the science of statistics provides the tool that helps make sense of the numbers around us.

If you're a professional statistician, *Stat80*, from Statware, can help you make sense of the numbers in your world. Originally designed for minicomputers, this statistical analysis package has been ported—with its full complement of mainframelike statistical capabilities—to the Macintosh.

Stat80 includes the major statistical procedures used in most analysis work, as well as all the data modification and selection facilities needed for data analysis. The program comes in two versions: the standard version fits on four disks and includes the most common statistical routines; the professional version takes up five disks and adds advanced procedures for factor analysis, canonical correlation, cluster analysis, and matrix operation.

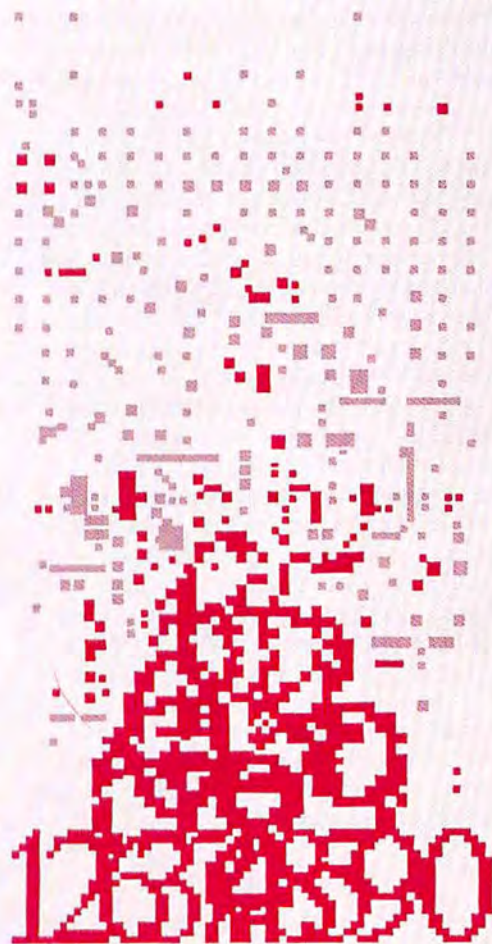
To speed data processing, *Stat80* uses a memory-resident data work space. On a 512K Macintosh the work space holds about 54K—enough room for 10,000 to 12,000 data points and their associated labels, with space for any required transformations or data manipulations. For Mac Plus owners, Statware supplies implementations that handle either 50,000 or 100,000 data points.

In terms of professional-level statistics packages, *Stat80*'s only rival in the Macintosh market is the new *StatView 512+*, from Brainpower. Space is too limited here to describe all of *Stat80*'s features, but a roll call of the program's most salient capabilities will give you an idea of how it works.

Data Handling

Stat80 provides a full-screen editor (the Apple Macintosh Development System editor, Edit) for data file creation. *Stat80* also lets you read data directly into the work space from the command line, although this method may be tedious for large data files. You can store data in the form of tables, rectangular files, or matrices. *Stat80* also provides its own data-storage format, which maintains all the program's labeling information for variables, values, and transformed variables. This form of data storage is useful for ongoing data analysis projects. Finally, the program lets you import or export data to or from other Macintosh programs via the Clipboard.

Stat80 provides a complete set of labeling and missing-value operations. The program enables you to rotate, sort, and select data on the basis of data values. *Stat80* also handles computed and recoded variables and conditional transformations. Approximately five dozen transformations are



available, ranging from simple arithmetic computations to procedures such as kurtosis calculations.

Data Transformations

Stat80 includes a complete set of data selection and transformation commands. The program performs conditional computations both for an entire data file and for selective subsets of a file. You can also sort, rank, or round data with transformation statements. *Stat80* creates Z-scores automatically and offers lagging of variables as well as other procedures helpful for analyzing time-series data. Date and time functions are available for these specialized needs, and the professional version does all necessary matrix operations, such as inversion and transposition, automatically.

Stat80 provides both data selection and data omission commands and a random sampling procedure.

Cross-Tabulation Statistics

With nominal or ordinal variable types, the statistician is often interested in a cross-tabulation analysis. *Stat80* provides the procedures for constructing a cross-tabulation table and for calculating the appropriate statistics. Specifically, *Stat80* calculates chi-square, Mantel-Haenszel, and McNemar tests for significance of changes, as well as Fisher's exact test for cross-tabulated data.

Nonparametric Statistics

Stat80 provides a full complement of nonparametric facilities, including the following nonparametric statistical tests: the Signs test, the Wald-Wolfowitz Runs test, the Wilcoxon Matched Pairs, the Mann-Whitney test, the Kruskal-Wallis, the Friedman's Block test, Kendall's tau, and the Median test.

Correlation and Regression

In simple terms, correlation and regression refer to the process of fitting a linear equation to a set of data points. The correlation procedure determines the relationship between two variables. Regression analysis is a more general procedure for predicting a dependent variable on the basis of two or more independent variables.

Stat80 contains facilities for both the Pearson product-moment correlation of variables and the rank-order method supplied with the Spearman rho procedure.

The program offers simple regression and scatterplots for simple two-variable situations. For more complicated analyses, *Stat80* performs regular, forward stepwise, and backward stepwise multiple regressions. Polynomial regression analysis and principal components analysis are also included. Finally, for more complex analyses, a procedure is available for handling a general linear model.

Analysis of Variance

For simple two-group cases, *Stat80* provides both paired and unpaired t-tests. The one-way analysis of variance procedure allows for user-supplied contrasts. And finally, for the more common, but also more complex, multiway analysis of variance, *Stat80* allows missing cells, random factors, and repeated measures.

A new version of *Stat80*, which is currently in beta testing, will incorporate major additions to the analysis of variance procedures. It will allow n-way factorial unbalanced designs, up to 9-way repeated measures designs, and various combinations of factorial and repeated measures designs.

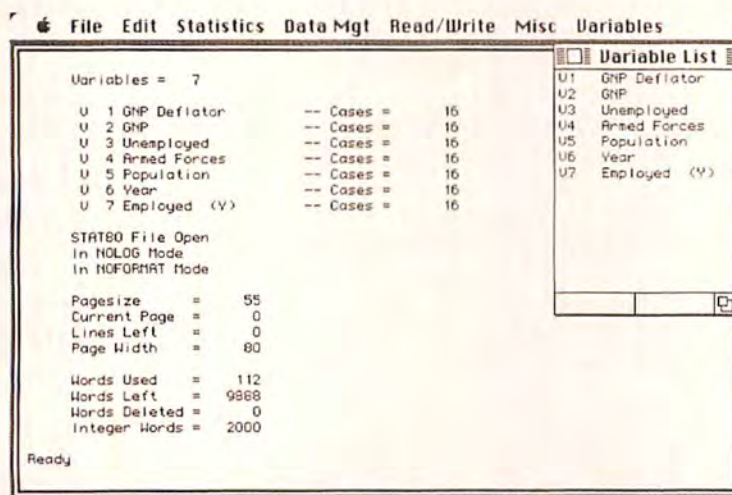
Advanced Statistics

The basic version of *Stat80* includes two advanced features. One, the general linear model, gives the advanced user the ability to perform tests not available in the other analysis of variance or regression procedures. Possible uses are unbalanced multiway analyses of variance, forcing a regression line through the origin, or any procedure in which all hypotheses can be tested with contrast matrices. The second feature permits the use of command files similar to macro or EXEC files, which enable the user to invoke a long sequence of commands with a single command.

Users of the professional version of *Stat80* (the version I heartily recommend) have at their command a multitude of advanced statistical procedures in addition to the two mentioned above. An entire set of matrix operations is available, as well as three multivariate statistical procedures. The program also lets you group cases statistically via a cluster procedure and offers canonical correlation—a procedure that shows the investigator the interrelationships between two sets of variables.

Finally, the professional version contains a complete factor analysis facility for reducing a set of interrelated measures to a smaller number of *factors*. The intelligence quotient (IQ), for example, is the result of a factor analysis of early tests of intelligence. *Stat80* lets you choose from four methods of factor analysis: principal components, iterated principal components, image, and alpha-factor analysis. Three rotations are also available: varimax, equamax, and quartimax.

Figure 1
This screen shows the general appearance of *Stat80*. In use, the program provides a menu bar that operates like an on-line help facility for the approximately 125 commands and 50 transformational operations available to the statistician. The list at the right provides a handy reminder of the current active variables in the work space.



Charts and Plots

Stat80's display options are minimal. The program produces only histograms, frequency distribution displays, and two- and three-dimensional scattergrams.

For presentation graphics, *Microsoft Chart* is clearly superior. A potent combination for statistical computing would be a hard-disk-based Macintosh with *Stat80* for number crunching and *Microsoft Chart* for graphics.

Accuracy

As the preceding sections show, *Stat80* is rich in features and functions. When all is said and done, however, there is really only one thing a statistics package must do—accurately compute statistics.

Statisticians, like programmers, have developed a standard benchmark test for statistical computations. The test uses the Longley data, an ill-formed set of economic data that is highly interrelated and that can cause problems with the matrix manipulations of many statistical packages.

I used *Stat80* with this data to build a multiple linear regression model of employment in terms of six other variables. Multiple linear regression attempts to predict a dependent variable (in this case employment) from a set of predictor variables. In the simple case of one predictor and one dependent variable, linear regression is a model of the "best" line drawn through the points. The Longley data is a good test because of the high degree of correlation among its independent variables. Calculation of the linear regression requires matrix inversions that tax the ability of most statistical packages.

Stat80's initial attempt at calculating the regression equation resulted in an error message stating that the data was ill conditioned and that certain variables were excluded from the regression equation. A second analysis, for which I explicitly overrode the normal defaults, resulted in correct figures.

This is exactly as it should be. A statistical package should warn the user when data is ill conditioned or marginal. When requested to continue, the package should produce the analysis. In the real world, we rarely know before we begin whether data has problems like those of the Longley data. By warning us of potential problems, *Stat80* lets us make informed decisions.

Speed Test

In addition to accuracy, the statistician is interested in the time a program takes to produce meaningful analyses. To test *Stat80*'s speed, I ran it on a Mac Plus and compared the results to those produced by an IBM PC XT running *SPSS-PC* (*Statistical Package for the Social Sciences*). The results can be seen in Table 1.

The Mac Plus was configured with a *Stat80* work space of 100,000 data points. It had a 400K external drive and no hard disk. The data was on the external disk. The IBM PC XT was a standard 10-mega-byte hard disk model with the 8087 mathematics coprocessor. All programs and data on the IBM PC XT were on the hard disk.

The test used a data set of 500 cases and 50 variables. Of the variables, 47 were floating-point numbers, and the remaining 3 were categorical variables. The test involved eight statistical procedures: fre-

quency distribution, descriptive statistics, a two-way cross-tabulation table, a t-test, one-way analysis of variance, multiple regression with 9 independent variables, multiple regression with 49 independent variables, and a 10-variable factor analysis.

From the results, it's obvious that *Stat80* gives almost immediate feedback for most statistical requests. In all file-intensive operations, *Stat80* performs three to eight times faster than *SPSS-PC*. *Stat80* reads the data into the work space once, whereas *SPSS-PC* must access a temporary work file whenever data is needed. (*SPSS-PC*'s triumph in the 49-variable multiple regression analysis can be attributed to the power of the 8087 math coprocessor chip.)

Evaluation

In some respects *Stat80* trades ease of use for power. For the most part, it forgoes the Macintosh interface, forcing you to use PC-DOS-like commands.

Given the program's intended audience of professional statisticians, this trade-off is a reasonable exchange. As a statistician myself, I will gladly forgo spreadsheetlike orientations or multiple overlapping windows for features such as factor analysis or canonical correlation.

Stat80 does include features that offset its command-line orientation. The program provides an EXEC facility that works like a spreadsheet's macro facility. In addition, *Stat80* features a unique help-by-example facility. At the user's request, the program supplies a sample command line. This quick on-line reference card is a useful innovation.

In keeping with *Stat80*'s size and complexity, the program comes with extensive documentation. In addition, Statware provides reasonably priced training sessions at its Salt Lake facility or on site.

Future plans for *Stat80* include a more complete implementation of Statware's minicomputer version for the Macintosh Plus. The new version, which may be in distribution by the time you read this, will include the powerful PROC language. Within the basic *Stat80* framework, you can use this structured C-like language to write any statistical procedure for data handling and manipulation.

But even in its current version, *Stat80* is fast and accurate, providing a comprehensive set of tools for the professional statistician. □

Table 1

These figures represent the times for a sample data file of 500 cases and 50 variables. To provide a measure of computational speed only, time spent displaying results has not been counted.

Benchmark Results: Stat80 versus SPSS-PC

Statistical Procedure	Times in Seconds	
	Stat80	SPSS-PC
Frequency distribution	3	24
Descriptive statistics	6	28
Cross-tabulation (two-way)	4	28
t-test	7	22
One-way analysis of variance	4	28
Regression (9 independent)	29	47
Regression (49 independent)	890	484
Factor analysis (10 variables)	37	47

The CAD Comparison

*Three programs, three prices, three purposes—
an overview of CAD software*



by Chuck Carroll

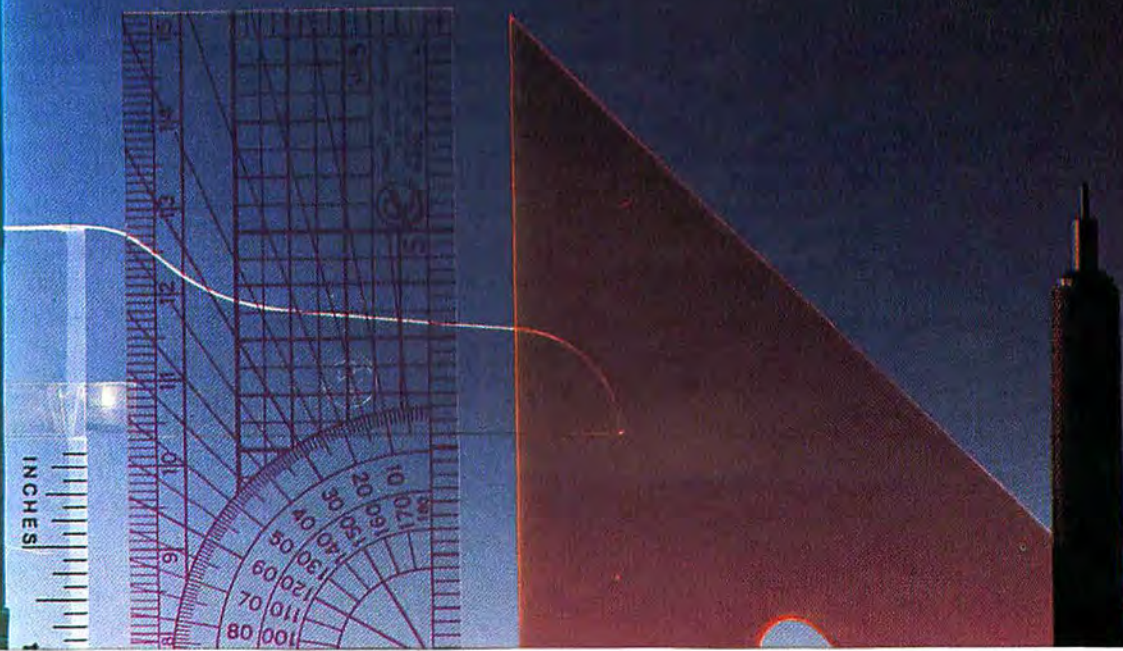
Computer-aided design (CAD) software is being used increasingly for everything from the dramatic graphics you see in TV commercials to plans for nuts and bolts, computer chips, yachts, toys, buildings, and just about everything else that used to be designed with a T square, pencil, and eraser. CAD is attractive to architects and designers because it saves time, expense, and energy in a variety of ways. CAD cuts drawing-creation time with automated drawing and calculation functions; it streamlines the drawing-revision process, since you can just edit a drawing and print out a new, clean copy; and perhaps most important, it collapses the separate processes of design and drafting into a single step.

The main attraction of CAD on the Macintosh as opposed to other personal computer or minicomputer systems is, in a word, price. Because the Mac was designed as a graphics computer, to work as part of a CAD system it doesn't need the expensive add-on graphics board, high-resolution monitor, and input devices required by, say, an IBM PC or compatible-based CAD system. The architect or designer who decides

on a Mac Plus-based system can end up paying half the cost of a PC system with similar capabilities (see "Desktop Engineering," *Macworld*, September 1986, for an overview of CAD on the Macintosh).

MacDraft, from Innovative Data Design (IDD), was the first Macintosh CAD program and is still the most popular (see "Drafting's New Compass," *Macworld*, January 1986, for a review). Its rivals in the general-purpose CAD arena—*EZ-Draft*, from Bridgeport, and *MGMStation*, from Micro CAD/CAM—are more powerful and more expensive packages. While *EZ-Draft* and *MGMStation* have CAM (computer-aided manufacturing) and CIM (computer-implemented manufacturing) abilities, this article looks only at their CAD abilities.

For my evaluation, I ran each program on both a 512K Mac with a 400K external drive and a Mac Plus with a 20-megabyte Apple hard drive. I strongly advise the latter configuration because it reduces the loading and regeneration time required for complex drawings and also because CAD drawings and symbol libraries eat up storage at a furious pace. The minimum practical configuration is a Mac Plus with an 800K external drive. For hard copies I used the ImageWriter and



who purchased *MacDraft* version 1.1 after June 13, 1986, are entitled to a free upgrade to version 1.2. Owners who purchased version 1.1 before the June date can upgrade for \$20 plus a shipping and handling charge. The upgrade includes a backup copy of the program and a Hard Disk Install utility.

My final verdict on *MacDraft* version 1.2 is that although it has room for improvement, the pluses far outnumber the minuses. Particularly because of its price and its ability to interact with *MacDraw* and *MacPaint*, *MacDraft* may be all the CAD program many users need.

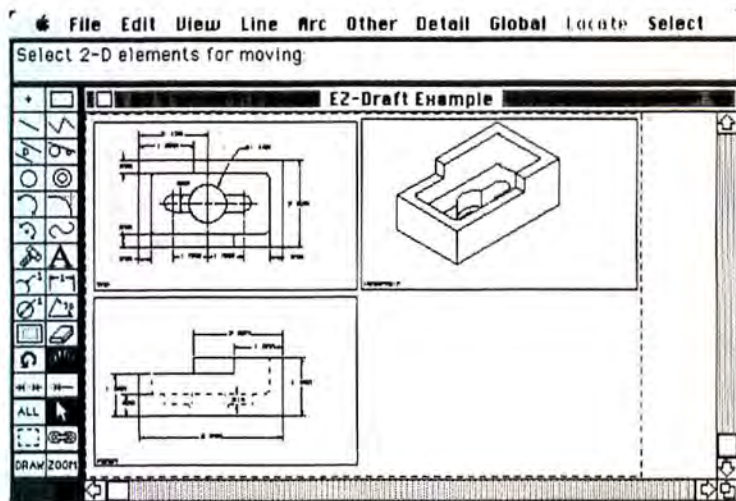


Figure 2

EZ-Draft lets you create orthogonal views of the same drawing. This screen image actually depicts a prerelease version of *EZ-Draft* that is newer than the one reviewed. The new version simplifies the program by putting common menu functions in a newly incorporated tool palette (shown on the left).

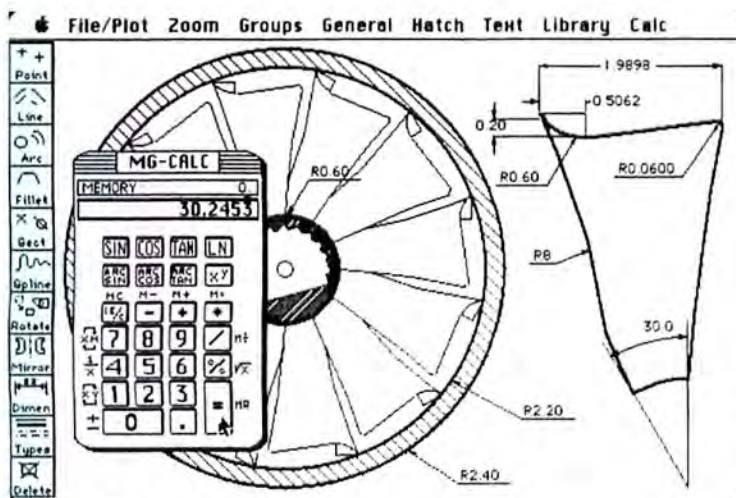


Figure 3

MGMStation's *Dimension* mode is ideal for shop drawings. You can drag the sophisticated calculator into a drawing at any time and then return it to its resting place.

EZ-Draft

EZ-Draft is the most powerful CAD program currently available for the Mac. Despite its name, this program is not easy, but neither is any other professional CAD program of similar complexity. *EZ-Draft* is so powerful and deep that you can't expect to have it up and running in a few hours. Although it is targeted at the general CAD market, *EZ-Draft* is particularly valuable to machine-tool designers, who require precise tolerances and frequently use surface finish, cut-line, hex-head, and slot commands.

EZ-Draft's vast selection of geometry entries (see Figure 2) is both a strength and a weakness. On one hand, the program offers a multitude of options: for example, you can choose among 21 ways to construct lines and 14 ways to construct arcs and circles. Double parallel lines, chamfers,* fillets,* and B-splines* are only a few of the menu items available. On the other hand, *EZ-Draft* is cumbersome to use; many of the commands could have been combined or simplified. One unquestionably strong suit is dimensioning; the program automatically generates a clear readout in a choice of ANSI or ISO format.

Civil engineers will appreciate the digital readout of the current cursor position during absolute,* polar,* or relative* coordinate data entry. Another big plus is the built-in calculator, which can be accessed from the drawing window. The Measure Distance and Calculate Area commands can be used with irregular shapes and peripheries, and the Zoom* and Pan* commands can be used to view various sections of the large drawings civil engineers are used to.

An architect designing a high-rise, multiunit condominium with four different apartment models will appreciate *EZ-Draft*'s Create Instance function. You can create a symbol, such as a sink, a cabinet, or even an entire room, in the same view as the assembly drawing and then put the symbol into the drawing simply by clicking the mouse at the insertion points. You can save the symbol as part of a symbols library and use it wherever necessary.

Two features introduced with version 1.2 merit special notice. The first and more dramatic of these is that *EZ-Draft* now works with the Vermont Microsystems color monitor. Especially useful in combination with *EZ-Draft*'s Layer* command, this ability addresses the frequently heard complaint that the Mac's 9-inch screen is too small to be effective in a CAD system.

The second important addition to *EZ-Draft* is the optional new Read/Write IGES* program included on a separate disk. This program enables *EZ-Draft* users to read files and drawings created on other CAD systems and to create drawings that can be read by other CAD systems that use the IGES format.

Although the trend among CAD developers in the personal computer market is toward offering some 3-D capability, the current version of *EZ-Draft* lacks this mode. However, its variety of isometric* views, such as front, back, and top, make this a relatively unimportant gap in an otherwise excellent CAD program. I was par-



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ticularly impressed by *EZ-Draft*'s extensive installation and troubleshooting documentation. Hot-line support for end users is available, as is training both on-site and at Bridgeport's sales and service center.

EZ-Draft fills a niche in the Mac market that had previously been vacant: it's a complete CAD system that rivals *AutoCAD* and *VersaCAD*. The program's \$2495 price may seem steep compared to other Macintosh packages, but it is in line with MS-DOS and PC-DOS programs with similar capabilities. The price is even more justifiable when you consider the cost of a Mac Plus compared with the typical \$12,000 to \$20,000 hardware configurations of other computer-based systems.

MGMStation

MGMStation (short for *Micro Graphic Manufacturing Station*) is marketed as a professional CAD system for "general drawing, mechanical design, architectural applications, schematic diagrams, and CAM applications." Whether it lives up to this billing is a matter of opinion. As its full name implies, *MGMS* is a CAD/CAM program.

While *MGMS* uses the familiar Macintosh pull-down menu structure, it does depart somewhat from the Mac standard. Besides the eight main menus across the top of the screen, *MGMS* displays a *MacPaint*-type toolbox along the left margin. Each toolbox icon contains a submenu. Negotiating the menus and submenus, with their total of 122 commands, requires a great deal of cursor movement and takes some getting used to.

MGMS has all the basic functions required for a professional CAD system, with the exception of an isometric* mode. Data entry and geometric output are enhanced by the visible digital readouts of coordinates showing you just where you are in your drawing. Design engineers will like the sophisticated calculator that waits on the right-hand side of the main menu and is always available, even while you're drawing. This calculator has memory, sine, cosine, tangent, and other trigonometry functions (see Figure 3). Another strong point is the program's dimensioning functions; *MGMS* simplifies the dimensioning process and creates excellent printouts for shop drawings.

MGMS has a unique symbols library structure. Symbol icons are displayed in a special toolbox on the right-hand side of the screen and can be moved into the drawing with the mouse.

MGMS has its own plotter drivers for A- to E-size drawings,* but I prefer the quick and clear ImageWriter printouts. They're useful for the designer and drawing checker, since corrections can be made and reprinted in a matter of minutes.

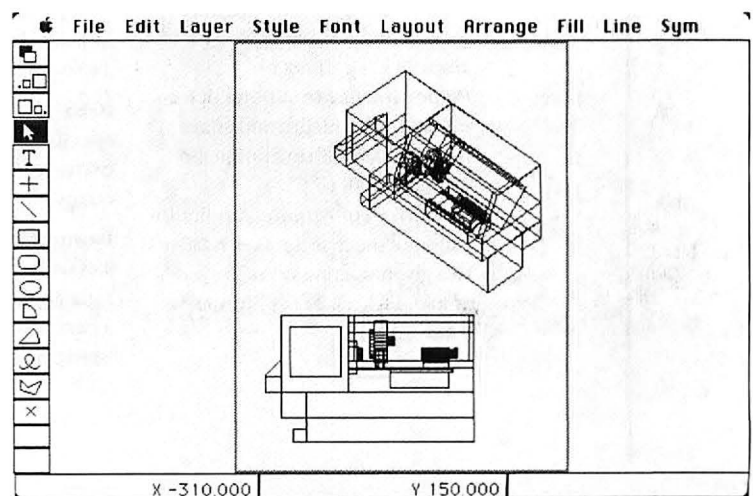
My wish list for *MGMS* includes 3-D and Isometric modes and a more simplified menu structure. Small print and page size make the manual difficult to read. However, you'll find it complete and detailed, and it even includes pin settings for cables and DIP-switch settings for different plotters.

MGMS is likely to prove itself especially useful in the design of machine tools and small machine parts and for producing shop drawings. PCB designers and electrical and mechanical engineers should also find it a useful replacement for their soon-to-be-obsolete drafting tools. *MGMS*, with a Mac Plus and an ImageWriter, fills the hardware and software CAD requirements of the small design firm at a reasonable price.

Summary

While evaluating these three programs, I executed the same drawings—one of a machine part, the other of an apartment plan—on all three systems. The ease of implementation of simple functions, such as drawing parallel, vertical, and horizontal lines and rectangles, varied greatly. Whereas *MacDraft* allows you to draw a rectangle with a single selection from the toolbox, *EZ-Draft* and *MGMS* require several selections from different menus and submenus. On the other hand, *EZ-Draft*'s and *MGMS*'s Rotate, Mirror, and Group/Ungroup commands are time-savers.

The main decision criteria for any type of software are the same: price, ease of use, and power. *MacDraft*, if you accept its limitations, wins hands down in the first and second categories. *EZ-Draft* is by far the most powerful and complex as well as the most expensive. *MGMStation* falls somewhere in the middle and is superb for machine shop drawings. In the final analysis, each program has its specific place in the rapidly growing CAD market, and the best way to decide which one is for you is to ask for a demonstration. Unfortunately, few salespeople will take the time to learn



Presenting MiniCad

Until recently, MiniCad, from Diehl Graphsoft, was only available in a 3-D CAD version. Version 2.0, announced at press time, provides 2-D capabilities as well, making it competitive with the other review programs.

A CAD Glossary from A to Zoom

A, B, C, D, E Drafting paper sizes.

A = 8½ by 11 inches

B = 11 by 17 inches

C = 18 by 24 inches

D = 24 by 36 inches

E = 36 by 48 inches

Absolute coordinates (see **Cartesian coordinates**)

B-spline curve A smooth, fitted curve through a specific number of points determined by their coordinate locations. Similar to a "French curve" in manual drafting.

Break An opening of a predetermined size inserted in a line at a location selected by the user.

Cartesian coordinates A means of identifying point locations at the intersection of the horizontal (*x*) axis and the vertical (*y*) axis on the plane of a 2-D drawing, plus the *z* axis on a 3-D drawing. Three types of coordinates are used in CAD programs:

Absolute coordinate A point location determined by the intersection of the *x* and *y* axes; for example, 14.7(*x*), 10.8(*y*).

Polar coordinate A point determined by the length and angle from a given starting point; for example, 160° 67.5°.

3-relative coordinate A point location of the *x* and *y* axes relative to a given starting point; for example, 12.5(*x*), 24.6(*y*) from 3.4(*x*), 2.6(*y*).

Chain A series of **entities**, such as lines, whose endpoints connect to form a continuous path.

Chamfer A command that truncates the corner where two lines meet. Similar to a **fillet**, but a straight line is used instead of an arc.

Entity A single element such as an arc, a curve, or a line, a combination of which may be used to form a **symbol**, or **group**.

Fillet A command used to create a smooth arc of a specified radius to round a corner or connect two lines.

Grid A drawing aid consisting of a screen background of evenly spaced visible dots. Particularly helpful when the **snap** mode is used. Grid dots will not show up on a plotted drawing.

Group (also **Symbol**) A collection of **entities**, such as lines, arcs, and circles, that together form a drawing unit—for example, a bathtub. The group functions as a single entity and can be saved in a symbols library. Groups can be ungrouped, and the individual entities edited, regrouped, and used in altered form.

IGES Initial Graphics Exchange Specification, a standard used for the exchange of files between IGES-compatible CAD systems.

Isometric A view showing an object with three axes—*x*, *y*, and *z*—at right angles to each other. Similar to a perspective view but with no vanishing points.

Layers (also **Levels**) Individual drawings similar to transparencies or overlays that may be "stacked" or treated individually for modification or plotting purposes; for example, layer 1 could be the foundation, layer 2 the plumbing, and layer 3 the heating, ventilation, and air conditioning.

Mirror A command used to reflect (as in a mirror) or "reverse flip" a drawing segment, **group**, or **symbol** around a specified axis.

Orthogonal In CAD, a command that limits drawing to the *x* and *y* axes, assuring 90-degree intersections and corners, as in rectangular rooms in a house plan.

Pan A function allowing the user to view an off-screen section of a drawing.

Polar coordinates (see **Cartesian coordinates**)

Relative coordinates (see **Cartesian coordinates**)

Snap A command that moves the screen cross hairs by predetermined increments, such as every ¼ inch or foot (see **grid**).

Spline (see **B-spline curve**)

Symbol (see **group**)

Zoom The CAD command that enlarges or reduces a designated area of a drawing.

the programs well enough to demonstrate them. The alternative is a direct call to the developers, all of whom I found to be helpful and cooperative.

In the future, I would like to see Mac CAD programs make more general use of digitizer tablets with template overlays and macros. Because many prospective users have no previous experience with CAD, the developers of *EZ-Draft* and *MGMS* need to rethink their attitudes toward documentation. The manuals for both products assume CAD experience. Both could

benefit from more illustrations and examples, and both need glossaries to keep the new CAD operator from getting lost in the jargon.

With the addition of full-featured CAD programs to its library, the Mac has taken a great step forward as a professional CAD machine. We can't expect the Macintosh to emulate the million-dollar Cray system or the expensive Intergraph and Computervision CAD workstations. For people just getting into CAD or for small firms with limited budgets, however, the Mac's price and ease of use make it an ideal choice over minicomputers and other personal computer systems. □

Object Orientation

by Kurt J. Schmucker

Often the hardest job is making things look easy. Until recently that's been the case with Macintosh programming. Under standard programming languages like Pascal, C, and BASIC, the user-interface elements that make the Mac a pleasure to use—scrolling windows, pull-down menus, dialog boxes, and the rest—have been anything but a pleasure to create.

Help is at hand for Macintosh software developers, however, in the form of new programming languages that are ideally suited to the Mac's operating style. Known as *object-oriented* languages, they



Designing an Object

When necessary, an object-oriented programmer can design special-purpose objects for an application. This example explores the design and implementation of an object for a graphics application like *MacDraw*. Assume the graphics application is written in Object Pascal and uses the MacApp class library as a foundation.

This object has no graphic representation like an arc, a rectangle, or an oval. Rather, it encapsulates the knowledge required to perform the Clear All command. This deceptively simple operation has four requirements. First, the operation must clear the Mac's screen. Second, the operation must be reversible: the exact state of the drawing must be restored if the user chooses Undo right after choosing Clear All. Third, the Undo must itself be reversible: choosing Undo again must redo the Clear All operation. And fourth, the memory for graphic entities that have been cleared from the screen must be freed when appropriate.

Like most other application building blocks, the MacApp class library contains a general model called a *command object*. To create a new object, you add to the generic command object specific information that differentiates the Clear All object. In Object Pascal you do this by (1) specifying the names of the data items and the procedures encapsulated in the object—the object's *interface*—and (2) specifying the actual procedures—the object's *implementation*.

The interface for the Clear All object appears in Listing 1. The object's interface contains

- two pieces of data: a linked list of the graphic entities currently in the drawing and a reference to the currently selected entity.
- six procedures that can be executed when messages are sent to this object. Four procedures constitute the program code that runs when the Clear All menu command is chosen (Dolt), undone (Undolt), or redone (Redolt) and when the

graphic entities are cleared from memory (Commit). In addition, the object contains two utility procedures: IClearAllCmd initializes the object when it is first created, and InvalidateEverything redraws the interior of the window.

The implementation of these procedures is not much more difficult than naming them in the interface. Because of space limitations, we can't list all six procedures here, so we will concentrate on one—Dolt.

When a user chooses the Clear All menu command, the Clear All object should perform the following steps:

1. Remove any highlighting from the current selection.
2. Clear the graphics entities from memory.
3. Erase the images of the graphics entities from the screen.

The actual implementation of the Dolt procedure (see Listing 2) directly reflects these three steps.

The procedure Dolt modifies the internal data of graphicsDocument, an object that collects and manages all the graphics entities that the user has entered. Dolt removes all the graphics entities from memory, sends graphicsDocument a message (SelectGraphicsEntity) to remove the highlighting on the current selection, and then sends a message to the Clear All command object itself (InvalidateEverything) to redraw the interior of the window.

The Clear All command object specifies what procedures to follow when certain actions, like choosing the Clear All menu command, occur. No code is required to detect these actions. The MacApp menu object detects the actions and activates the programmer's special code.

```
(* This Command Object (Clear All) has graphics entities. It is undoable. *)
TClearAllCmd = OBJECT(TCommand)
  fStoredListHead: TGraphicsEntity; (* Save the list by saving the head pointer *)
  fSelectedGraphic: TGraphicsEntity; (* Save the current selection. *)
  (* Initialization *)
  PROCEDURE TClearAllCmd.IClearAllCmd(itCmdNumber: INTEGER);
  (* MacApp will call these routines when appropriate *)
  PROCEDURE TClearAllCmd.Commit; OVERRIDE; (* Free everything when the command is done *)
  (* *)
  PROCEDURE TClearAllCmd.Dolt; OVERRIDE;
  PROCEDURE TClearAllCmd.InvalidateEverything;
  PROCEDURE TClearAllCmd.Redolt; OVERRIDE;
  PROCEDURE TClearAllCmd.Undolt; OVERRIDE;
END;
```

Listing 1

```
PROCEDURE TClearAllCmd.Dolt; OVERRIDE;
VAR graphicsDocument: TGraphicsDocument;
BEGIN
  graphicsDocument := TGraphicsDocument(SELF, fChargedDocument);
  graphicsDocument.fHeadOfGraphicsLinkedList := NIL;
  graphicsDocument.SelectGraphicsEntity(NIL);
  SELF.InvalidateEverything;
END;
```

Listing 2

include Object Pascal, Smalltalk, Neon, ExperCommonLISP, XLisp, Object Assembler, Object Logo, and Coral Lisp.

Object Lesson

An *object* in the programming sense is a package of information and instructions about how to use that information, all bundled into a single unit. Icons, windows, scroll bars, and the other elements of the Mac interface can all be examples of objects.

The nice thing about object-oriented programs, from the user's point of view, is that the elements that make up the program help you decide what to do next at any given point. This is second nature to Mac users. When you select an icon from the desktop, for example, and the File menu suddenly becomes activated, you're experiencing the guiding hand of the object-oriented Mac interface.

Languages like C, BASIC, or Pascal are oriented toward operations instead of objects; applications created with these languages typically require that you first select an operation, such as Copy, and then specify what to perform that operation on. Creating Mac-style programs with normal languages is difficult, because such languages lack an easy means of describing an object that can respond to requests and has the power to make decisions.

Object Programming

The objects in an object-oriented program respond to requests to perform actions, known as *messages*. For example, a scroll bar might recognize the messages *inchUp*, *pageDown*, and *disable*. The way programmers send messages to objects varies among object-oriented languages. Table 1 shows seven ways to send the message "expand by 100 units" to the object named *projectBar*.

Programmers can store standard program elements, such as a scroll bar, in libraries for use in future programs. When you incorporate an object from a library into a new program, the object automatically carries with it the knowledge of how to respond when it receives the proper messages.

If a developer needs a special scroll bar that responds normally to most standard messages but responds unusually to one message, say *drawYourself*, it's easy to make. The developer merely creates a new scroll bar object, overrides the standard *drawYourself* message, and tells the new scroll bar how it should respond to a *drawYourself* message. The developer then gives this new object a name, such as *funnyShapedScrollBar*, and adds it to the collection of objects that may be used to build applications.

To develop a new Mac application with an object-oriented language, developers simply combine stock and modified objects with any objects they may need to design from scratch. (See "Designing an Object" for an example of object design with Object Pascal). Figure 1 shows a small geometric editor I developed in Object Pascal using the MacApp class library; a new



Language	Sample Syntax
Object Pascal	<code>projectBar.Expand(100);</code>
Smalltalk	<code>projectBar expand: 100.</code>
Neon	<code>100 expand: projectBar</code>
ExperCommonLISP	<code>(send projectBar 'expand 100)</code>
XLisp	<code>(projectBar 'expand 100)</code>
Object Assembler	<code>MOVE.W 100 (A^), -(SP)</code> <code>MOVE.L projectBar (A6), -(SP)</code> <code>MethCall expand</code>
Object Logo	<code>tell :projectBar [expand "100]</code>

Table 1

*The ways in which programmers send messages to objects varies for different object-oriented languages. This table shows seven ways to send the message "expand by 100 units" to the scroll bar object named *projectBar*.*

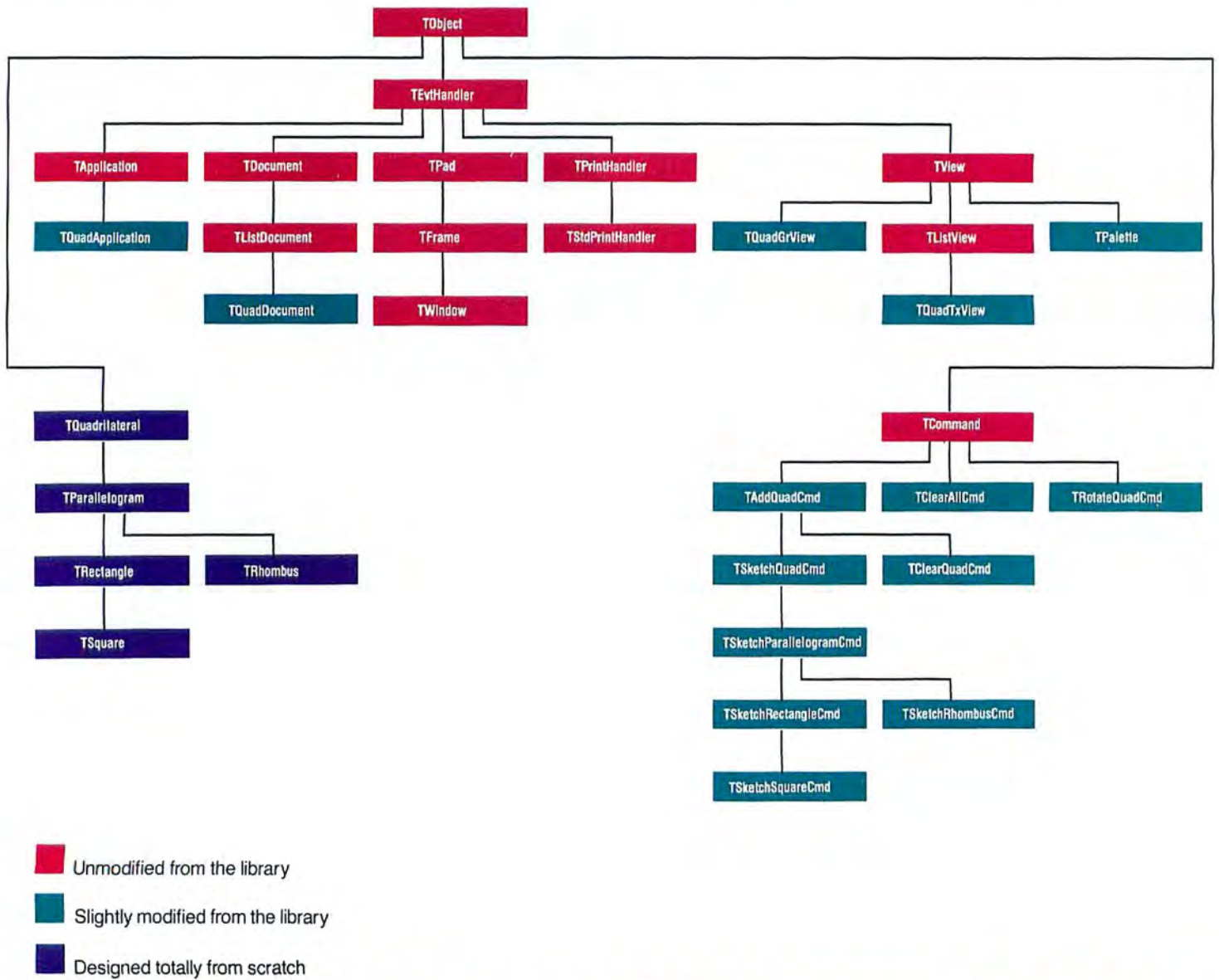


Figure 2

The building blocks of the QuadWorld application shown in Figure 1. The red objects came unchanged from the library, the objects that were modified slightly are green, and the purple objects were designed completely from scratch. Note that this last category has the fewest members.

Apple product consisting of objects specially designed to help developers working on Macintosh software. Figure 2 shows the objects that compose this graphics application, divided to show which ones are standard, modified, or new.

Many object-oriented languages have self-contained development environments that provide a wide variety of tools for developing new applications. Undoubtedly the most famous and comprehensive of these is the Smalltalk environment.

Smalltalk included one of the first multifont, multistyle text editors. It also includes program-debugging facilities that enable a programmer to inspect any object at run time and to stop an application, change any of its procedures, and continue running with the new procedures in place. A step-by-step interpreter is also part of the programming environment and is especially useful for debugging fragile code.

The Object of the Game

Object-oriented languages offer many benefits—both for the developer, who works with them directly, and for the end user, who runs applications written in them. The developer benefits because these languages dramatically cut the time it takes to design, implement, and test programs. In fact, object-oriented languages can cut development time by as much as 75 percent. Additionally, the relative simplicity of programming with object-oriented languages enables developers to more easily add new features to an application or modify it to incorporate new changes to the Mac's system software.

Users find that applications developed in object-oriented languages are often more consistent with the Mac user interface guidelines. This is because standard library objects are usually designed to follow the Mac guidelines precisely.

As an example, windows in graphics applications on the Mac are supposed to auto-scroll; when the user draws a line beyond the drawing window, the window should follow automatically. Neither *MacPaint* nor *MacDraw* currently does this. Had these applications been written in Object Pascal with objects from the MacApp class library, these programs would have included auto-scroll as a matter of course, since MacApp's intelligent window object already knows how to auto-scroll (see Figure 3).

The bottom line is obvious: it's always a plus to have the right tools for the job. As the use of appropriate languages for Macintosh programming spreads, bugs and user-interface inconsistencies will become less frequent, developers will have time to be more responsive and creative, and the overall quality of Mac software will rise even higher. □

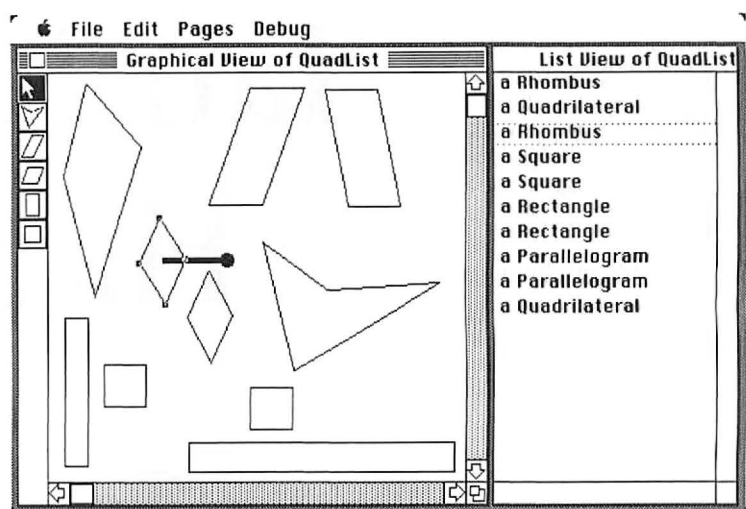


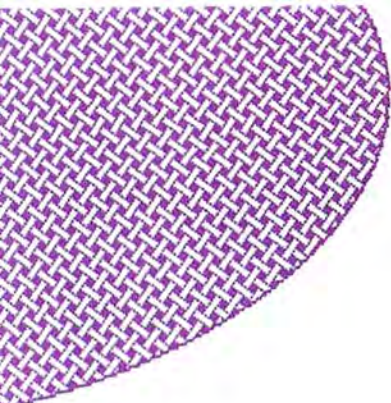
Figure 1

QuadWorld is a simple geometric editor that shows the power and flexibility of object-oriented programming, especially in conjunction with the MacApp class library. Figure 2 shows the objects used to build this application.



Figure 3

Multiple windowing in Object Paint is a research prototype designed and implemented by Apple's Larry Rosenstein to demonstrate that object-oriented programming can create real applications. Rosenstein's research prototype is credited with convincing many developers to switch to object-oriented programming.



Taming Your Hard Disk

by Gordon McComb

Make your hard disk perform with utilities that help you catalog, locate, and back up your files

Hard disk drives let you store thousands of applications and documents on one drive, and such vast central storage space all but eliminates floppy disk handling while providing rapid access to files. But along with the advantages of increased storage capacity come a few logistical problems that arise when you try to find, track, or back up numerous files.

You can soften up a recalcitrant hard disk with a handful of useful utilities. The three major types of hard disk utilities—file locators, cataloging programs, and backup utilities—provide workable solutions and make your hard disk drive easier and more pleasant to use.

File Locators

File locators are the bloodhounds of utilities. A Macintosh Plus running under HFS (Hierarchical File System) can track up to 15,000 files per disk. Even a few dozen files on an open desktop can be messy, so to keep the desktop manageable, place some or all of the files within folders (see "Organize Your Desktop"). Folders can be *nested*, placed inside other folders. Most files are located under just one or two layers of folders, but it's not uncommon to nest a file under five or six folders, creating a classic Chinese box puzzle.

Unless you have a clear method of organizing files and folders, and you stick to it religiously, you'll have trouble locating errant files (see "Order out of Chaos," *Macworld*, May 1986, for developing an organizational strategy around HFS). It's easy to forget where you've stashed a file, and

easier still to accidentally save a file in the wrong folder. Misplace an important document, and you may spend several minutes hunting it down. Instead of opening each folder to search for a missing file, let a file locator utility do the searching for you.

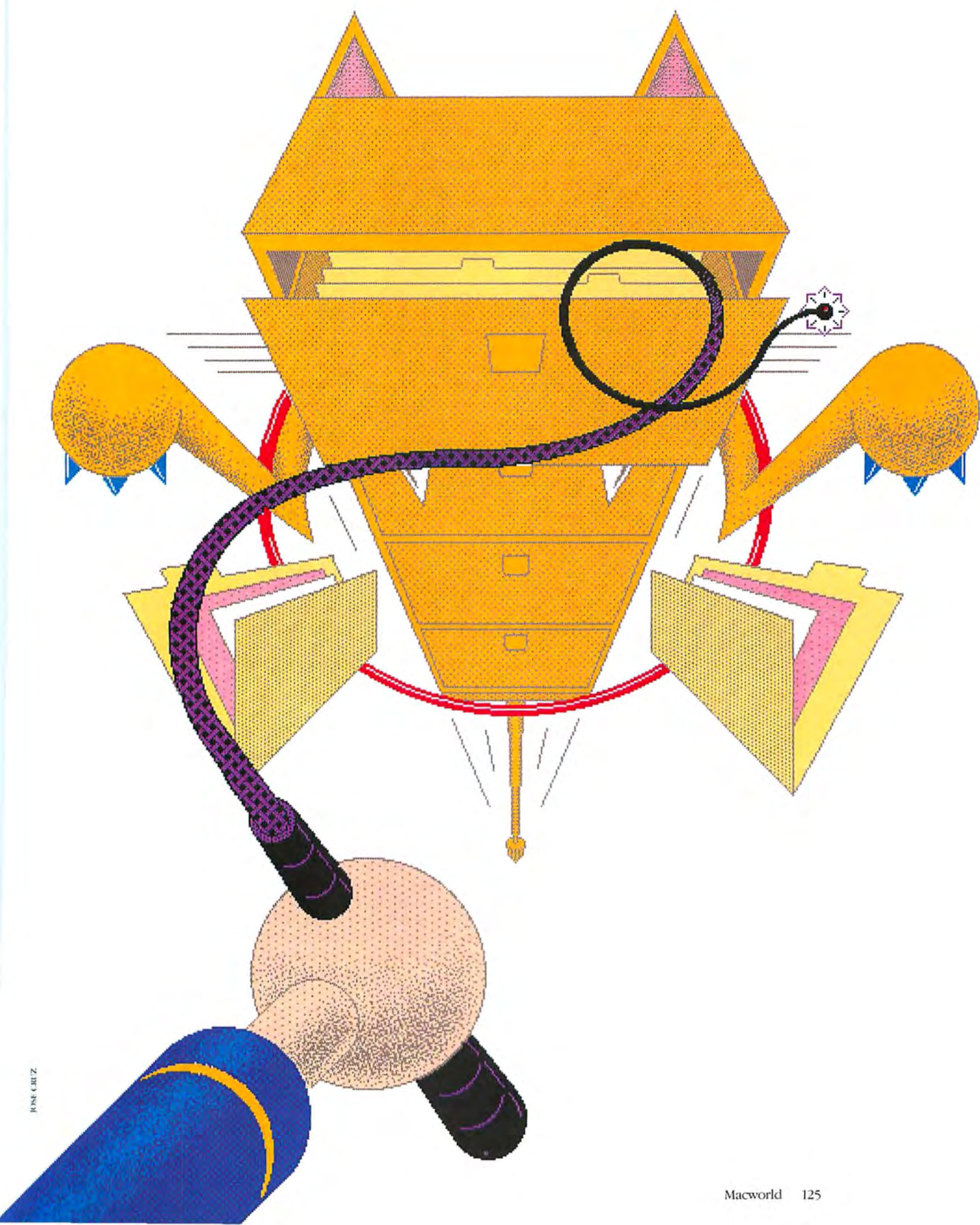
HFS Locator

HFS Locator is a desk accessory that finds files based on search criteria that you specify. The program works only with HFS, but you can search both floppy and hard disk drives.

You can enter the entire name of the file for the search or just part of the name. The program accepts wild-card characters, which let you hunt for unknown files or those with similar prefixes or suffixes. The program works with commonly used wild-card characters, such as "?" and "*", which serve as placeholders for unknown characters in file names.

You can specify searches for only those files created or modified before or after a certain date. When searching for an application, you can set *HFS Locator* to open the application automatically, as soon as it's found, thus bypassing the Finder. *HFS Locator* also finds all documents created by one application, even if they're not all in the same folder.

When it finds a file, *HFS Locator* displays the file name at the top of a dialog box (see Figure 1). Pressing the Find Next button advances you to the next document. Once you've found the exact file you want,



Organize Your Desktop

You'll never tame your hard disk drive unless you keep a clean desktop. A tidy desktop helps you locate files quickly and easily. You'll also make fewer mistakes because you'll have a clear view of what's on the disk. Here is a simple three-step course on cleaning up your Macintosh desktop.

- Use folders to hold common files. You're free to decide how to organize the files, but a good place to start is at the level of broad generic applications like graphics (*MacPaint*, *MacDraw*, *Paint Cutter*, and so forth), word processing, desk accessories, fonts, and spreadsheets. You might want to drag onto the desktop icons for commonly used applications of the Disk window, so that you can open them immediately. Once in an application, you can change files with a file locator or by using the Open command.

Each application should stay in a separate folder along with the documents that go with it.

If you keep a lot of documents for a particular application, subdivide them, too. For example, the *MacPaint* illustrations for a book can be organized by the chapters in which they're found. Each project has its own folder, which in turn holds folders for chapters or main sections.

- Organize the folders and files. Instead of piling them into one heap, arrange files within folders so you can quickly find the ones you want. If a folder contains many files, you can see more of them by choosing the By Name command from the View menu, which lists the files alphabetically. You can still open the files and move them around. Also, you can save space by shrinking the window to just fit the list.

Use the Finder to automatically sort the file and folder icons for you. You can organize them by name, date modified, size, or type. Start by selecting one of the sort commands from the View menu (such as By

Name for alphabetical order). Choose Select All from the Edit menu, then drag all the files onto the open desktop. Before you do anything else (don't let the files become deselected), choose By Icon from the View menu, then Put Away from the File menu. The Finder will bring in each icon in alphabetical order. You can sort by date, size, or type in the same way. Repeat the process for each folder that's full enough to warrant sorting.

- Place little-used files on floppies. Don't be tempted to put all of your files on the hard disk. Some applications and documents may not see much use; placing them on the hard disk takes up valuable disk space and requires that many more floppies when making backups. A good rule of thumb is to keep those files you use less than every two or three weeks on floppies. You can always put a file on the hard disk later if you find you're using it more frequently.

you can rename or delete it without returning to the Finder, or you can create a new folder and place the file inside it.

Pressing the Show Path icon displays the hierarchy of folders, or *tree*, for the highlighted file. The tree is inverted; it starts with the innermost folder (the one that holds the file) and works its way outward.

Search time varies depending on the capacity of the hard disk and the number of files on the drive. A search through about 10 megabytes of data took less than 7 seconds. During the search a bar graph shows the percentage of the disk that's been scanned.

DiskInfo

DiskInfo is a shareware desk accessory from Maitreya Design. It's not a true file-locating program, but it does allow you to manually sift through disks and folders from within any application that supports desk accessories. It's easier to use *DiskInfo* to find a missing file than to open and close folders on the desktop. Although it can't locate files using complex search criteria, such as creation date or specific application, *DiskInfo* can search for whole or partial names.

DiskInfo displays the file's name, size, type, last modification date, and the application that created it. You can also delete and rename files and folders without returning to the Finder.

Cataloging Programs

By cataloging programs, you can get a list of every file contained on a hard disk. Once you've used a hard disk drive for a few months, it's easy to forget exactly what you've put on it. You can print a disk catalog from the desktop with Print Catalog (in the File menu), but it only lists the folders and files immediately visible in the disk window. Since you're likely to have hundreds of other files stored within hidden folders, you can't expect to get a complete listing from the Print Catalog.

Program cataloging records the contents of your hard disk and either displays the listing on screen or stores it in a file for future reference. You can sort the listing in

various ways, such as by name or by disk (for cataloging more than one hard disk or all your floppies). The listing shows you each file's location, creation date, and other pertinent information.

MDCII

MDCII from New Canaan Microcode is compatible with both MFS (Macintosh File System) and HFS and works on any Mac with at least 512K. The utility automatically reads files off a hard disk or any floppy disk in either the internal or external drive.

The cataloging process is not quick: reading, sorting, and categorizing 10 megabytes of data (832 files) took about 3 minutes.

For cataloging floppies, *MDCII* prints the disk contents on a directory label. The program also prints the contents of both floppies and hard disk drives in a report sorted by file name, date created, date modified, size, type, creator, volume name, or category. Additionally, *MDCII* lets you create up to 16 file categories, such as word processing, graphics, spreadsheets, and fonts (the program already has 16 categories of its own).

The program categorizes each file using the file type and creator information, four-letter codes by which the Mac identifies files (see *Get Info*, *Macworld*, July 1985). You can edit the category listings to add or delete file types. For easy identification, icons for each category appear with the listings. You can print the catalog or save it as a text file.

Disk Librarian

Disk Librarian, from Little Bit, is a \$20 shareware utility that's HFS- and MFS-compatible and works with both floppy and hard disk drives. *Disk Librarian* automatically catalogs the current drive; in fact, there is no way to avoid it. To index the hard disk, simply copy *Disk Librarian* onto it.

As with *MDCII*, cataloging time varies, depending on the number of files stored on the drive. I found *Disk Librarian* to be faster than *MDCII*—indexing 832 files in about 1 minute. You can index additional disks at any time. Once you save a catalog, you can reindex it, a process that takes less than a quarter of the original index time.

After cataloging a drive, *Disk Librarian* displays two windows: Disk and

Document. The Disk window alphabetically lists the various disks cataloged and displays both files and folders. It lists file size in kilobytes and prints any folder comments you've entered into the Get Info dialog box. You can also display the file's type and creator. The Document window lists alphabetically all the files from each disk, and Get Info dialog comments for each file can be displayed or hidden.

One of *Disk Librarian*'s best features is its subset dialog box (see Figure 2). The window displays only the files you've specified: files containing a particular text string (for example, all files whose names contain "Mac"), files modified before or after a certain date, files larger or smaller

than a specific size, or files of a certain type or by a particular creator. A type or creator subset listing is especially useful. By entering MPNT in the file "creator" box, for example, you can find all documents made by *MacPaint*. Or you can find all application programs by entering APPL in the "type" box. If you don't know the creator or type codes for a particular file, you can check the listing in the Disk or Document window. This technique is by no means simple, but it works.

Once the files and disk are cataloged, you can print listings or save them for later use. Saved catalogs must be opened with *Disk Librarian*.

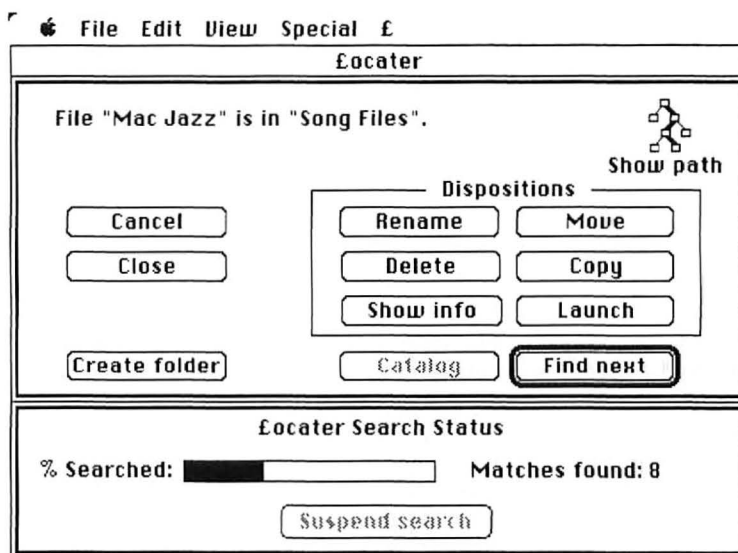


Figure 1

HFS Locator roots through disks and folders to find files that meet your search criteria. You can find files by whole or partial name, application, and date created or modified.

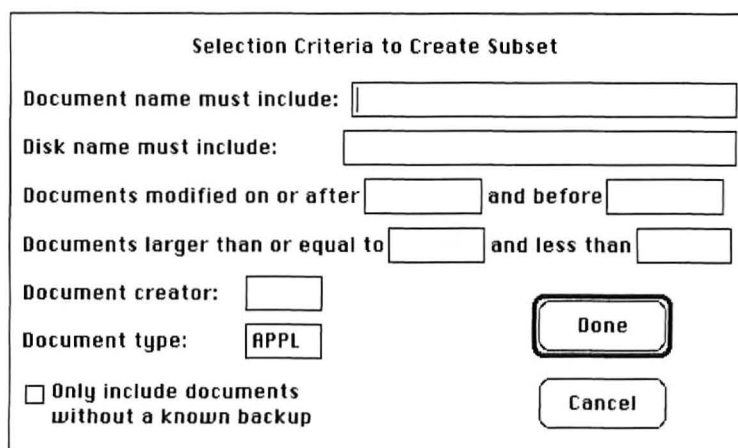


Figure 2

The subset dialog box in *Disk Librarian* creates a separate directory, listing only certain files on the disk. The Type and Creator boxes let you restrict searches for documents and applications using the Mac's internal file codes. For example, entering APPL into the Type box, as shown here, finds all the applications on the disk.

Utilitarian Alternatives

Several other hard disk utilities are available or were in development at press time. In addition to file locators, catalogers, and backup utilities, there are programs for dividing a hard disk into partitions, recovering damaged files, and running copy-protected programs without using a key disk.

Hard Disk Partition, from FWB Software, divides HFS hard disks into partitions. Each partition can carry password protection to lock out unauthorized users. The program also lets you back up hard disks. Levco, manufacturer of the high-performance *Prodigy*

4, plans a package of utilities for SCSI drives, including a file locator, a partitioning program, a backup utility, and an encryption program. The file locator also works with HFS-compatible non-SCSI drives.

Two products let you upload copy-protected software on your hard disk drive so that you can start the programs from a hard disk without a key disk. These programs remove the copy protection by installing patches, which are available for most popular programs. These programs include *Hard Disk Util* from FWB Software (see *Macware Reviews*, *Macworld*,

May 1986) and *Copy II Hard-Disk* from Central Point Software. These copy programs are intended only for registered owners of the software and should not be used to make illegal copies.

There are no utilities that automatically search for and recover damaged HFS files. However, with some detective work and luck you can use *Fedit Plus* to locate text files by searching for text strings and copying them to new files. Graphics and applications files are far more difficult to recover because they don't contain text strings.

Disk Ranger

Mainstay's *Disk Ranger* is another cataloging utility. Like *Disk Librarian*, it's compatible with both MFS and HFS. The utility reads floppy and hard disks and sorts by name, disk or volume, type, or creator. The catalog window displays the file name, date modified, file type, file creator, size, volume, and folder tree.

Disk Ranger lets you search through the index to find particular files, to print disk labels, and to rename or delete duplicate files. A disk catalog can be saved for later use, either as a *Disk Ranger* document or as a text document. You can edit text documents with any word processor.

Backup Utilities

Data on a hard disk represents an investment of both time and money. Imagine a hard disk drive holding several thousand files: it represents months, perhaps years, of hard work. Now imagine losing it all in a fraction of a second. Although it doesn't happen often, it is possible to lose some or all of the data on a hard disk. You don't need a physically damaged drive to lose data: you might accidentally erase the disk,

or an energy surge might scramble important directory information. Whatever the cause, it prevents you from using some or all of the files on the drive.

Making a copy of the data is the best insurance against accidental loss. To do this, you could individually copy each file onto floppy disks. But few of us have the patience or inclination to conscientiously copy 20 megabytes of hard disk data onto 30 or more floppy disks every few days. Backup utilities automate and simplify the process of archiving a hard disk drive.

Backups can be recorded on floppy disks, another hard disk, or a streaming tape. Archiving data onto hard disks or streaming tapes is relatively easy and requires little user intervention. All the backup utilities covered in this article, except *HD Backup*, can archive data onto hard disks or streaming tape systems in addition to floppy disks.

Floppy disk backups, even with a backup utility, require that you insert disks until the drive's entire contents have been copied. The number of floppy disks you'll need depends on the number and sizes of files on the drive. None of the currently available backup programs compress the data to any extent when making archival copies, so you can assume an 800K disk

will hold about 800K of data. Consequently, a hard disk filled with 15 megabytes of files will require no less than 19 floppies.

Macintosh backup utilities also let you restore the hard disk—should it fail—by copying the archived files back onto the drive. Often an integral part of the backup program, the restore facility also functions as a stand-alone application.

Flashback

Mainstay's *Flashback* lets you back up an entire hard disk or just selected files. Similarly, you can restore the entire contents or just selected files. *Flashback*'s best feature is the method by which you select files for backup and restore. The program depicts the folder tree structure graphically and lets you click on folders you don't want to include (see Figure 3). Anything within the marked folders, including other folders, will not be backed up or restored.

Conversely, *Flashback*'s interactive prompt feature lets you flag the files you want to back up. Using the prompt makes backups extremely time-consuming, because for each file the prompt asks if you want to archive or restore. Fortunately, you can turn off the prompt facility and let *Flashback* run automatically.

You can save backup configurations for future use, and you can make several independent backups of the same drive. You might, for example, select only *Excel* files and folders for backup. Save the configuration file and then recall it whenever you want to repeat the backup procedure for those files.

If the files have already been archived, you can select an incremental backup; this procedure resaves only those files that have been created or changed within a certain period of time and places them on additional disks. When restoring the drive, you insert both the primary backup disks and the incremental backup disks.

The time it takes you to back up a hard disk will, of course, depend on the amount of data stored on it. With initialized disks, you can turn off *Flashback's* Verify Disks option, and the backup process (including swapping disks) takes about 90 seconds per megabyte of data. If the disks are uninitialized, backup time runs considerably longer. Restoring data takes only about half the backup time.

HFS Backup

HFS Backup, from Personal Computer Peripherals, is a straightforward, easy-to-use backup and restore utility. It doesn't have as many bells and whistles as *Flashback*, but it does the same job. The program requires HFS and works with both the Enhanced 512K Macintosh and the Mac Plus.

When you open the program, you're asked whether you want to archive the entire disk or only files that have been modified or selected. When backing up the entire drive, you can identify folders you don't want to archive. Once the drive has been copied, you can make incremental backups of only modified files.

To back up selected files, simply click on the files and folders you want to copy. If you need to back up the same data regularly, save your selected file set for future use.

Archival time with *HFS Backup* is a little slower than with the other backup utilities I tested. One disk worth of data (800K) takes about 2 minutes to copy; that means archiving a 10-megabyte drive takes over 20 minutes. You can trim the backup

time by about 30 percent, however, by turning off the verification and format modes. These safety features are not absolutely required.

HD Backup

PBI Software's *HD Backup* simplifies the archival process by presenting just one window and four options (see Figure 4). If you have more than one hard disk on line, you start by choosing the volume you want to back up. You then select one of four options: Backup all files, Backup changed files, Restore all files, or Restore single file. You cannot, however, back up selected files—a limitation if you regularly back up file subsets, such as all *MacPaint* files. Unless all the subset files have been modified, you'll have to back up all disk files or use the usual Macintosh copy procedure.

HD Backup takes an unusual approach to archiving data. The program backs up by duplicating the hard disk drive

file by file. (For instance, a backup of a *PageMaker* file is simply a copy of the original.) Consequently, *HD Backup* can't split a large file and save it on two or more disks. This means you cannot back up a file larger than 400K or 800K (depending on the capacity of the floppy drive). The advantage of this system, however, is that you have direct access to your data if your hard disk fails completely and can't be restored. With other backup utilities, you must restore the archived data to a hard disk before you can access it.

As the number of files on your hard disk grows, you'll come to depend more and more on utilities to help you through the tangle. After all, when you keep all your work in one place, it's important to know what you've got, how to find it, and above all, how to keep it safe and secure. □

See *Where to Buy* for product details.

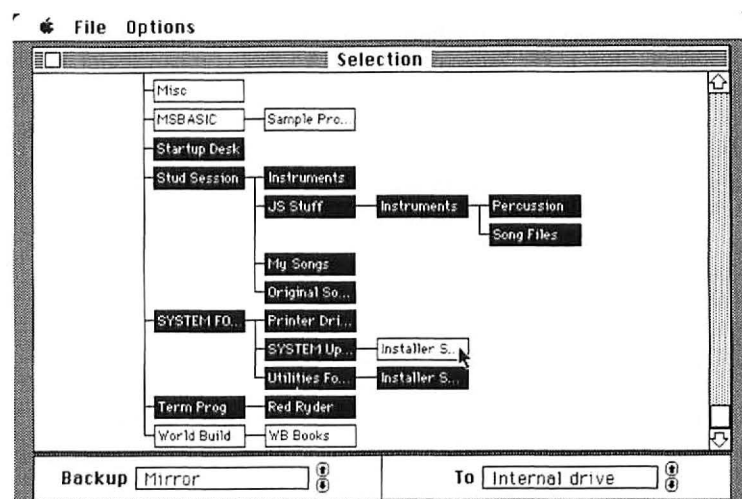


Figure 3

Flashback displays a graphical tree of the folder structure of the disks you're backing up. Clicking on a folder deselects it and keeps its contents (files and other folders) from being archived.

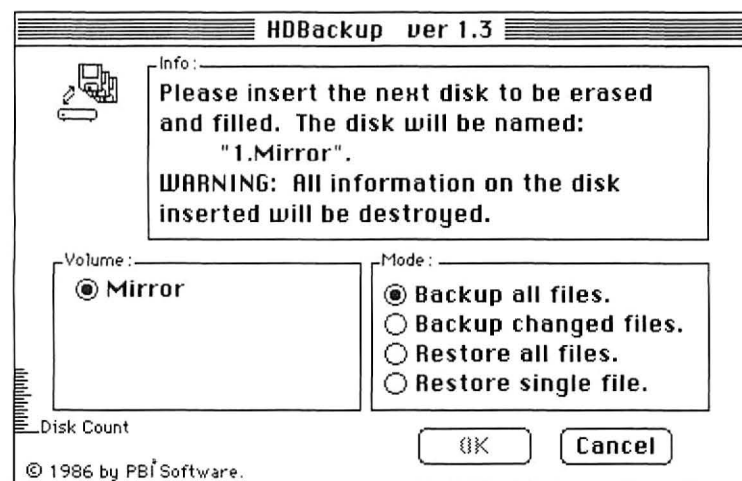


Figure 4

Straightforward and unadorned, the *HD Backup* dialog box provides simple backup and restore functions and allows you to select a backup drive (only one is shown here because no other drives or disks are mounted).

Reviews

Word Processing in a New Style

Laser Quill 1.2

Word processing for the professional writer. **Pros:** Style sheets; extensive type controls; text wraps around pictures; versatile search criteria. **Cons:** Performance degrades with columnar text; somewhat inflexible font and type style changes; limited file transfer. **List price:** \$199.95. **Requires:** 512K. **Copy protection:** yes.



For the last few years, a small development group in Leicester, England, labored to create a sophisticated Macintosh word processor with desktop publishing capabilities. The result of that endeavor, *Laser Quill*, was recently introduced in the United States.

Laser Quill is not intended for the casual user. The program is aimed at professional and technical writers, especially those who write structured documents. *Laser Quill* has a unique approach to formatting documents: it uses style sheets—templates with predefined paragraph and heading formats. And the program's multicolumn capability, page setup, headers and footers, and type controls are superior to those of *MacWrite* and *Microsoft Word*.

Window on *Laser Quill*

When you open a *Laser Quill* document, the window shows the page number and word count as well as the time the document was created. The program lets you have up to four documents open at once and provides a zoom feature for sizing windows on a 512K Mac or on a Mac Plus.

Laser Quill has the standard editing options, including a so-called intelligent cut-and-paste feature that groups words with appropriate spaces and punctuation. You can control the cursor keys from either the numeric keypad, the Mac Plus keyboard, or the original Mac keyboard. Short-cut selection techniques allow you to

highlight words, paragraphs, and entire documents quickly, but you can select a single line only by dragging.

A document's potential size depends on disk capacity and the amount of graphics included, but the absolute maximum is 698 pages or 2246 paragraphs (the maximum paragraph size is approximately 32,748 characters).

Document Formats

You may be accustomed to modifying margins, tabs, and indents with rulers—and to changing line spacing, type styles, and fonts with menu options. *Laser Quill*'s approach to formatting documents differs from those of other Macintosh word processors. With *Laser Quill* you define a set of formatting attributes as one of three styles: heading, paragraph, or highlight (type styles such as bold, shadow, superscript). The styles you define are available as menu options (with corresponding keyboard equivalents), which are saved with the document.

This structure is ideal for legal documents or screenplays that require several formats (see "Customized Paragraphs"). In a screenplay, for example, you define separate paragraph formats for stage directions, dialog, action, and camera lighting directions, rather than inserting and copying a ruler before each paragraph or heading change. You can specify up to 20 styles each for headings and paragraphs and 15 for highlights; you save format sets as style sheets called *Stationery*.

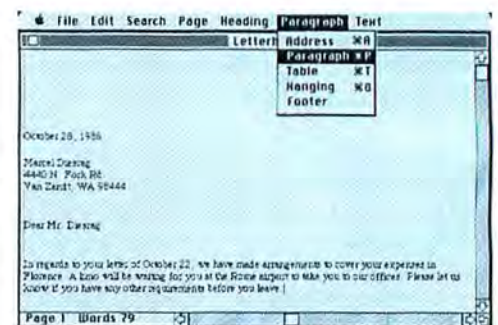
Paragraph and Heading Styles

The key to creating and modifying paragraph and heading styles in *Laser Quill* is the Edit Styles dialog box (see "Style Definition Dialog"). The ruler lets you adjust margins, indents, and tabs (decimal and regular) in inches, meters, points, or picas. When you move the margin or tab marker, the location appears in a digital display at the bottom of the ruler.

The Edit Styles dialog box also has controls for paragraph and heading alignment. Begin Page, for example, forces headings to always begin a new page, and Auto Indent suppresses indentation after headings. Other controls apply to line spacing (in points or lines) and type styles. A Fixed Spacing option maintains the chosen line spacing when superscripts or subscripts appear in a line. You select fonts from a pull-down menu. A display window shows the chosen font, font size, line spacing, and indentation as they will appear in the document.

Highlights

Highlights override the type specifications of the selected paragraph or heading. Standard highlight options include Normal,



Customized Paragraphs

Laser Quill lets you define formats for paragraph and heading text. Definitions, such as dialog or stage direction, can be selected from the menu and the keyboard.



which cancels all highlights and levels of superscripts and reformats the text to the style of its paragraph or heading. Baseline cancels all levels of superscripts and subscripts without affecting other highlights or style settings. Strikeout draws a horizontal line through selected text, allowing you to mark up text without deleting it. When you create highlight options, they appear in the Text menu, called the Style menu in most Macintosh programs. Definable highlights include the basic text style options (bold, shadow, etc.), superscripts and subscripts, and fonts.

A drawback of the system is that you cannot highlight (or make case changes to) more than one paragraph at a time. Furthermore, you can only apply one highlight

option at a time; to work around that limitation you must create a new paragraph or heading definition. Also, if you change a heading or paragraph from one style to another, the highlights applied in the original style carry over to the new one. In such a situation, paragraph or heading definitions should override highlights.

Changing fonts and type styles in *Laser Quill* is not as flexible as in other Mac word processors. To change a paragraph from 12-point New York italic to roman, you must either create a highlight option for that font or add a new paragraph or heading style. The program would be less cumbersome if all the font and type-style options were available as default items in the Type menu, rather than as highlight definitions that must be set by the user.

Frames, Columns, and Desktop Publishing

Laser Quill lets you create movable rectangular frames that can contain text, pictures, or other frames. In a manner similar to that of desktop publishing programs like *ReadySetGo*, *Laser Quill*'s frame option lets you position frames anywhere on the page, wrap text around pictures, and create columns of text that reflow dynamically when you make editorial changes. Each frame displays cross hairs with measurements of the frame in the chosen scale.

As with graphics pasted into other Macintosh word processors, you cannot type text in the margins to the left and right of a frame, but you can arrange groups of frames to work around that limitation. *Laser Quill* lets you clip or scale pictures to fit within frames. A frame attached to a paragraph moves with the paragraph; a frame attached to a page stays in the same position on the page.

You specify continuous text frames to create multiple columns of text that reflow automatically when you make changes. When you fill a continuous text frame, the program generates other frames of the same dimensions. Resizing the first frame of a series resizes all the frames in the series. However, if you create multiple columns of text, you can only resize the frames vertically. Also, performance is hampered when you enter or edit text within frames.

Type Controls

Kerning (adjusting the space between letters) is an important feature for desktop publishing. *Laser Quill*'s kerning capabilities let you vary the letter spacing with normal, condense, and expand icons in the Edit Styles dialog box.

A more flexible kerning strategy in *Laser Quill* allows you to move characters closer together or further apart—by up to seven increments in either direction—a distance equal to one-quarter the width of the space character in the currently selected font. This allows you to form ligatures between two characters, such as *fl*. Superscripts and subscripts are 60 percent of the baseline-character size, and you can increase vertical distance from the baseline by seven levels. *Laser Quill*'s font sizes start at 2 points and go up to 127 points.

An overstrike option lets you type in a character centered over the character immediately to the left of the insertion point. Overstrike is useful for Greek scholars and mathematicians who create special symbols. For example, you can place superscripts above subscripts. Another option allows you to transpose characters—a welcome feature for writers who commonly make transposition errors.

The Hidden Word

Laser Quill's search capabilities are more versatile than those of other Macintosh word processors. The program lets you search for case-sensitive text. It also lets you use special characters that modify the search rules. For example, you may want the wild-card search restricted to a few characters or numbers. You can search for embedded carriage returns (returns not followed by a full stop, like a period), spaces, and tabs. Or you can search for a specific text string at the beginning of a line, such as *The*, or for a class of characters. The Search menu also includes a Go-to-Page option.

Preparing to Print

Laser Quill's Page Setup window shows a scaled representation of the right-hand page (see "Page Setup"). Dragging the page outline area within the frame changes the page margins. The scale measures inches, millimeters, picas, or points.

You can specify the width for *guttering*, which allows you to alternate left and right margins between left- and right-hand pages when printing.

Laser Quill's easily set headers and footers can each occupy up to 25 percent of the page height. You have the flexibility to designate headers or footers on left- and right-hand pages and to format them with heading or paragraph styles. The program gives you menu options for three date for-

mats, five page-number formats, and the time. The headers and footers can also include any text string, frames with pictures or text, and titles from a list of heading styles.

Utilities

Laser Quill keeps track of the vital statistics for documents. Choosing the About... option in the Apple menu displays a window that tells you the number of pages and words in the document, the total time spent on the document, the number of typing sessions, the start date and time of the current session, and other data about the current session.

In addition, you can save documents in a compact form to save disk space, and you can scale fonts on screen. If you have the new ROM, this feature only uses font sizes existing in the System file but positions them as if they were the selected font. Thus, you can choose an 11-point font and not sacrifice speed or clarity on screen, and printing is unaffected. *Laser Quill* is

copy protected, but you can install up to three copies on a hard disk.

The Road Test

Inconsistencies with the Macintosh user interface are minor, once you become accustomed to the program's design. The manual is clearly written and indexed, with a tutorial that leads you step-by-step through the program. The program needs a more flexible design to allow for changing fonts without changing highlight styles. And the ability to transfer material from one document to another should be expanded. You can't transfer style information from one document to another unless both were created from the same stationery pad. A method is needed for transferring styles between documents. For example, moving a heading to a new document should cause that heading style to appear as a menu option in the new document.

Laser Quill only accepts text files, and you can only save *Laser Quill* documents as text files. The company plans to offer a utility that converts *MacWrite* files to *Laser Quill* and vice versa. On the performance side, working with frames to create columnar text is cumbersome, and the program is somewhat slow at reformatting documents as you make editing changes.

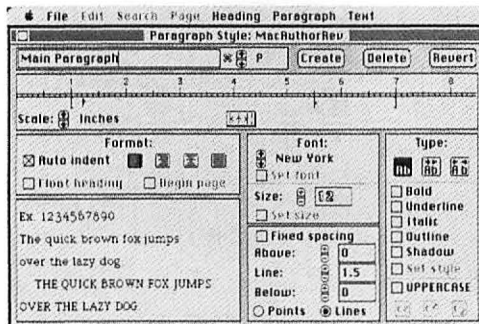
As a tool for professional writers, *Laser Quill* lacks a few options, such as a glossary for storing and retrieving abbreviations and footnoting capabilities. For desktop publishers, the program needs more precise ruler measurements; you cannot specify increments of less than 5 points.

The Final Word

Overall, *Laser Quill* is well suited to people who work with structured documents like books, screenplays, legal and technical documentation, or manuals. And at \$199.95 *Laser Quill* offers a lot of practical features for the price. The program's style sheets, extensive search capabilities, and type and page setup controls allow writers to work more efficiently and easily. And that's what word processing is all about. —Daniel Farber

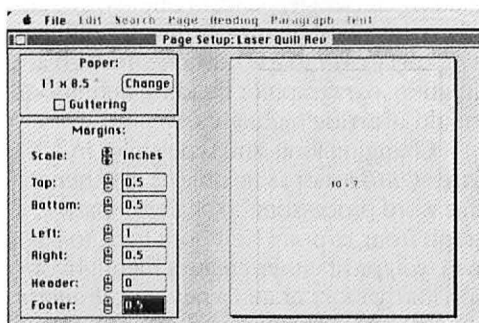
Check your local dealer for availability. Our thanks to the Winner's Circle of Berkeley, California, for an assist in testing *Laser Quill*.

See *Where to Buy* for product details.



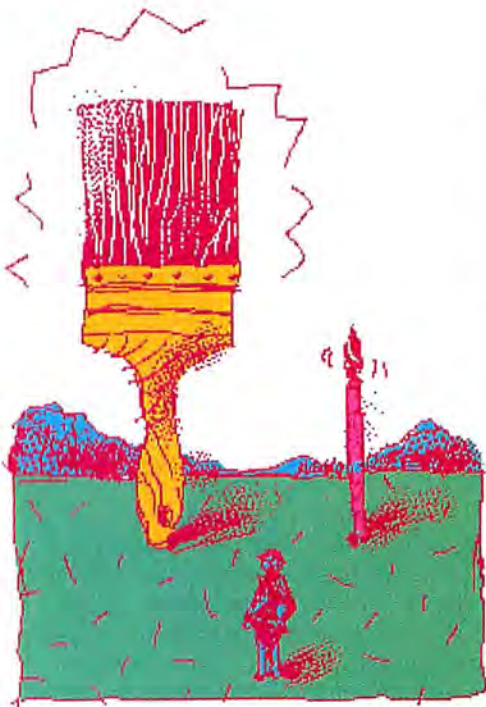
Style Definition Dialog

The Edit Styles dialog box contains all the formatting options you can apply to paragraph, heading, and highlight definitions. For common formats, save the set of style definitions as a template.



Page Setup

The Page Setup dialog box has a page display that lets you set margins by moving the page rectangle. Alternatively, you can type in numbers or scroll to specify page dimensions.



It's a Brush! It's a Pen! It's SuperPaint!

SuperPaint 1.0 (prerelease)

Graphics program. **Pros:** Combines bit-mapped and object-oriented drawing in a single program. **Cons:** A block of text can't contain multiple fonts, styles, or sizes. **List price:** \$99. **Requires:** 512K. **Copy protection:** no.



In Henry Ford's day, you could buy a car of any color, as long as it was black. In Steve Jobs's day, you could use any Macintosh graphics program, as long as it was *MacPaint*. But nowadays consumers are beset with choices. *MacPaint* clones abound, from MacroMind's scaled-down *CheapPaint* desk accessory to Ann Arbor Softworks' upscale *FullPaint*. Now there's yet another graphics program, Silicon Beach Software's *SuperPaint*.

(This review is based on a prerelease version of *SuperPaint*. A few features had not yet been implemented at the time this was written, but we didn't want to hold off covering this impressive program for another month.)

While existing Macintosh graphics programs build on a *MacPaint*-like framework, expanding and enhancing the venerable program's features, *SuperPaint* goes a

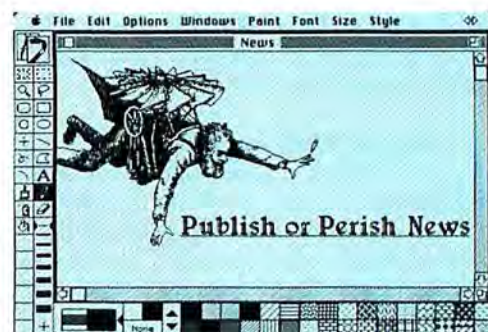
step further. At first glance, the *SuperPaint* screen looks similar to *MacPaint* and its ilk (see "Painting Tools"). But don't brush it off as just another bit-mapped graphics program. Click on the compass icon at the top of the tool palette, and another "layer" appears. Beneath the program's *MacPaint* exterior lies another drawing mode, an object-oriented subprogram that offers many of the capabilities of *MacDraw* (see "Drawing Tools").

SuperPaint is a hybrid that lets you use bit-mapped and object-oriented drawing tools in the same document. It's as if you created an illustration with *MacPaint*, then placed a transparent overlay on the drawing and added elements with *MacDraw*. To switch from one drawing mode to the other, you simply click an icon. The advantages of integrating the two drawing methods are many. For example, you can combine the precise, pixel-by-pixel drawing abilities of bit-mapped graphics with the laser-printing features of an object-oriented program: laser fonts, smoothing, and gray scales. Object-oriented shapes have other advantages: they take up less memory than bit maps, and they can be moved or modified at any time, offering more flexibility than a block of pixels.

While working with two layers may at first seem complicated, *SuperPaint* provides several options that make the artist's life easier. For example, if a drawing contains so many elements that you can no longer remember which segments are in which layers, a Hide Layer command lets you view one drawing mode at a time. In addition, *SuperPaint* allows you to paste a selection from the drawing layer into the painting layer, and vice versa. A selection pasted into the painting layer becomes a bit map, while anything pasted into the drawing layer becomes an object. Yet another option, *SuperPaint*'s "cut-through" tool, lets you copy and paste a section made up of both layers.

A Retouched MacPaint

SuperPaint's painting portion matches the abilities of *FullPaint* and surpasses those of *MacPaint*. The tool palette contains drawing tools familiar to *MacPaint* or *FullPaint* users: brush, pencil, eraser, spray can, paint bucket, shapes, and lines (see "MacPaint: the Electronic Easel," *Macworld*, Premier Issue, and *Macware Reviews*, *Macworld*, September 1986). Several of the tools have been improved, however. For example, the paint bucket can fill an area that extends off the screen; you can draw rectangles and ovals from the center



Painting Tools

SuperPaint provides a selection of tools reminiscent of *MacPaint*, including a brush, a pencil, and an eraser. But it also adds new tools to the old format, such as an arc and a three-level magnifying glass.



Drawing Tools

SuperPaint's drawing mode resembles Apple's *MacDraw*. Tools include a rectangle, an oval, an arc, a polygon, and a freehand shape. Objects drawn in this layer of the program overlap bit maps created in the painting layer.

as well as from an edge; and you can constrain lines to angles of 30 and 60 degrees as well as 45 and 90 degrees. And the program's improved pattern palette offers a None option that makes shapes transparent.

Other enhancements include a magnification tool similar to *MacPaint*'s FatBits, which lets you edit a drawing pixel by pixel. While FatBits comes in one size, *SuperPaint*'s magnifying glass provides three levels: 2, 4, and 8 times original size. And *SuperPaint* reduces as well as enlarges. Select Reduced View, and a miniature version of an entire page appears alongside a strip of the full-size document. As you work on the document, your actions are duplicated on the miniature page. Yet another new feature is *SuperPaint*'s Arc tool, which draws a quarter of a circle

or an oval; the tool draws a solid wedge in the current pattern, or a curved line if the "none" pattern is selected.

Picture Windows

In addition to improving several tools and adding others, *SuperPaint* rectifies one of *MacPaint*'s major flaws: its small drawing window. For starters, *SuperPaint* lets you use the entire screen as a drawing area. Commands allow you to hide the pattern and tool palettes, as well as expand the drawing window to fill the screen. Two scroll bars let you move a document horizontally or vertically. Finally, many of the tools—the marquee, lasso, line, and shape tools—cause the document to scroll when they hit the edge of the window. The latter feature allows you to draw, modify, or cut and paste large areas.

Unlike *MacPaint*, *SuperPaint* lets you work on several documents at once. You can switch from one document to another by clicking on the document's window or by selecting its name from the Windows menu. This feature makes it possible to cut and paste among documents without quitting one and opening another.

MacPaint was never meant to be a text editor. Neither was *SuperPaint* in its painting mode, but the program once again improves upon its predecessor. In *MacPaint*, once a line of text passes the edge of the drawing window, it's lost. *SuperPaint* text, however, seems to push the document ahead of it as text reaches the right edge of the screen. As well as scrolling horizontally to accommodate a long line of text, the program also scrolls a document upward when text reaches the bottom of the screen. *SuperPaint* text is not confined to basic black; you can also type letters in a design selected from the pattern palette. Like any other part of an illustration done in the painting mode, text becomes merely a pattern of pixels once you finish typing it. For more flexibility in editing and printing text, you must use the drawing portion of *SuperPaint*.

SuperPaint and *FullPaint* provide many of the same improvements over *MacPaint*: multiple windows, scroll bars, a full-screen drawing area, and options such as slanting, distorting, or rotating a selected portion of a drawing. But there the similarity ends. *FullPaint* is a bit-mapped graphics program, plain and simple. *SuperPaint* goes beyond bit-mapped graphics, adding an object-oriented mode that is similar to *MacDraw*.

Slick on the Draw

Unlike *SuperPaint*'s painting portion, which adds to the capabilities of its ancestor, *MacPaint*, the program's drawing half doesn't improve upon *MacDraw*. For example, *SuperPaint* doesn't provide *MacDraw*'s multipage documents or scaling and measurements features. But *SuperPaint* does include many of the features of Apple's program, and a few enhancements as well. (If you're unfamiliar with *MacDraw*, see "The Electronic Drafting Set," *Macworld*, September/October 1984.) In the drawing mode, you can create lines,



SuperPaint fixes one of *MacDraw*'s major flaws: its small drawing window.

arcs, rectangles, ovals, polygons, and free-form shapes, which you can move, resize, fill with patterns, and otherwise edit. As in the painting mode, you can draw ovals and rectangles from the center out as well as from an edge. And in both drawing and painting mode, shapes cause a document to scroll when they hit the edge of the screen, allowing you to create large drawings.

When you select a shape, it's surrounded by "handles" that let you shrink, enlarge, or distort the shape. As in *MacDraw*, you can group a number of shapes into a single object and ungroup them if necessary. You can move a single object or select and move a number of objects at once. Shapes can be brought to the front or the back of a drawing, duplicated, or transformed into a bit-mapped image. Another option lets you designate objects as transparent, allowing underlying objects to show through.

Text and Printing

For many people, the most useful aspect of *SuperPaint*'s drawing mode will be its ability to print laser fonts. When typing text in drawing mode, you click on the Text icon and then draw a box in which to type. The program provides two types of text boxes: "snap-to" boxes start out small and grow to accommodate text as you type, while "layout" boxes are drawn at a specific size before text is typed. Layout boxes work

well in newsletters and the like, where you must insert text in a column or box of a predefined size. Both types of text boxes allow you to edit text at any time, select a border, and add a background pattern in any of 32 levels of gray scale. Unfortunately, a box can contain text of only a single font, size, and style. For desktop publishing applications, this limitation is a major handicap. (Mindscape's *ComicWorks*, another graphics program, provides more flexibility in the text-editing department; see *Macware Reviews*, *Macworld*, September 1986.)

SuperPaint has other printing pluses. An option called LaserBits lets you edit a bit-mapped image before printing it on the LaserWriter. A bit-mapped drawing is first saved as an object in the drawing portion of the program. The "bit object" is then enlarged, allowing you to edit the picture in an environment similar to that of *FatBits*. The edited image is then reduced to its original size. When printed, the picture will take advantage of the LaserWriter's 300-dots-per-inch resolution. The LaserBits option allows you to overcome the "jaggies"—rough, ragged lines found in *MacPaint* drawings printed on the LaserWriter. Another option scales a selection to half its original size, maintaining its resolution for laser printing, as if you'd selected 50 percent reduction on the LaserWriter. According to a Silicon Beach representative, *SuperPaint* will automatically compensate for the slight difference in size between printed bit-mapped and object-oriented graphics, ensuring that the printed image closely matches what you see on the screen.

In addition to LaserWriter and ImageWriter printing, the program supports color printing on the ImageWriter II. In the drawing mode, you can select an object or group of objects and assign a color to that part of the drawing.

Now for the ultimate question. Should you purchase *SuperPaint* or go with *FullPaint* or *MacPaint*? I'll take the car analogy a step further: if you had a chance to buy a BMW or a Chevy Nova at roughly the same price, which would you choose? *SuperPaint*'s combination of bit-mapped and object-oriented graphics tools puts the program in a class by itself.—*Erfert Nielson*

See *Where to Buy* for product details.

The Buffer Zone

Max Printer Server/Buffer 2.2

Printer buffer. **Pros:** Easy-to-use cut-sheet mode; AppleTalk compatibility allows sharing with up to 31 computers. **Cons:** High price; cost-effective only in high-volume printing situations; incompatible with programs that bypass Mac print manager (OverVue, Smartcom II). **List price:** 2.21 with 256K \$449; expansion board \$249. **Requires:** 512K.

MacBuffer 2.2

Printer buffer. **Pros:** Can be shared by two computers. **Cons:** Inflexible cut-sheet mode; high price; cost-effective only in high-volume printing situations; incompatible with programs that bypass Mac print manager (OverVue, Smartcom II). **List price:** version 2.3 with 256K \$299.95; upgrade to 512K \$150; upgrade from 512K to 1MB \$250; upgrade from 256K to 1MB \$400; adapter cables for the Mac Plus \$13, for the ImageWriter II \$15. **Requires:** 128K.



There's a joke among mountain climbers that says if you lose your footing, it isn't the long fall that hurts, it's the sudden stop. Using an ImageWriter is similar: it isn't the long wait for the printer that hurts, it's the sudden stop in your work that occurs when the Mac starts sending data to the printer.

One way to prevent these interruptions is to use print spooling software, which intercepts data destined for the printer and stores it on disk or in memory, then sends it to the printer in short bursts while you continue working. Spooling programs have drawbacks, however; they require a great deal of free disk space or memory, they aren't always reliable, and not all spoolers let you print on single-sheet paper.

For a faster and more reliable (although far more expensive) alternative, try a printer buffer such as Ergotron's MacBuffer or DataSpace's Max Printer Server/Buffer. A buffer is a hardware device containing memory chips that store the data coming from the Mac. The buffer's microprocessor then communicates with the printer, letting you go back to work. Both buffers I tested also let more than one Mac share the same ImageWriter; the MacBuffer



FRED STINSON

provides ports for 2 Macs, while the Max provides an AppleTalk connector that lets up to 31 Macs share an ImageWriter. Both make printing more convenient, but you must weigh the added convenience and productivity against the cost.

Preparing to Buff

Both the MacBuffer and the Max are easy to set up and use. Attach your ImageWriter to the buffer's printer port, then attach the buffer to your Mac. You can use either of the Mac's serial ports, except when you're using the Max under AppleTalk. In that case, you attach a standard AppleTalk connector to the Max. Both units are powered by a bulky AC adapter that overlaps a second outlet on most power strips.

Next, copy the supplied printer drivers to your start-up disks. At this writing, both firms' drivers are modified versions of Apple's ImageWriter driver 2.2, although Apple has released version 2.3. (See *Getting Started* in this issue for more information on printer drivers and version numbers.) Representatives from Ergotron and DataSpace report that upgrades will be supplied free of charge. Neither buffer forces you to replace your existing Image-

The DataSpace and Ergotron buffers provide a fast and convenient, though more costly, alternative to print spooling software

Writer file; using the Chooser desk accessory, you can switch between it and the buffer's driver (and any other printer drivers you may use).

If you use the Max on an AppleTalk network, you can perform an optional installation step: naming the buffer. Just as each Mac and LaserWriter on an AppleTalk network has its own name, you can name the Max using an application that comes with the unit. The unit's preset name is "Max Print Server," but you might want something more descriptive, such as "Network ImageWriter."

Buffer Performance

Normally, the Mac sends data to the ImageWriter at 9600 bits per second. Because the buffers can accept data at much faster speeds, however, their drivers boost the data transfer rate to 230.4 kilobits per second (230,400 bits per second) for the Max and 56.7 kilobits per second for the MacBuffer.

Those figures would lead you to think the Max is four times faster than the Mac-Buffer, but it isn't so. The Max may be able to receive data four times faster than the MacBuffer, but the Macintosh can create the data only so fast. Therefore, the difference between the units' transmission speeds doesn't create a significant disparity in actual performance. Indeed, the Mac-Buffer and the Max ran neck-and-neck on the test track, and in some tests, the Mac-Buffer was slightly faster (see "Buffers Benchmarked").

Printing on single sheets is always a sticky problem for a spooler or a buffer. The buffer is ready to take all the data from the computer at once, but the computer is programmed to pause so you can insert new sheets of paper. The MacBuffer and the Max take different approaches to solving the problem. With the Max, you click the Print dialog box's Hand Feed button as you normally would. Instead of displaying the "please insert the next sheet" dialog, however, the Max driver sends the entire document to the buffer, and the single-sheet light illuminates. The buffer pauses between pages, waiting for you to press a front-panel switch to print each page.

The MacBuffer's method is not as elegant. To print on cut sheets, you press the buffer's single-sheet switch once (twice for 8½- by 14-inch paper). You then print the document with the Mac's Automatic (continuous-feed) option set. The Mac thinks it's printing on continuous-feed paper, so it sends data continuously. The MacBuffer, however, pauses between sheets, blinking an indicator light until you change sheets and press the single-sheet switch again.

This more awkward approach also eliminates printing single sheets on any size paper other than 8½ by 11 and 8½ by 14.

In my tests, both buffers performed reliably. You can encounter some pitfalls, however. If a software developer bends Apple's rules and sends print data directly to the serial port instead of going through the Mac's print manager, that application won't work with a buffer. Most programs do work properly, but two notable exceptions—Hayes's *Smartcom II* and ProVue Development's *OverVue*—do not. *OverVue* users must print reports to a disk file, then use a word processor to print the disk file.

A High Price to Pay

Although the speed differences between the two are slight, I prefer the Max to the MacBuffer. Its slick approach to single-sheet printing is more versatile than the MacBuffer's, and its AppleTalk compatibility means more Macs have access to an ImageWriter, a boon to offices with overworked LaserWriters and underutilized ImageWriters. The Max cannot buffer output destined for a LaserWriter, although DataSpace is working on a LaserWriter buffer. Ergotron is also developing a LaserWriter buffer; each firm expects its product to be available before the year is out.

Unquestionably, the Max and the Mac-Buffer minimize the waiting inherent in printing, but there's a hitch: depending on memory capacity, either buffer costs between \$300 and \$700—about the same as an ImageWriter. If you want two Macs to be able to print hard copy, you might be better off buying a second ImageWriter and

spooling software; that way, you'll have a spare printer in case one breaks down. The Max and the MacBuffer both do a good job, but you'll have to do a lot of printing—and have very little patience for waiting—to make either one earn its keep.—*Jim Heid*

See *Where to Buy* for product details.

The Fountain of Fonts

LaserWorks 1.1

Font editor. **Pros:** Interface and quick print tests will especially appeal to type designers new to computers. **Cons:** Not a full-featured professional font editor. **List price:** \$299. **Requires:** 512K. **Copy protection:** yes.



Granted, type design is not for everyone. It's an arduous, exacting art costing as much as \$200 an hour for professional work. Yet increasingly, novice desktop publishers as well as graphic designers and commercial artists are looking for tools that will let them take full advantage of the LaserWriter's high-resolution graphics. These users want to design laser fonts and graphic characters that can be downloaded to PostScript-supported printers or phototypesetters.

The first PostScript-defined font editor to heed the call for custom character generation was Altsys's *Fontographer* (see *Macware Reviews*, *Macworld*, July 1986). Now *LaserWorks*, a new font editor from EDO Communications, offers similar capabilities but at three-fourths the price of *Fontographer*. How do they compare, and which edit-a-font program is for you?

Comparison Shopping

Each program provides two basic methods for creating fonts, logos, and other graphic elements. You can copy and modify an existing font, using it as a template, or you can design a totally new font. Like *Fontographer*, *LaserWorks* uses PostScript's "path construction" technique, which means you define and edit a font by entering and adjusting control points along the font's contour (see "Creating a Font"). The program automatically connects these points to form the font's outline, which you

Document printed	MacBuffer	Max (AppleTalk)	Max (single user)
Disk catalog, faster quality	0:57	1:04	0:57
28-page MacWrite file, faster quality	10:20	12:35	10:02
28-page MacWrite file, draft quality	2:57	4:04	3:06
19K MacPaint picture, final quality	0:44	1:27	0:45

Buffers Benchmarked

Performance results of the Max and MacBuffer. All tests performed on a Macintosh 512K Enhanced with a MicabDrive AT 20MB hard disk. AppleTalk tests were performed with one user; performance will slow with additional users. All times are in minutes and seconds.

can save and download to a PostScript-compatible printer. You can also install these newly created characters as Macintosh screen fonts.

In addition, both programs let you cut, paste, rotate, mirror, and slant font outlines to your heart's content (see "Getting the Goodies"). You can adjust each character's width and weight and save these permutations as the various members of a typeface family—regular, bold, italic, and so forth.

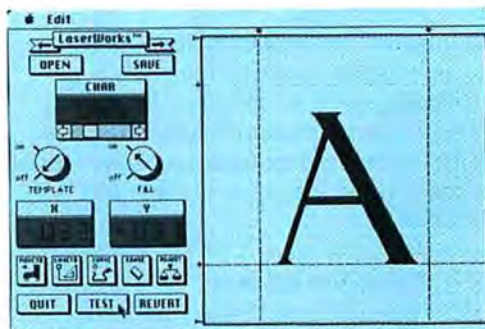
Beyond basics, *LaserWorks* compares to *Fontographer* the way *Avis* compares to Hertz Rent-a-Car: it tries harder. For example, *LaserWorks*' interface is more graphically oriented. Its icon-laden approach enables you to move around the program much faster than you can in *Fontographer*, where most options are tucked away in pull-down menus. *LaserWorks* has shortened its learning curve by providing context-sensitive on-line help and documentation that includes thorough tutorials and reference sections. *Fontographer* lacks such painstaking comprehensiveness.

Performance Factors

On the other hand, *LaserWorks* is not as sophisticated a design tool as *Fontographer*. Head to head, *LaserWorks* has fewer types of drawing planes, control points, and coordinate displays than *Fontographer*—features that are crucial for precision work. *Fontographer* also includes a multiple zoom-in capability that enlarges the drawing area up to four times its normal size, and a first-rate Undo function that lets you effortlessly take back up to eight editing operations. With *LaserWorks*, you must move the character to another window and use a scaling function to make it larger or smaller, and you can only undo operations by using an erase function on a point-by-point basis.

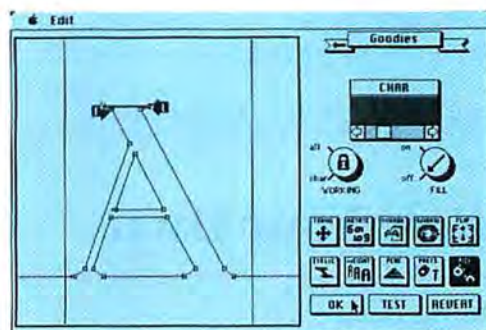
Yet *LaserWorks*' interface and printing procedures make some type designers choose it over *Fontographer*. Most noticeable is the program's congenial interface, with its extensive use of icons and pop-up menus.

Equally impressive is *LaserWorks*' speedy and resourceful print-test capability. As you work on various characters, you can print a copy of each change you make by simply clicking on the Test button. If you're used to waiting for output from a LaserWriter, you'll be surprised at how fast



Creating a Font

In *LaserWorks*' Edit window, you generate fonts by using three control points: Moveto, Lineto, and Curve. For fine-tuning a font outline, Erase, Adjust, and Fill character tools are also available.



Getting the Goodies

In *LaserWorks*' Goodies window, the Pick option lets you copy and save in a Parts notebook a character outline section, such as a serif, to help you build other characters in the same font. Other modifying tools include Translate (move), Rotate, Mirror, Reverse, Flip, Weight, and Peak.

you get the results. The reason is that *LaserWorks* creates fonts directly in PostScript, while programs like *Fontographer* use QuickDraw formulas that must, in turn, generate PostScript.

Furthermore, *LaserWorks* provides a choice of test routines to print out characters in different sizes and styles or in various locations on the page. You can even customize the test procedures by altering the PostScript codes, as *LaserWorks*' manual explains.

Some type designers prefer *LaserWorks* to *Fontographer*, especially those with limited computer experience. Many agree, however, that for the most stringent demands of professional type design, *Fontographer* is still out in front. —Richard Jantz

See *Where to Buy* for product details.

The Mac Hits the Switch

X-10 Powerhouse 1.0

Home control system. **Pros:** The system is relatively inexpensive and is more versatile than conventional timers. **Cons:** Its design can lead to errors in programming the interface. **List price:** interface, software, and cable \$79.99, lamp or appliance modules \$17.99. **Requires:** 128K. **Copy protection:** no.



What can you do about people who forget to turn lights off or who leave the television on all night? How can you give your house or apartment a lived-in look to fool would-be burglars when you're out or away? Plug-in timers are one solution, but they can be a chore to use if you need more than one or two. The X-10 Powerhouse system, a sophisticated timer that you program with your Mac, provides an automatic on/off switch for lights and appliances.

Which Switch to Throw?

The heart of the system is the computer interface, a compact unit (about 7 by 5 by 2 inches) that plugs into a wall outlet. You control lights and appliances by plugging them into modules that respond to signals the interface sends over existing electrical wiring. Each module is identified by a two-character code, such as A2 or B6, that's easily changed; X-10 handles up to 256 separate modules. Available as well are dimmer-switch modules that can change a lamp's brightness setting. X-10 also provides a telephone responder, a radio-operated controller, a burglar-alarm interface, and a thermostat controller.

To program the interface, connect it to the Mac's modem port with a supplied cable. Next, run the *Powerhouse* software, and two windows appear (see "X-10 Powerhouse Screen"). To the right is the Module Map, on which you place icons corresponding to your modules. To guide you, the Module Map provides a floor plan of your working area. (The backgrounds are *MacPaint* drawings that you open from the Open File dialog box. They're easy to

customize, except on a 128K Mac.) You can choose from any of 40 icons representing everything from TV sets to toasters; there are even transparent icons that let the background show through.

Once you've arranged the icons, you can program the interface to control the modules they represent. *X-10* identifies as an event each instruction to turn a light or an appliance on or off. To turn on a lamp every Monday and Thursday at 5 p.m., for example, you select New Event, click on the lamp's icon, and move it to the Events window. Since this is a recurring event, choose Weekly and set the desired time and days. Although it's simple to set the time for an event by pointing and clicking, the option to type in the time would be a welcome feature. Once a module's event has been entered, selecting another icon on the Module Map connects the event to that module also. This feature is handy but makes it too easy to change an event without realizing it.

Finally, click the switch into the "on" position. The scroll bar on the left allows you to set the brightness level of dimmer modules. Checking the box next to the burglar's mask varies the timing slightly for added security. You can review a module's programming by displaying its events graphically. *X-10* lets you print the events list, although you can't display it on screen. As many as 128 events can be programmed, and each event can affect up to 16 modules.

When you're satisfied with a schedule of events, you can save it on disk, send it to the interface, and unhook the interface from the Mac. The interface then works independently, sending commands from its

own memory for the events you've programmed. Even while it's disconnected, up to eight modules can be manually controlled by switches on top of the *Powerhouse*, a handy feature. In case the power fails, battery backup makes sure your list of events doesn't disappear for up to 100 hours.

While You're Away

The *X-10 Powerhouse* should be useful to anyone interested in added convenience or security. Homeowners, as well as offices and businesses, can benefit from this low-cost interface that automatically controls lights and appliances. The hardware and software are easy to use and tie up the Mac only when the interface's programming is changed. And while the *X-10* won't walk the dog, it can cook breakfast. —Franklin Tessler

See *Where to Buy* for product details.

Role Your Own

World Builder 1.0

Game construction. **Pros:** Allows creation of complex text-graphics games with a minimum of programming. **Cons:** Interaction with the games' characters is largely confined to fighting; limited programming language.

List price: \$79.95. **Requires:** 512K. **Copy protection:** no.



For years, role-playing adventures have been the mainstay of computer games. The good ones provide challenging puzzles that add up to hours of enjoyment. But if playing adventure games is fun, imagine being able to write your own. *World Builder*, from Silicon Beach Software, gives nonprogrammers the tools to map out a labyrinth of interconnected scenes, draw the scenes and the characters and objects they contain, and add accompanying sound effects and text. The software handles most of the work that goes into creating a game, so you can concentrate on characters, plot, and action, rather than programming.

At the heart of *World Builder* is a code generator that combines the individual elements of a game—scene backgrounds, characters, objects, text, and sound—and produces a finished game. Completed games don't require *World Builder* or any pro-

gramming language to run; simply insert the game disk and proceed to play. With some ingenuity, you can write games that are every bit as good as those available commercially. In fact, if your game is good enough, you can sell it. Silicon Beach asks no licensing fee for commercial games developed with *World Builder*.

For an example of what *World Builder* can do, take a look at Silicon Beach's *Enchanted Scepters*, which was created entirely with *World Builder* (see *Macware Reviews*, *Macworld*, June 1986). Although *Enchanted Scepters* was written for novice and intermediate adventurers—simple puzzles, no plot line—there's no reason why the game couldn't be more complex. In fact, you can try your hand at improving *Enchanted Scepters*. Use *World Builder* to dissect the game; pull out scenes, characters, and other elements, and rewrite portions of the game to suit your fancy.

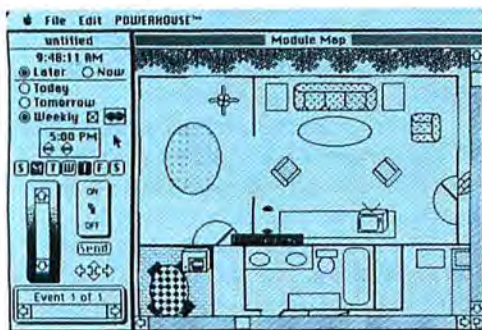
World Builder works on Macs with at least 512K of memory. Although the program works with one disk drive, games over 100K or so require two drives—one for the *World Builder* disk and another for the game disk. A hard disk is recommended if you're working with numerous sounds, as sound files take up lots of disk space.

Although *World Builder* is theoretically capable of generating games with up to 2500 scenes, the actual maximum size of your adventures depends on available disk space. A game with over 200 scenes fits easily on a single 400K disk; an 800K disk holds close to 1000 scenes.

Saved New Worlds

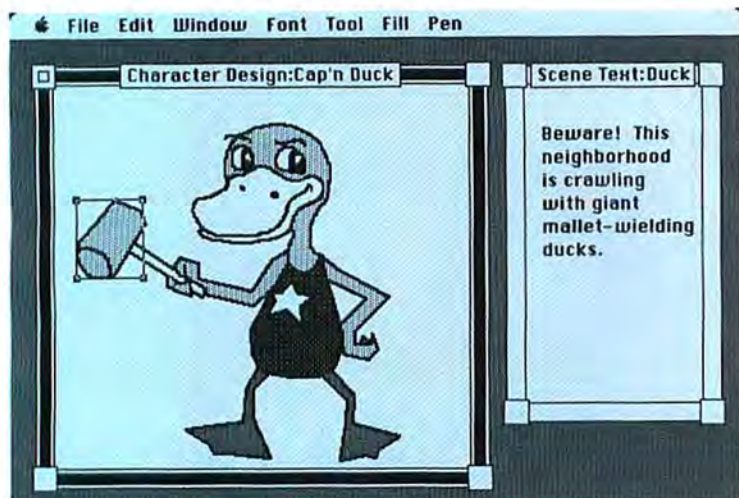
You start work on a new game by opening the World Template. The Template file is an empty world, a world without characters, objects, scenery, or other game elements. Creating a map of your world is the first order of business. You do so in the Scene Map window, which displays a series of small squares representing the scenes in an adventure. In this window you name each scene and drag the corresponding square into position on a scrollable map. Players move between scenes by issuing the familiar North, East, South, and West commands.

Once a scene is placed on the map, you're ready to draw it in the Scene Design window. *World Builder* incorporates a *MacDraw*-like graphics editor for making rudimentary shapes such as ovals, rectangles, and lines. As with *MacDraw*, the



X-10 Powerhouse Screen

On the right is the floor plan of a house with several module icons in place. The floor lamp in the Events window on the left will be programmed to turn on at 5 p.m. every Monday and Thursday.



graphics editor lets you move and resize objects after you've created them. Additional editing commands flip and rotate shapes, smooth or unsmooth polygons, and fill shapes with any of 30 patterns. The graphics editor also produces *MacPaint*-like bit-mapped graphics. But because bit maps take up a good deal of disk space, they should be reserved for drawings that require detail, like faces, hands, or small objects.

World Builder's graphics editor is more than adequate, but it doesn't compete with those of *MacPaint*, *MacDraw*, and other sophisticated drawing programs. If you need extra capabilities, you can create illustrations with one of those programs and paste them into *World Builder*.

The Character Design and Object Design windows also make use of the graphic editor's tools. The Character Design window allows you to populate your world with dragons, demons, robots, or any other creatures you dream up (see "Character Study"). In the Object Design window you draw items that the player will encounter when searching a location.

World Builder lets you assign attributes to characters and objects. Character attributes include physical and spiritual strength, resistance to magic, and tendency to run away when attacked or offered a bribe. Objects are either movable or fixed and are identified as weaponry or garb. *World Builder* treats most characters as adversaries—you fight them when you encounter them. Reducing all the fighting attributes to zero prevents a character from initiating or sustaining fights. You can assign any character as the protagonist and tweak a character's attributes until he/she/it behaves properly.

While not all adventure games include graphics, all rely on a certain amount of text. *World Builder* lets you write descriptive text for each scene. During the game, the text appears next to the scene window. Scene text describes the present location of the player, the directions of various exits, and comments made by other characters in a scene.

Scenes can also be accompanied by sound effects. *World Builder* comes with a small assortment of sounds that you can put in your own games. Libraries of pre-recorded sounds are available from Silicon Beach at \$10 per disk. You can also record your own sounds with the MacNifty Sound Digitizer, available from the Kette Group. *World Builder* includes a utility program that converts and compresses MacNifty sounds for use in games.

Adventure Code

Although you can play out your adventure once the scenes, characters, objects, text, and sounds are complete, it won't be very satisfying. All you can do is roam your world, pick up objects that are strewn about, and fight off monsters.

World Builder adventure code takes care of special tasks that are not automatically handled by the program. For example, you might want to display a message when the player searches an area. The code also brings characters and objects to a scene, prevents a player from completing an action unless certain requirements are met, and tallies points for scoring. Adventure code is relatively simple and takes only a few hours to learn. It's composed of just two string variables, TEXT\$ and CLICK\$, plus an assortment of numeric variables for setting flags and conditions during play. There are only five instructions: If-Then, Print, Sound, Move, and Let. Your code

Character Study
World Builder's graphics editor provides a combination of bit-map and object-oriented drawing tools with which to create adventure-game scenery and characters.

should accommodate any action a player might take in a given scene.

Although adventure code has few variables and instructions to memorize, using it effectively is not always easy. Creating and implementing an advanced feature, such as automatic time-keeping, can be a difficult chore, because it must be done in a roundabout manner.

Sparse Parser and Other Limitations

World Builder is a powerful program, but it isn't without limitations. One of the most serious is the lack of a parser, which breaks down a sentence into the various parts of speech—verbs, objects, indirect objects, and so forth. An intelligent parser, like that found in Infocom adventures, decodes elaborate sentences. Such a parser interprets the command "Pick up the green sword, stab the dragon, and run" as one swift move. Since *World Builder* games have no parser, commands must be ultra-simple. After the dragon is dead, the player can then "run." This elementary command syntax hampers some game designs, especially those requiring frequent interaction with nonfighting characters.

Another problem is the absence of a synonym-lookup table. Some commands are built in, including Look and Get, but the program has no synonyms for these common words. Type "pick up" or "take" instead of "get," and the game responds with "Huh?" or "What?" Clever use of adventure code relieves this problem somewhat, but it's still annoying.

These limitations aside, *World Builder* offers a unique challenge to anyone who enjoys writing fiction. With *World Builder*, a story comes alive with text, graphics, and sound. You can make a game as simple or as elaborate as you wish. Both *World Builder* and *Enchanted Scepters* provide an assortment of scenes, sounds, characters, and objects, so putting together a game can be simply a matter of organizing the pieces the way you want them. Additional *World Builder* data libraries will probably appear on *CompuServe* and other on-line services—as have libraries for popular graphics and music programs—offering a wealth of world-building materials.

Who knows, with *World Builder*, you may be able to create your own world in six days. And on the seventh day, you can play it. —Gordon McComb

See *Where to Buy* for product details.

Big-Time Graphics

PosterMaker 1.0

Giant graphics. **Pros:** Excellent user interface and manual. **Cons:** Effort required to put together a large poster. **List price:** \$39.95. **Requires:** 512K. **Copy protection:** no.

MacBillboard 4.01

Pros: A MacPaint-like graphics program is included. **Cons:** You are limited to five preset enlargements. **List price:** \$35 (shareware). **Requires:** 512K. **Copy protection:** no.

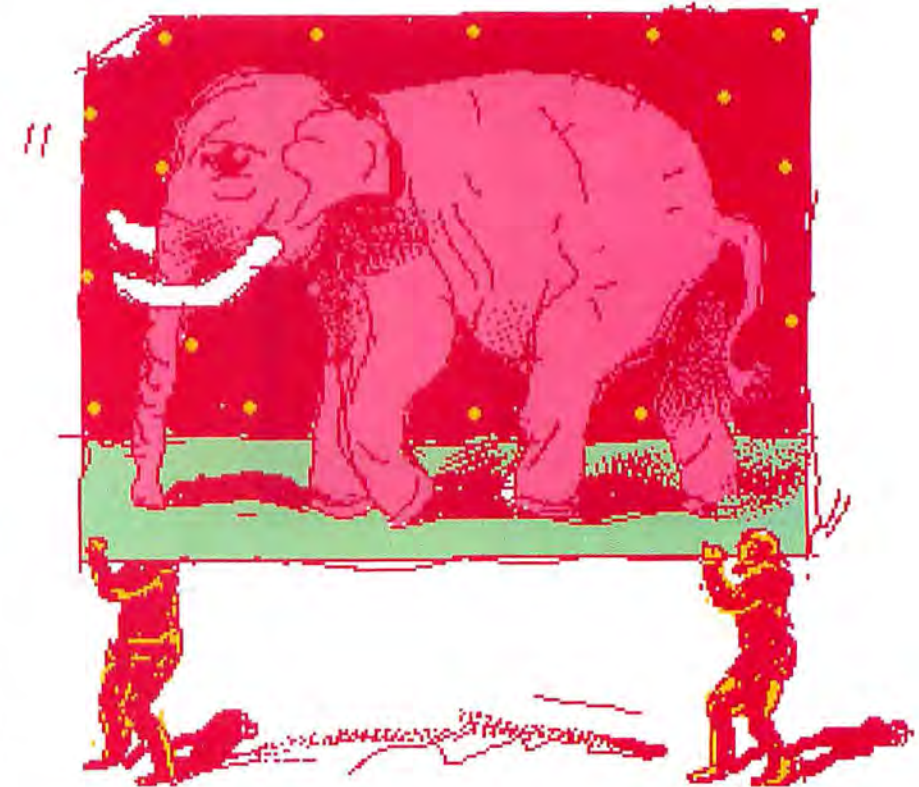


If you want to catch someone's attention, an 8½- by 11-inch piece of paper isn't going to do the trick. You've got to think big. Two new programs—*PosterMaker* and *MacBillboard*—allow you to make giant posters, signs, charts, or banners using the Mac and an ImageWriter or LaserWriter. Either program enlarges a *MacPaint* image up to 32 times its original size, creating a billboard-sized document as large as 21 by 26 feet. The programs print an enlarged image in strips on the ImageWriter or on individual sheets on the LaserWriter. While both programs take care of scaling an image and printing the 8- by 10-inch segments that make up a poster, it's up to you to trim matching edges and tape together or mount the finished product.

PosterMaker

Strider Software's *PosterMaker* is easy to use, with a well-written manual that complements the program. To use *PosterMaker*, open the application and then open a *MacPaint* image or paste in an image from the Scrapbook. Two adjacent windows appear on the *PosterMaker* screen: the window on the right is a movable viewfinder that frames a selected portion of your document at its actual size, while the one on the left shows a miniature version of the entire document, similar to *MacPaint*'s Show Page window (see "Up to Scale").

You can select and print an entire picture or use the program's selection rectangle to surround one section to be printed. Slide the scaling control bar to indicate the percentage of enlargement; the height and width of the poster appear



alongside the left-hand window. If you wish, add a border to the poster by selecting one of nine options in the Borders window.

Once you've scaled an image and selected the portion to print, simply select Print Scaled Poster and wait for the enlarged image to print out. Although the program automatically prints the entire poster, it never hurts to keep an eye on the ImageWriter, which has been known to mangle continuous-feed paper without the slightest provocation. Then trim the right-hand margins of the poster segments (use a ruler to draw a straight edge before cutting, or use a paper cutter to make the job easier) and tape or glue the poster together.

PosterMaker comes with six templates—digitized reproductions of nineteenth-century decorative poster frames. Additional template disks of 20 images each are available from Strider Software.

MacBillboard

CE Software's Don Brown makes no bones about imitating popular software. His *MockWrite*, *MockTerminal*, and *MockChart* have been on the shareware circuit for some time. *MacBillboard*, another shareware offering, could well have been called *MockPaint*, since it bears a remark-

able resemblance to Apple's *MacPaint*. I was pleasantly surprised by *MacBillboard*'s capabilities. Although its crude icons and wordy manual aren't as slick as those of its competitors, *MacBillboard* is a solid graphics program that offers most of *MacPaint*'s features and throws in some extras as well.

Among *MacBillboard*'s features are a scrollable drawing window, three sizes of FatBits, text that extends past the edge of the screen when you type, white-on-black text, and a "live" Show Page window in which you can draw. Also included are a fourfold card template for greeting cards, a utility that reverses images for iron-on transfers, a banner-maker that prints long strips of enlarged text and graphics, and—last but not least—the ability to enlarge and print documents.

Like *PosterMaker*, *MacBillboard* prints images at up to 32 times their original size (see "The Big Picture"). *MacBillboard* is limited, however, to printing in increments of 2, 4, 8, 16, and 32 times original size. *PosterMaker*'s scaling control lets you set any percentage from 1 to 3200. Otherwise, the program's printing capabilities are similar to those of *PosterMaker*.

MacBillboard does have one advantage over *PosterMaker*: in addition to using *MacPaint* graphics, the program enlarges images created in *MacBillboard*, saving you the trouble of switching from one program to another.

I found both programs satisfactory for making poster-size reproductions of *MacPaint* graphics. If your objective is simply to enlarge artwork, charts, signs, or other graphics, I'd recommend *PosterMaker*. It's easier to use and more versatile than *MacBillboard*, and the documentation is much more straightforward. But if you don't own *MacPaint* or another graphics program, I'd urge you to purchase *MacBillboard*, an unpretentious but feature-packed program. (A note to the uninitiated: shareware is not public domain software. Although the authors of shareware programs encourage you to pass their programs on to your friends to try out, they also encourage you to pay for shareware that you end up using. Please help support the "try before you buy" distribution system.)—*Erfert Nielson*

See *Where to Buy* for product details.

The GENie in the CRT

GENie

On-line information service. **Pros:** Easy access; lowest on-line cost; experienced tech support; generally bug-free. **Cons:** Menus don't list all the features; roundtable discussions of uneven quality. **Sign-up fee:** \$18. **Off-peak rate** (6 p.m.-8 a.m.): \$5 per hour (300 or 1200 bps).



The GENie on-line system is one of the newer kids on the block of information services, competing for turf with The Source, CompuServe, and others. Begun in October 1985 by General Electric's Information Services Company, GENie now has 18,000 subscribers, a figure growing by 50 to 100 per day. And compared to its bigger brothers, it's cheap: for a sign-up fee of \$18, you can log on at \$5 per hour between 6 p.m. and 8 a.m.

Is GENie worth it? Well, for starters, it has a pretty broad range of consumer services. You get the electronic mail, a continually updated list of newsletters, a references section, a CB simulator, national real-time conferences, roundtables, shopping services, an extensive "game room," and a section that includes the GENie on-line manual. And new services are being added on a regular basis. During the month I used GENie, several new services appeared, including Grolier's Academic American Encyclopedia. By the time you read this, GENie will also offer airline reservations and other travel services.

Table Talk

Macintosh users will find a number of Mac-specific services on GENie. Besides the "MACazine" (part of the *Computing Today!* on-line magazine), the service offers two Macintosh roundtables. One, Coffee MUG, holds real-time conferences Saturday, Sunday, and Wednesday nights. The discussions get lively, breaking off into separate "rooms" as various subjects evolve. On one night I joined an informed discussion about future Mac products.

Coffee MUG also has an extensive software library, with hundreds of public domain files that cover a dozen different categories, including *MacPaint*; movies,

music, and speech; games; *MacWrite*, *Word*, and fonts; desk accessories; general utilities; communications files; languages; general texts; education; templates (*Multiplan* and others); and new material yet to be classified.

Then there's the Mac developer's roundtable—the Programmer's Club—for the more technically inclined. Messages on the bulletin board and topics in the real-time conference deal with program development, but the software developer's library is a gold mine for programmers and nontechnical users alike. It features bug reports, documentation, numerous utilities, and source code for public domain programs. In the Programmer's Club you'll also find software updates directly from Apple.

Low Cost, Easy Access

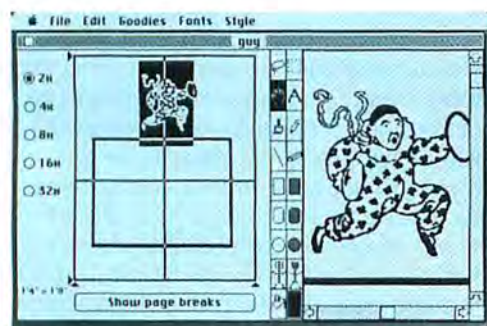
GENie is the cheapest major on-line service to date. With a sign-up fee of \$18.00, it compares well with The Source (\$49.95) and CompuServe (\$39.95). Then there are the connect-time charges. During off-peak hours (Monday through Friday, 6 p.m. to 8 a.m. local time, weekends, and holidays) it'll cost you only \$5.00 an hour to use GENie at either 300 or 1200 bps. (By contrast, The Source charges \$8.40 per hour at 300 bps and \$10.80 per hour at 1200 bps; while CompuServe's fee is \$6.00 and \$12.00 per hour, respectively.) For an extra \$10.00 per hour, you can also access GENie at 2400 bps. And if you need to access GENie during prime time, you can—for \$35.00 an hour. (Obviously, you're discouraged from doing so.) Note, too, that since GE's commercial computer network is one of the largest in the world, it has numerous local access numbers—some 450 in the United States alone. GE claims that getting on line to GENie is a local call in 90 percent of the United States.

GENie makes signing up easy. You don't have to go to a local bookstore. You can do it on line by calling 800/638-8369. Set your communications software for half-duplex, have your Visa, Mastercard, or checking account number ready, and once you're connected, enter HHH and press Return. Wait, and at the U# = prompt, Enter 5JM1999 and press Return again. GENie's main menu will appear, allowing you to explore a bit while you decide if you want to sign up. If you want, you can subscribe on line and a representative will call you back in a day or so with your local access ID



Up to Scale

PosterMaker shows the dimensions of a poster in inches, as well as the percentage a drawing is enlarged.



The Big Picture

MacBillboard provides *MacPaint*-like drawing tools plus the ability to enlarge pictures to up to 32 times their original size.

number. Choose a password and a mailbox name, and you're ready to go. Once you're signed up, you'll get your GENie manual in the mail (though it's also on line).

Taking Requests

If you're interested in one-to-one communications with other Macintosh users and want to keep up with the latest releases and bugs, GENie's worth checking out. Though it doesn't yet have the huge list of features offered by its competitors, GENie has an ear tuned to its users. The service has added features that its users have requested. And at \$5.00 an hour, it's a system you can afford to explore without cleaning out your bank account. —Stan Miastkowski

See *Where to Buy* for product details.

From a New Perspective

MacPerspective 2.0

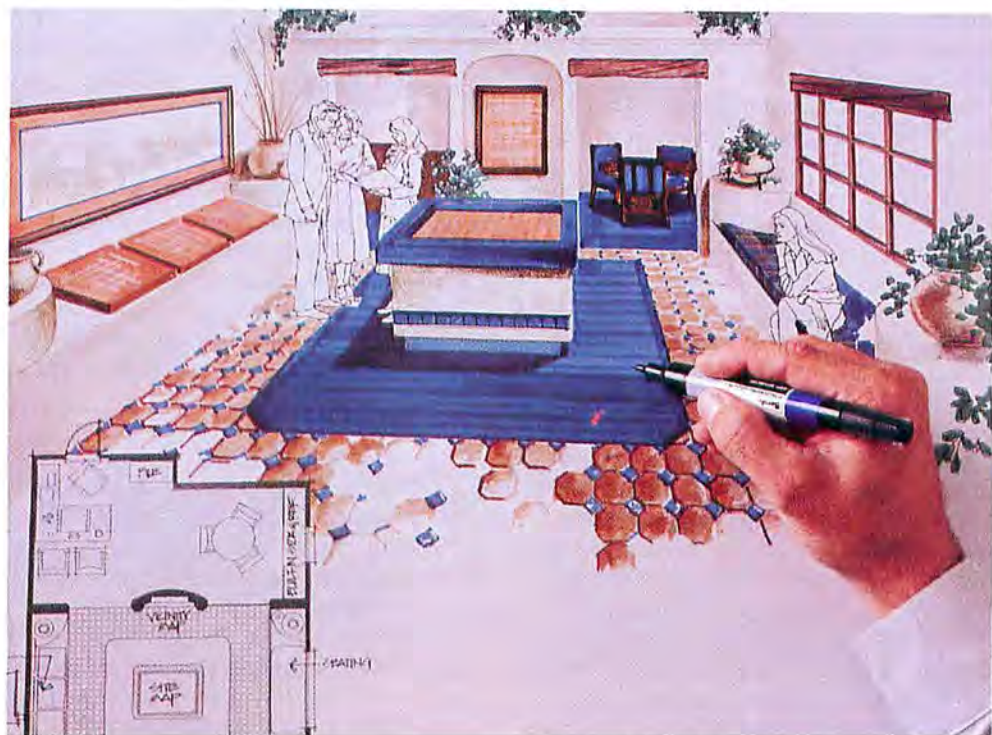
3-D wire-frame drawing program. Pros: Easy to use, productive tool for businesses that require perspective drawings. **Cons:** Drawing size is limited to 3000 points. **List price:** \$149. **Requires:** 512K. **Copy protection:** no.



Cast aside those pencils, extra-long straightedges, and vanishing points that disappear beyond the edge of your drawing board. B. Knick Drafting's 3-D wire-frame perspective-drawing program, *MacPerspective*, facilitates construction of objects composed primarily of straight lines from user-defined points that form the object's boundaries. Written for architects, draftspeople, commercial artists, and illustrators, the program is easy to use and requires no previous knowledge of how to create perspectives. It is helpful, however, to have a basic understanding of the x - y - z coordinate system and of concepts such as cone-of-vision, eye position, and picture plane.

Fast on the Draw

MacPerspective's main strengths over its competitors are its easy data entry and its speedy on-screen object construction.



After completing a perspective drawing, the architect prepares a final watercolor presentation for the client.

The hardest part is getting started. The user is initially asked for coordinates for the eye position and center of vision (that is, where you're standing and which way you're looking) to determine the viewpoint for drawing the object. This can be a difficult decision if you don't have an accurately scaled plan in front of you. The program doesn't provide a default viewpoint, so you must resort to trial and error.

To create an object on screen, line-by-line, type coordinate values representing the various points of the drawing. *MacPerspective* determines the location of each point as it appears in perspective and connects successive points with straight lines.

The program uses a default setting for the starting point, or origin, of the object to be drawn. The origin ($x=0$, $y=0$, $z=0$) is the lower left-hand corner of the view to be created. The screen display includes a coordinate box that gives the coordinates of the current cursor position, with a blank area below for entering new coordinates. You can enter coordinates in absolute (x , y , z) or relative (L[eft], R[ight], D[own], etc.) values. To draw a line 8 feet high (up) from the current cursor position, for example, simply type *U8*.

MacPerspective lets you represent distances in feet and inches or in decimal units. Both formats can be used in the same drawing. The program creates ob-

jects on screen in three dimensions as you enter information and then lets you view and print two-dimensional and axonometric projections (see "Partial Interior"). Once points have been located on the screen, you can move to them or draw lines connecting them by clicking on them with the mouse. To distort the perspective for special effects, such as bird's-eye views or worm's-eye views, you specify the appropriate eye position.

As you add or delete lines, the program continuously rescales the object to fit within the confines of the drawing window, allowing you to see the whole object throughout its construction. You can also zoom in on a portion of the object and continue drawing; to zoom simply drag the mouse over the portion of the object to be enlarged, and it expands to fit within the drawing window. Unfortunately, the program responds too readily to mouse movements, so that a less-than-perfect click of the mouse will be interpreted as a zoom instruction. Then you must wait while the whole object is drawn at a very large scale (off screen) and then redrawn at the normal scale after dezooming. This frustrating sequence happens quite regularly.

Drawing and Quartering

MacPerspective lets you move or copy lines or groups of lines to a different part of the drawing, or via a "3-D Clipboard" to other documents. The program keeps the 3-D information with the copy, so that when you paste it into another document, the appearance of the object varies according to its new location. The paste command is accompanied by upside-down and left-to-right reversal options. Although you can easily paste mirror images and rotations of the original object into place, the program requires that you have a thorough understanding of the x-y-z coordinate system to do so. During the cut-and-paste process, *MacPerspective* presents dialog boxes asking for data about the current location of the object and its proposed location and orientation. Once mastered, the upside-down and reversal options are welcome features, since many perspective drawings include repetitions and rotations of certain objects (doors, windows, etc.). The program also allows you to set up two coordinate systems within one document by specifying the relationship of the second coordinate system to the original one. Tricky, but very useful if a portion of an object sits at an angle to the rest of it.

Where to Draw the Line?

The author has focused the program on the wire-frame modeling of residential designs, which have limited memory requirements. However, the program supports a range of applications, including nonarchitectural graphic illustration, as well as the renderings of interiors and exteriors of large, complicated buildings such

as shopping centers and office developments. However, the program's memory limitations may restrict the level of detail or the complexity of your drawings.

While attempting to represent the interior of a shopping center with a complicated marble-tile paving pattern, I reached the limit of the program's memory and had to create the drawing as multiple documents with identical viewpoints, which I used as a series of overlays after printing. This was acceptable, but cumbersome. The program should be expanded beyond its current software-based memory limitation of 3000 points. Furthermore, *MacPerspective* lacks hidden-line removal, a feature that becomes important as larger documents are created, since many lines are not visible from any one particular viewpoint and are typically unwanted in the printed output.

Looking Around

MacPerspective lets you view objects from as many viewpoints as you wish by specifying new eye positions. You can save and print each of these views as a separate document on the ImageWriter or LaserWriter in any size up to 100 inches wide or high. A dialog box asks for the width of the drawing to be printed. From this dimension, the program calculates the height of the drawing and the number of pages needed to print it, but you can resize it before printing. The program calculates the most economical way to print the drawing (wide or tall), but you can override this feature by choosing a different paper orientation from the standard printing dialog box. However, this action occasionally produces the opposite result than what you expected.

Putting It in Perspective

Despite its few and relatively minor drawbacks and the absence of an Undo command (an unfortunate omission from the standard Macintosh interface), *MacPerspective* is a very practical program that is simple enough to have a wide range of applications. But its real value is in letting you quickly and simply create a drawing that can be seen from numerous viewpoints and then create a hard copy you can use as the basis for a presentation-quality rendering in your medium.—Dennis R. Dornan

See *Where to Buy* for product details.

BASIC Gets off the Street

True BASIC 1.2

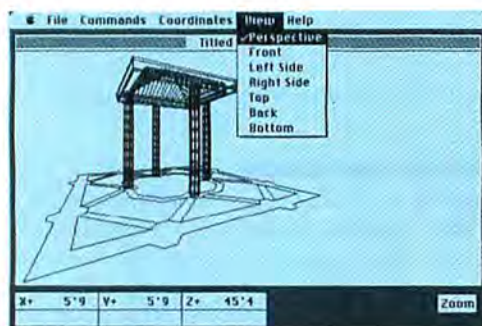
BASIC compiler. **Pros:** Superior control structures, program portability between computers running True BASIC, speed, excellent documentation. **Cons:** Incompatible with existing Microsoft BASIC programs, low-level access to toolbox. **List price:** True BASIC \$149.90, modules \$49.95 each, run-time system (including commercial license) \$150. **Requires:** 128K. **Copy protection:** no.



Since microcomputers began speaking it in the mid-1970s, BASIC has become the world's favorite programming language. Previously, it was popular in schools, having been developed in 1964 at Dartmouth College by Dr. John G. Kemeny and Dr. Thomas E. Kurtz.

But academia's BASIC and the versions found on microcomputers took separate paths toward maturity. Dartmouth BASIC acquired new control structures befitting the new era of "structured programming," a method of program design that makes a program easier to understand, modify, and debug. These additions to BASIC's vocabulary allowed programmers to avoid the hard-to-follow GOTO statement and eliminated the need to number program lines. And as computer output devices changed from clattering teletypes to video screens, commands were added for drawing graphics. Like the rest of the language, these graphics commands are machine-independent; the same BASIC program produces output on different machines without modification.

Microcomputer BASICs, most of which come from Microsoft, evolved differently. Until the release of version 2.0 of Microsoft BASIC (MBASIC) for the Mac, MBASIC required line numbers and lacked the control structures that simplify the writing of well-structured programs. MBASIC 2.0 and its successor, version 2.1, make line numbers optional and add the WHILE...WEND control structure but still lack the wide selection of control statements available in structure-oriented languages like Pascal. Moreover, MBASIC programs are machine-dependent; an MBASIC 2.1 program written on a Macintosh will not run under an IBM PC's MBASIC.



Partial Interior

The object appears on screen in perspective view as information is entered in the coordinate display area. The top row of numbers represents the current cursor location for the beginning of the line, and the empty boxes below tell the program where to position the end of the line.

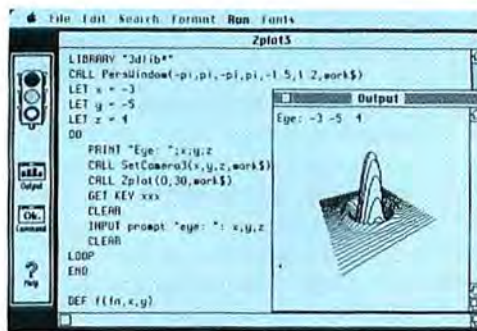
Observing these shortcomings, Kemeny and Kurtz dubbed MBASIC "Street BASIC—a horrible dialect of a beautiful language" and helped design True BASIC, which conforms to a standard proposed by an American National Standards Institute (ANSI) committee chaired by Kurtz. True BASIC is currently available for the IBM PC, the Macintosh, and Commodore's Amiga. True BASIC offers significant advantages over MBASIC, but MBASIC programmers will need to adjust to its differences.

True BASIC differs from MBASIC in three areas: programming environment, program execution, and language syntax. MBASIC programmers will have little trouble adjusting to True BASIC's environment. True BASIC's windows are similar to MBASIC's—the Source window shows a program's listing, the Command window lets you type commands directly, and an output window shows the text and graphics a program produces. True BASIC provides Find and Change commands and also offers niceties that MBASIC lacks: you can change the font size of listing and output text, and the icons in a Control box work as shortcuts for running programs, displaying windows, and summoning help screens (see "Controlling True BASIC").

True BASIC and MBASIC execute programs quite differently. When you run a program, True BASIC compiles it into a compact intermediate code and then interprets it. MBASIC, in contrast, simply interprets a listing on the fly as a program runs. True BASIC's approach has important advantages. The intermediate code is more efficient than the original source code, making True BASIC significantly faster than MBASIC (see "True BASIC Benchmarks"). And since it scans a program before execution, True BASIC is able to immediately report errors such as missing or misspelled keywords. MBASIC, conversely, reports errors only when it encounters them—which could be 10 minutes into a program's execution. Finally, you can save a program in its compiled form, which uses less disk space but can't be viewed or edited.

The most significant differences between True BASIC and MBASIC, however, are in the languages themselves. Few MBASIC programs will run under True BASIC without modification, and vice versa. Space doesn't permit a point-by-point comparison; here instead are the highlights.

● **Portable programs.** A program written in the Macintosh version of True BASIC



Controlling True BASIC

True BASIC automatically scales graphics to fit within the Output window's size. Shown here is the output of a program that uses the optional three-dimensional graphics library.

will run without modification on the IBM PC or Commodore Amiga True BASIC. Because True BASIC translates its own screen coordinate system into the pixel values appropriate to the machine it's running on, even graphics programs are portable. This portability makes True BASIC ideal for schools or businesses that use several brands of computers.

● **Control structures.** True BASIC offers more control structures than MBASIC, giving programmers a larger vocabulary for writing programs that are easy to read and follow. True BASIC adds the SELECT CASE, multiple-line IF... THEN, and DO... LOOP structures found in the ANSI BASIC standard.

● **Matrix statements.** True BASIC provides statements for manipulating arrays, greatly simplifying matrix arithmetic and other array operations.

● **Syntax variations.** The syntax of many True BASIC statements differs from those of MBASIC. For example, True BASIC requires the LET keyword before assignment statements, and INPUT statements appear differently. Also, True BASIC doesn't

permit multiple-statement lines, where each statement is separated by a colon (:). Overall, True BASIC programs are easier to read and understand than their MBASIC counterparts.

● **Macintosh-specific libraries.** True BASIC's developers realize that a portable language can't exploit the unique features of a given machine. True BASIC comes with a library file of extensions that let you open the Mac's Toolbox. Writing a True BASIC program with pull-down menus and other Mac features is more difficult than with MBASIC, however, requiring frequent trips to *Inside Macintosh* and to the reset switch when things don't work. An improved Toolbox library that should simplify writing Macintosh applications should be available by the time you read this.

● **Other libraries and run-time system.** True BASIC sells libraries that add powerful features to the language. Three are currently available: a library of advanced string-handling functions, one for sorting and searching, and one that adds three-dimensional graphics statements. The run-time system lets you turn a True BASIC program into a stand-alone application that doesn't require True BASIC to run.

Is True BASIC a better BASIC? Yes. Should you switch? Maybe. If you want to run existing MBASIC programs, or if you're content with MBASIC's performance and used to its syntax, adapting to True BASIC may be more trouble than it's worth. After all, the metric system is a better way to measure, but few Americans have thrown away their yardsticks. Consider True BASIC, however, if you find MBASIC slow and awkward or if portability is important to you. With its elegant structure and superb manuals, True BASIC is also an excellent choice for the beginner. —Jim Heid

See *Where to Buy* for product details.

	All times in minutes and seconds		
	True BASIC	MBASIC 2.1 (B)	MBASIC 2.1 (D)
Calculate 1651 prime numbers	:10	1:11	1:11
Perform 10,000 calculations	:09	:33	:93
Display 15 lines of text	:00.7	:03	:03
Write 100 records to disk file	:03.4	:04	:04

True BASIC Benchmarks

Performance tests show that True BASIC is considerably faster than MBASIC. All times are in minutes and seconds.



Xmodem Accelerator

TurboDownload 3.1

Communications desk accessory. Pros: Reduces downloading costs for some users by 40 percent; retains Xmodem's standard of error detection; compatible with MacBinary protocol. **Cons:** Incompatible with MacTerminal; does not work with autopilot macros. **List price:** \$39.95. **Requires:** 128K. **Copy protection:** no.



As anyone who uses an on-line service can tell you, the high cost of access is discouraging. Familiarity with the service, autopilot macros, and higher baud rates can trim expenses by reducing your on-line time, but another way to cut costs is to speed the file downloading process. *TurboDownload*, a communications desk accessory from Mainstay Software, lets users retrieve data faster, without sacrificing transmission quality.

Ack and Nak

TurboDownload's secret is the way it sidesteps the Xmodem error-checking protocol. Xmodem is a file-transmission technique for detecting errors in file downloads and retransmitting the suspect information. The host computer sends data in 128K blocks and appends an error-checking code to the end of each block. After receiving a data block, the remote system recalculates the error-checking code and compares it with the code sent by the host. If the codes differ, the remote system sends a character called *nak*, instructing the host to resend (recover) the last block. If the codes correspond, the remote

system sends a character called *ack*, and the host sends the next block.

Mainstay devised a way to speed download time with minimal weakening of Xmodem's error-checking abilities. By sending a steady stream of acks during transmission, *TurboDownload* tricks the host into sending data without waiting for error-checking calculation at the other end. This represents a compromise to the user. Although error detection (but not recovery) still occurs, it's no longer linked to the specific blocks containing errors; thus, any error aborts transmission, requiring you to resend the entire file. The benefit is a reduction in time spent downloading files, and therefore, a reduction in on-line charges.

The Compromiser

Using *TurboDownload* makes more sense for some users than others. Clearly, at \$39.95 it will pay for itself in no time, if it's used daily. But users who download less frequently may not want to give up the error recovery abilities the program bypasses. Mainstay claims that only one in twenty average downloads will fall prey to transmission errors, and the company recommends that *TurboDownload* users stick to short or medium-length files. Common sense says that an error discovered at the end of a 30-minute download will double the on-line charges to 1 hour and lessen *TurboDownload*'s value.

Mainstay's product is compatible with the MacBinary file-transfer protocol and is claimed to be compatible with a host of popular communications programs such as *Smartcom II*, *Microphone*, *Red Ryder*, and Mainstay's own terminal emulation program, *Telescape*. *TurboDownload* doesn't work with Apple's widely used *MacTerminal*, however, and at this point Mainstay has no plans to offer *MacTerminal* users a similar product. Another minor drawback is that *TurboDownload* cannot be in-

cluded in the autopilot macros available in many communications programs. If you frequently use an autopilot sequence to access a particular file on line, you may be irritated at having to interrupt or abort the macro to implement *TurboDownload*.

In several hours of testing, I found no proof to support Mainstay's claims of 50 to 60 percent savings in on-line charges. I did discover a consistent 40 percent reduction in download time while retrieving files from CompuServe at 1200 bps. Used wisely, though, *TurboDownload* can be a real money saver and an asset to your communications setup.—*Scott Spanbauer*

See *Where to Buy* for product details.

Teaching Tools

MicroGrade 1.0

Grading program. Pros: Scoring flexibility and instantaneous grade calculation. **Cons:** Lacks ability to analyze test questions. **List price:** \$95. **Requires:** 512K. **Copy protection:** no.

MicroTest II 1.0

Testing programs. Pros: Test banks are available. Is capable of creating multiple test versions. **Cons:** A serious lack of graphics capabilities. Cannot create divisions within a test. Lacks Macintosh styles. **List price:** \$95. **Requires:** 128K. **Copy protection:** no.



Two of the most time-consuming tasks facing every educator are tracking student grades and preparing exams. Chariot Software Group offers programs that simplify both these tasks: *MicroGrade* and *MicroTest II*. *MicroGrade* is a versatile program that tracks student grades and produces a variety of reports, while *MicroTest II* stores test questions and helps you generate tests.

Making the Grade

MicroGrade has many features and benefits that enhance a teacher's performance and save time. To use *MicroGrade*, start by entering scoring categories and assignments, grade standards, and the class roster. (*MicroGrade* accommodates up to 350 students.) After the initial setup, you enter assignment scores quickly with the program's name-search feature. Weighted-

percentage scoring lets you weight the value of individual assignments independent of the raw score. A preference dialog box lets you set preferences such as grading by total points or weighted percent.

Unfortunately, attendance tracking is not part of the *MicroGrade* program, nor is the ability to analyze individual test questions (although a future release may include this along with the ability to read test scores directly from a Scantron machine). And *MicroGrade* is not capable of transferring information to other programs such as *Multiplan* or *Chart* for further analysis. However, *MicroGrade* does allow you to adjust a class curve instantly by changing grade cutoff values and by updating new scores as you enter them. The program automatically flags changed scores to help you monitor grade security. You may mark assignments incomplete or excused, and you may drop any number of scores. You can sort student information by score, name, or ID number and reinstate dropped students (see "Easy Information Access").

MicroGrade's extensive report generation options include class roster, student summary, dropped students, class standards, overall class grades, grades by assignment, grade book, and statistics. The statistics report shows a bar-graph analysis of individual or class performance. Reports may be printed by student ID for confidential posting.

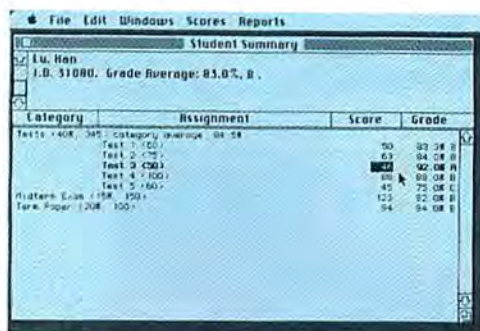
MicroGrade is also useful for on-line student counseling. For students with end-of-semester blues, you can easily project a final grade based on different scoring scenarios.

A Tool for Testing

For creating tests, Chariot Software offers *MicroTest II*. Each test bank, or *book*, you create places test questions in chapters, which you organize by teaching objectives, textbook chapters, or other logical groupings. One chapter can contain up to 200 questions; one book, up to 50 chapters.

MicroTest II allows you to enter free-format, multiple-choice, and true/false questions. Multiple-choice questions offer as many as eight choices, and free-format questions hold up to 1024 characters—too short for lengthy essay questions.

Question design is restricted, since the program cannot create graphics or import graphics or text from other programs. *MicroTest II* only allows a single font and size per question and does not support Macintosh styles such as bold, underline,



Category	Assignment	Score	Grade
Tests (40%)	Test 1 (100)	90	92.00 B
	Test 2 (100)	67	64.00 D
	Test 3 (100)	100	92.00 B
	Test 4 (100)	88	88.00 B
	Test 5 (100)	45	75.00 C
Midterm Exam (15%)	100	125	92.00 B
Term Paper (20%)	100	94	94.00 B

Easy Information Access

With *MicroGrade*, teachers can access different types of information about individual students.

and superscript. To get around these limitations, try specialty fonts like the public domain Princeton font, which provides symbols and graphics characters. You can also output tests as text files for use with programs like *Word*, *MacWrite*, and *Ready-SetGo* to create tests with graphics.

The Final Product

Once you have designed and entered your test questions, preparing a test is easy; just select questions from any chapter.

MicroTest II allows up to 250 questions per test, and you can view the questions before selecting them. You can automatically print up to three versions of each test and answer sheet. The program also handles most test-formatting details for you. It rennumbers questions automatically for each test version, and it can print two independent page headings on the first page or on every page. And an options screen lets you control features like the number of multiple-choice questions and the number of lines between questions and choices. Once you have formatted your test, print it out directly on ditto masters with the ImageWriter.

MicroTest II requires a two-drive system and stores up to 10,000 questions per test data bank on up to nine 400K disks. Unfortunately for users of double-sided or hard disks, the program only uses 400K on each disk or hard disk partition. Also, the program allocates a minimum of 400K for each test bank, no matter how many questions you enter. Chariot Software maintains a library of 140 test banks provided by eight college textbook publishers. The current test banks are primarily in the fields of health, psychology, sociology, business and management, biology, and computers.

The developers of *MicroTest II* are planning a major upgrade with two top priorities: better use of 800K drives and hard disks, and greater flexibility in question entry and test formatting. Other improvements are under consideration, such as a more flexible multiple-choice format and the incorporation of Macintosh styles (underline, bold, etc.). The *MicroTest II* manual—like *MicroGrade*'s—is well written, although it lacks an index.

MicroGrade and *MicroTest II* are time-saving programs for educators. *MicroGrade* helps you closely monitor student performance throughout the grading period with a minimum of effort. And *MicroTest II*, although limited by its lack of graphics capabilities, still saves you time when developing and formatting tests. Both are valuable teaching tools.—David Kater

See *Where to Buy* for product details.

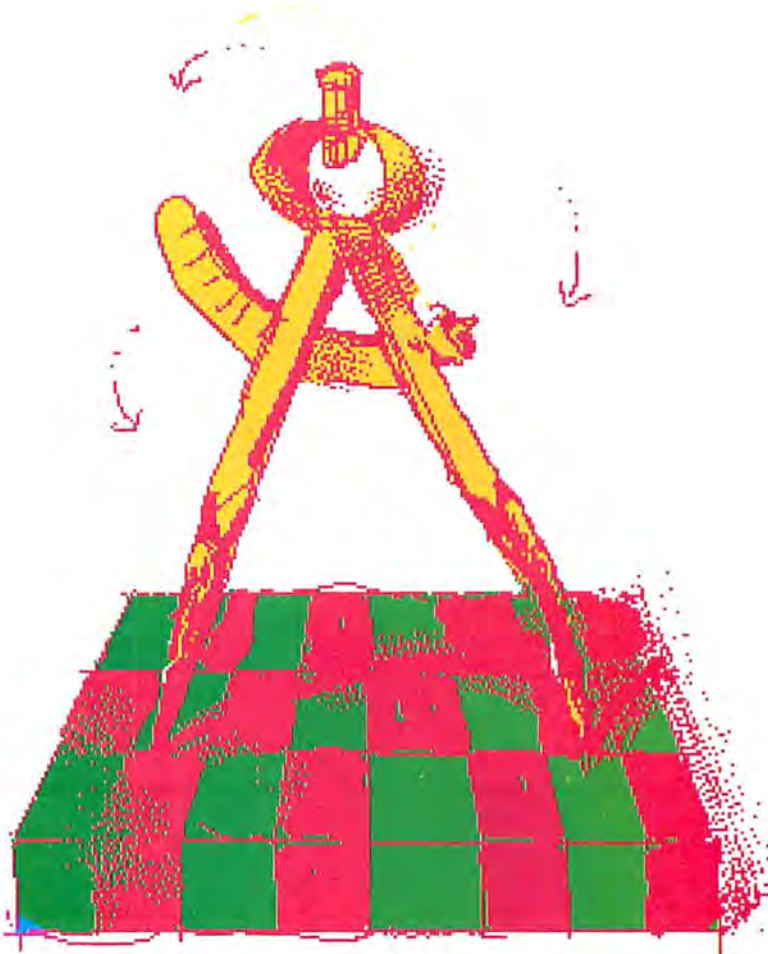
Mapmaker, Mapmaker, Make Me a Map

MacMap

Map templates. **Pros:** Professional-quality graphics and detailed data tables suitable for many demographic applications. **Cons:** Inadequate documentation, second-thought-provoking prices. **List price:** \$75 to \$1170. **Requires:** 128K. **Copy protection:** no.



The *Filevision* programs, *Filevision* and *Business Filevision* (Telos Software Products, Santa Monica, California), introduced a new type of data-management software, linking a traditional database to a graphic image (see "Filevision: A Database in Pictures," *Macworld*, January 1985). By clicking on part of a diagram, you uncover information about the portrayed object. Applications suited for such data-linked graphics include office layouts, warehouse plans, and garden plots, but maps are probably the best candidates for this type of product. By letting the user work with territories, data-linked graphics allow salespeople, political candidates, public utility administrators, and many others to plan their work graphically. But maps are tough to draw, and



creating a database that covers the whole country is doubtfully anyone's favorite pastime.

Strategic Locations Planning has capitalized on this situation by offering *MacMap*—a set of ready-made maps and optional linked data tables for use with *Filevision*. The maps divide the United States into counties, congressional districts, zip code areas, standard metropolitan statistical areas, and advertising regions (areas of dominant influence and designated marketing areas). You can also get a set depicting all the countries of the world.

The templates are divided into two types: polygon templates and point templates. In the point templates, a point symbol, like the city markers on traditional maps, represents each region, thereby displaying several discrete regions in a small space. In the polygon templates, geographic or demographic areas appear as outlined shapes, like the county and country boundaries on standard political maps.

The optional demographic data tables that augment the *MacMap* templates are drawn primarily from United States census data. Strategic Locations Planning offers 11 different tables (though not all are avail-

able for each template) holding copious data on population, household income, age, sex, race, housing value, education, and occupation—all correlated to the regions on the accompanying template. The data tables are updated annually, and updates are available to current users at half price. Prices for the templates vary from \$75—for ten maps depicting the United States by three-digit zip code regions or for a set showing the countries of the world—



Mapping Prospects

Owners of *Filevision* data-management software can analyze demographic data at a glance with *MacMap*'s meticulous maps and linked data tables. This map compares household income for California counties.

to \$400 for a set of 50 templates (one per state) divided by county. The addition of data tables raises the price steeply, however. The latter set of templates accompanied by three data tables will run you \$1170.

To use the templates, you start up *Filevision* or *Business Filevision* and open the needed *MacMap* file. You create the tables you need for your application with Strategic Locations' data tables. After you link the appropriate data to the maps, you shade areas according to the data ranges they represent (see "Mapping Prospects") with *Filevision*'s highlighting options. For point templates, highlighting commands installs an appropriate symbol at each point that matches a specified range.

Political Planning

MacMap's off-the-rack electronic atlas is just the tool for transportation planners mapping bus routes according to population density, retail chains planning new store locations according to household income, or Equal Opportunity enforcers studying patterns of racial distribution. In Michigan's gubernatorial race, Dick Southern uses *MacMap* to determine political preferences and plan campaign strategies in Daniel T. Murphy's bid for election.

Documentation Drawbacks

The templates I worked with were clear and accurate, with ample data for many applications. But while the templates themselves are of high quality, the documentation that accompanies them has a few flaws. Most serious, the manual was written for *Filevision* and has only been minimally updated for *Business Filevision*. Several steps in the tutorial refer to menu choices and procedures not available in *Business Filevision*, without providing alternate methods. The manual would also be more useful if it dealt with specific *MacMap* templates.

Barring these few drawbacks—described by one user as "gnats on a real solid elephant"—*MacMap* is a fine product. Despite its high price, users seem to agree that the graphic presentation capabilities offered by the *MacMap/Filevision* combination is a bargain for any business that depends on demographic data analysis. —Cynthia Harriman

See *Where to Buy* for product details.

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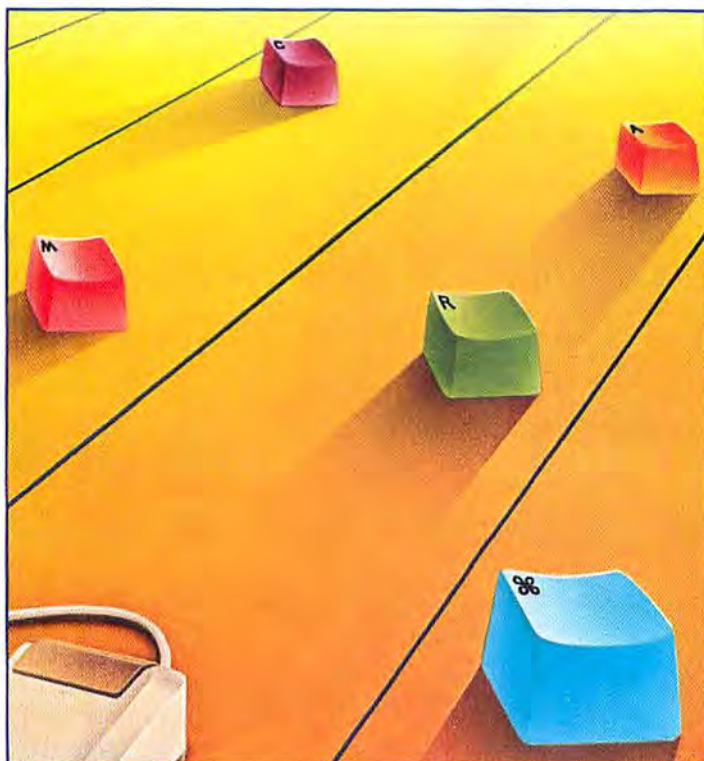
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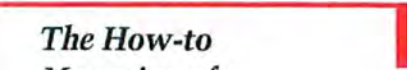
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Courtesy: Bob White, Architect, Fernandina Beach, FL 32034

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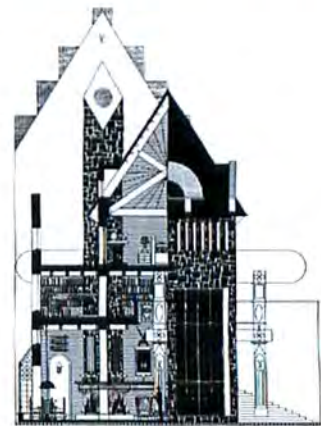
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Quick Tips

Answers to your questions

by Lon Poole

Several readers responded to June's *Get Info* advice not to reinitialize single-sided disks for double-sided duty. Joseph Hofmeister of Cincinnati disagrees with my statement that disk manufacturers test both sides of every disk they make and sell disks that fail on one side as single-sided disks. He contends instead, "Disk makers test both sides of double-sided disks. For single-sided disks, they test one side only. If that works, they wrap it up and sell it without looking at the other side. If the first side they test fails, they turn it over and see if the other side is good. If it is, they sell it as single-sided and forget the failed side." In the June 1986 issue of *MacFUG News* (published by the University of Utah Macintosh Users Group), Deep Disk pseudonymously claims to have heard from several unimpeachable industry sources that there is no quality difference whatsoever between double- and single-sided disks.

Are some single-sided disks sold with good, though untested, flip sides? Probably. But how can you tell which ones? Scott Bongiorno of Santa Cruz, California, asks, "Doesn't someone have a utility program for checking the quality of both sides of a disk?" Let us know if you have one. In the meantime, you can take your chances using both sides of single-sided disks, but I'm sticking with double-sided disks for valuable documents and applications.

Q MacPaint's Font 12

I have used the Font/DA Mover to install fonts in applications—as well as in the System file—by holding down the Option key when I click the Open button. One day, while installing a font in *MacPaint* 1.5, I noticed a font labeled simply 12. The sample showed characters that looked quite interesting. However, I could not in-

stall it on *MacPaint*'s Font menu, and when I tried to copy the font to another disk, I got an error message. Please explain how to access this font.

*Derek Lichter
Queens, New York*

A *MacPaint*'s private font 12 isn't really a font at all. It contains pictures for the tools along the left edge of the program's drawing area and for the 32 tips of the paintbrush tool.

You can change font 12 with Apple's resource editor, *ResEdit*, which is available from most user groups that maintain software libraries. For some reason, *ResEdit* version 1.0D5 works with font 12, but the newer versions 1.0D7 and 1.0D12 do not. Changing the tool pictures has little effect, but changing the brush tips gives you a new set to choose from. For detailed instructions on brush-tip editing, see the sidebar in "Mining the Mac's Hidden Resources" (*Macworld*, July 1985).

Q Mac Typesetting

I would like some information about which Linotronic typesetters to use with an Apple Macintosh.

*Ben Sala
New York, New York*

A Allied Linotype has two phototypesetting machines, the Linotronic 100 and the Linotronic 300. Both use the PostScript page-description language and plug into the AppleTalk network just like a LaserWriter. The most obvious difference between the two models, aside from price, is resolution. The L100 (starting at \$30,950) has a maximum of 1600 dots per inch, and the L300 (from \$55,950) has a maximum of 2540 dots per inch. You'll find other differences too, including the range of font sizes and the type of laser technology.

Both Linotronic machines use laser technology to transfer page images to photographic paper, which the machines develop, fix, wash, and dry internally. Cost per page of printed output ranges from 40 to 75 cents per page. To avoid unnecessary expense, Allied Linotype recommends printing proof sheets for a few cents per copy on a LaserWriter and printing only final copy on an L100 or an L300. For more information, contact Allied Linotype, 425 Oser Ave., Hauppauge, NY 11788, 516/434-2000.

If you can't afford your own Linotronic, there are shops that will print your documents on their machines. The California-based Krishna Copy Center, in Berkeley and San Francisco, charges \$3.50 to \$5.00 per page for output from its self-service L100s, depending on the number of pages. The copy shop prints Macintosh files sent on disk or via modem; call 415/540-5959 for details. Design & Type, a full-service typography and design firm in San Francisco, does L300 output for \$5.00 to \$25.00 per page, depending on factors such as page size, page complexity (graphics take longer to print than text), and number of pages. Call Merrill Shields at 415/495-6280 for more information.

Q Ejecting by Mouse

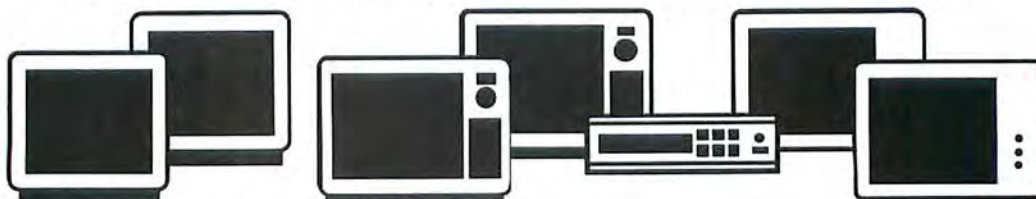
When I try to eject the disk in the external drive by holding down the mouse button while restarting the Mac, the disk doesn't eject. What's wrong?

*Mike Arriola
San Diego, California*

A Pressing the mouse button during restart ejects the disks in both the internal and external drives only on a Mac

(continues)

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TV Monitor**	Composite/NTSC Video	10 Monitors
VCR** (VHS & Beta)	Composite/NTSC Video	1 VCR
IBM Compatible Monitor	IBM Compatible Video	5 Monitors
High Speed Compatible Monitor (22.25 KHZ Horizontal scan rate)	High Speed Composite Video	10 Monitors
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*Maximum number of devices per output is a function of device type and impedance.

**May require use of RF Modulator.

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When all you want is a masterpiece

with the new 128K ROM. On a machine with the original 64K ROM, this procedure ejects the disk in the internal drive but not the one in the external drive.

Q The Chooser's User Name

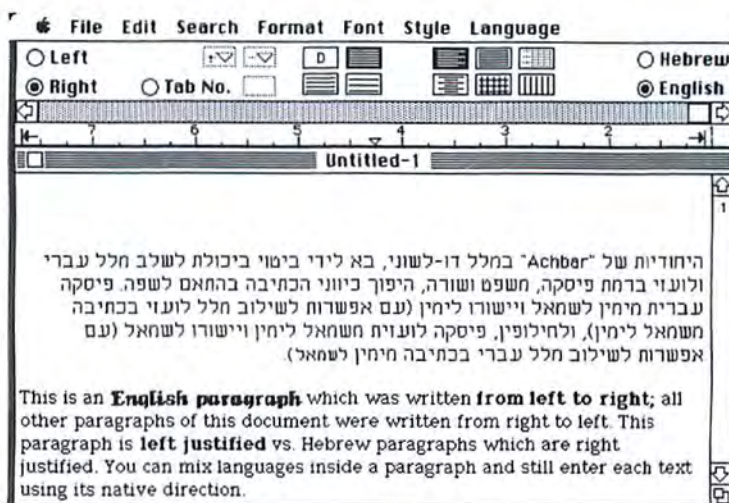
What is the User Name at the bottom of the Chooser desk accessory?

Elizabeth Shaker
Des Moines, Iowa

A The user name is the name by which you, or more accurately your Mac, is known on an AppleTalk network. The name can be up to 31 characters and for best results should be distinguishable from other names on the same AppleTalk network. Since the user name stays in the System file, each start-up disk could have a different identity. To avoid confusion, make the Chooser's user name the same on all your start-up disks.

Q Word Processing in Hebrew

I frequently write in Hebrew using Hebrew fonts on the Mac. Hebrew goes



from right to left, which means I have to type words, sentences, and whole paragraphs backwards. There must be a simple desk accessory somewhere that reverses direction, so that (using Hebrew letters) I can write *shalom* and not *molahs*.

Yosi Gordon
Saint Paul, Minnesota

A I don't know of any desk accessories, but there is a bilingual Hebrew/English word processing application program called *Achbar* (formerly

Bilingual Word Processing

Achbar allows writing and editing in both English and Hebrew. When you change languages, the program automatically changes the direction of text entry.

called *MouseWrite*), from Davka Corporation (845 N. Michigan Ave. #843, Chicago, IL 60611, 312/944-4070; \$199; a version with vowels, \$225, requires an 800K drive). I have not used this application, but I have seen the manual for version 1.1. *Achbar* looks roughly equivalent to *MacWrite* 4.5, except you can freely mix left-to-right English paragraphs and right-to-left Hebrew paragraphs (see "Bilingual Word Processing"). Another notable difference is the

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merge printing feature. A low-cost option enables *Achbar* to handle Hebrew vowels. Maximum document size is 32K with version 1.1, but version 2.0 removes this restriction; the new version, which should be available by the time you read this, permits color printing on an ImageWriter II. Davka also distributes *Notzab*, a bilingual database manager. Both *Achbar* and *Notzab* require at least 512K, and they both work on the Mac Plus.

Q Mac Plus Pinouts

What are the pin assignments for the Mac Plus ports?

Gary Franklin
Patchogue, New York

A The pin assignments, or pinouts, for the Mac Plus are printed in Apple's *Macintosh Technical Note No. 65*. The notes are now distributed through the Apple Programmer's and Developer's Association (290 S.W. 43rd St., Renton, WA 98055, 206/251-6548; membership \$20).

You may be able to photocopy a set from your local Mac user group's library. The notes are also available individually from on-line information services, including GENIE's CMUG roundtable, MACDEV on CompuServe's MAUG, Delphi's ICON-tact database, and local electronic bulletin boards like MacQueue (415/661-7374 or 415/753-3002).

Q Toolbox Contents in 128K ROM

Are there any new Toolbox routines in the 128K ROM (that aren't detailed in the latest *Inside Macintosh*)?

Rob Jones
Juneau, Alaska

A This question, like the last one, can be answered by reading *Macintosh Technical Notes*, in this case numbers 57 and 57a. The information in those notes is too lengthy to permit reprinting here.

Q Persistent Alarm Clock

Is it possible to get the Mac alarm to beep repeatedly? Its single beep just doesn't compel one to jump out of a snug,

warm, four-poster waterbed to turn it off. Now if it were loud and repetitive, it might at least make me turn over.

Ralph Niven
Lexington, Kentucky

A Your best solution is a \$49.95 desk accessory called *Smart Alarms*, which you can buy from software dealers or from its distributor, Imagine Software in Berkeley, California (415/769-4033). *Smart Alarms* sets up to 1600 separate alarms, each with a message you specify. When an alarm goes off, the Mac beeps five times and repeats the five beeps every minute until you either shut off the alarm or postpone it. Alarms can go off whenever desk accessories are allowed, that is, when the Apple menu is available. Otherwise, the alarm sounds the next time you start up the Mac.

An application available from user groups and on-line sources, *The Talking Alarm Clock*, by Steve Maller, displays the current time in 72-point gray numbers against a black background. When this

(continues)

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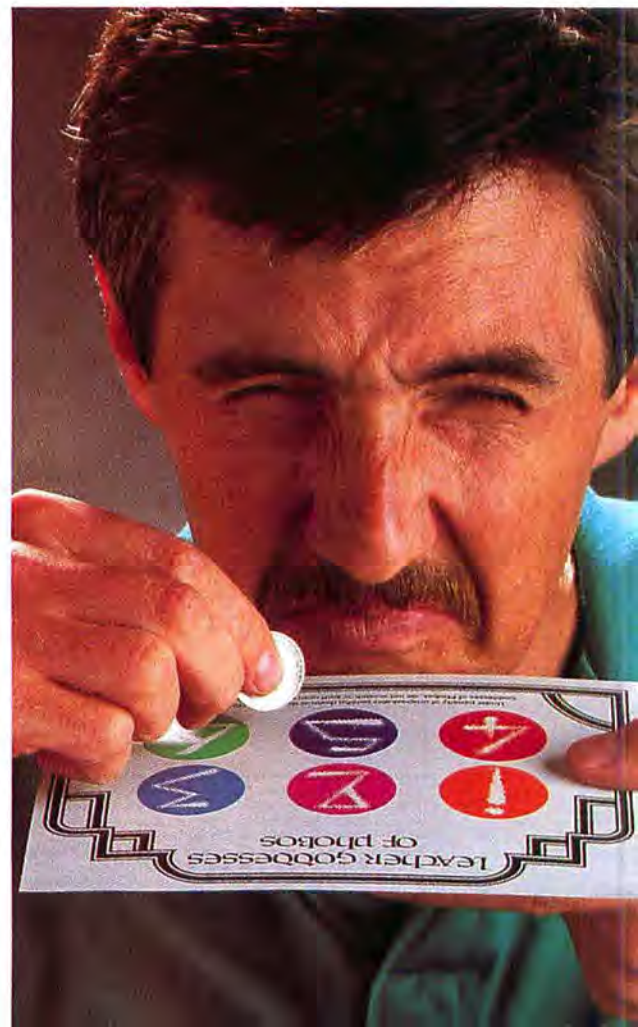
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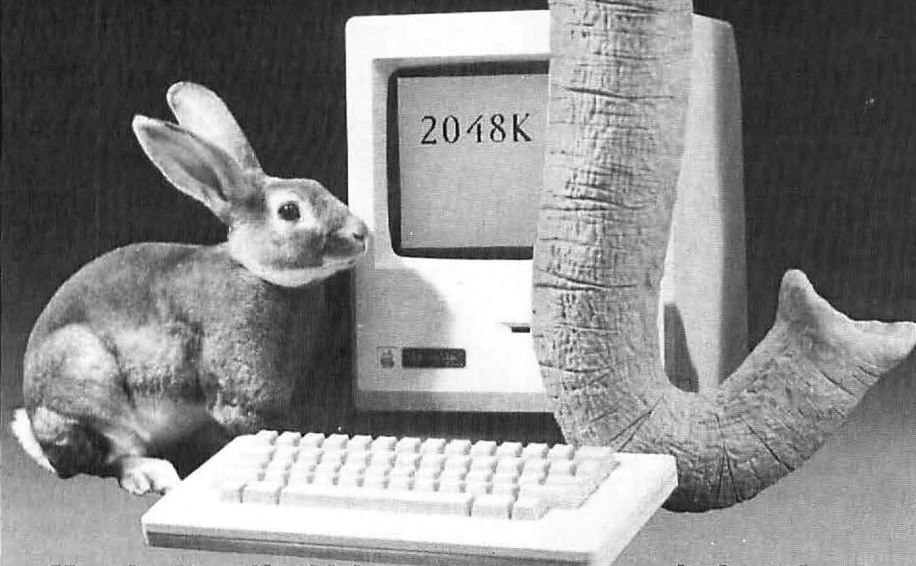
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How To/Quick Tips

alarm goes off, you hear a loud warbling tone followed by a spoken message; the tone and message repeat several times.

Q Temporary files

Many of my disks have generic icons. For example, my *MacPaint* disk shows generic icons named Paint1 and Paint2, and the disk that contains my *Microsoft File* documents has generic icons named MF1, MF2, and so on. I can't open the generic icons with any applications I have tried. What are these files? Is there any way to tell which application opens a particular generic icon?

Jon Smith
New York, New York

Q I am new to computers and to *Macworld*, which is way above my head. In May, you said, "Don't delete any open files or any temporary files with names like Paint1, MW0001, Print File, and Undo File." Why not? I have regularly deleted MW0001, MW0002, and the rest because they took up about 35K of disk space, which I needed for other documents. Have I ruined the program, the document disk, or both? Also, what is an Undo file?

Mary Moody
Hill AFB, Utah

A In answer to both questions: *MacPaint*, *MacWrite*, *Microsoft Word*, *Microsoft File*, and many other applications create temporary files with those odd names and generic icons. Ordinarily, an application removes its temporary files when you choose Quit from the File menu. If you turn the Mac off without quitting, or if a system error or a power failure precludes quitting, the temporary files remain.

Often you can tell which application created a generic file by the file name itself. For example, an MW prefix means *Microsoft Word*, an MF prefix indicates *Microsoft File*, and Paint1 and Paint2 are *MacPaint* files. Other file names don't suggest which application created them. *MacWrite* creates the Undo file for use with the Undo

(continues)

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How To/Quick Tips

command, but you'd never guess the file creator from that file name.

You can always determine which application created a file by inspecting the file's normally invisible Creator attribute. (For a complete discussion of how file Creator attributes relate to icons, see *Get Info* in the July 1985 issue of *Macworld*.) To see Creator attributes, you must use a utility program such as *ResEdit* (available through user groups or as part of Macintosh Developer's Utilities 1.0, a \$25 disk available to those who spend \$20 to join the Apple Programmer's and Developer's Association, 290 S.W. 43rd St., Renton, WA 98055, 206/251-6548) or *Fedit Plus* (from MacMaster Systems, 939 E. El Camino Real #122, Sunnyvale, CA 94087), or a desk accessory such as *DiskInfo* or *SetFile* (both available from user groups and on-line information services).

Temporary files that contain useful information are usually opened automatically the next time you start the appropriate application. *MacPaint*, for example, opens *Paint1* and *Paint2* files and attempts to use their contents to rescue the last *MacPaint* session. If you want to open a temporary file that doesn't open automatically, you must change the file's normally invisible Type attribute. You can do this with *ResEdit*, *Fedit Plus*, *SetFile*, or one of many other applications and desk accessories. To determine which Type attribute will let you open a particular temporary file, inspect the Type attribute of other files that have the same Creator attribute. If you find more than one Type for a particular Creator, you may have to try each one—setting the Type and then opening the file—to see which works. Before experimenting, copy the temporary file by using the Finder's Duplicate command or by dragging the generic icon to another disk.

Few temporary files contain information useful enough to store. Unless you need temporary files for rescue efforts, go ahead and drag them to the Trash. Just be sure the files you remove are indeed temporary, that is, that they have generic icons and did not come on the original program disk. And don't use a desk accessory to delete temporary files belonging to an application in use, or you risk a system error

(continues)

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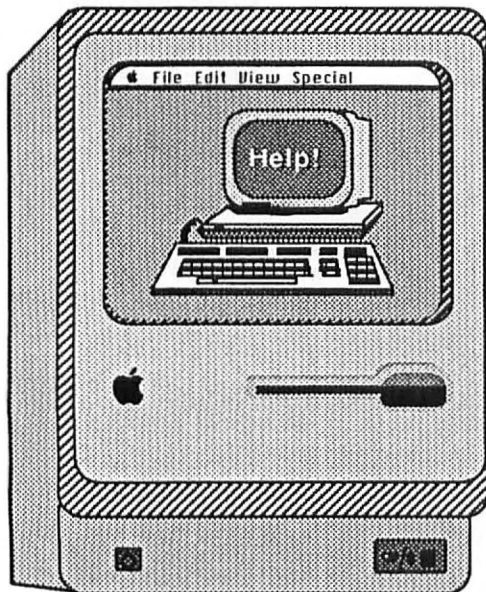
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or other problems. Likewise, when using the *Switcher*, don't use one application to delete temporary files that belong to another application installed in the *Switcher*.

Q Identifying LaserWriter Fonts in Menus

Is there another way of distinguishing LaserWriter fonts from ImageWriter fonts besides remembering the names? I would like to be able to tell at a glance which fonts look best on each of the two printers.

R. P. Kubelka
Sunnyvale, California

A You can change LaserWriter font names—prefixing each name on the menu with an asterisk or other identifying character—with the font editor program *Fontastic* (\$49.95 from Altsys Corporation, P.O. Box 865410, Plano, TX 75086, 214/596-4970) or a resource editor program such as Apple's *ResEdit* (available through user groups or the Apple Programmer's and Developer's Association). With both the Mac Plus and the Mac 512K Enhanced, prefixed font names are grouped together because the Font menu is alphabetized (see "On the Menu").

To change a font name with *ResEdit*, start it and insert a copy of a start-up disk that contains LaserWriter fonts. A window appears, listing all the files on the inserted disk. Find the System file in the list and double-click to open it. Another window opens; this one lists the resources in the System file by their four-letter names. Find FONT on the list and hold down the Option key while you double-click it open. Yet another window appears, listing font resources with their types, resource

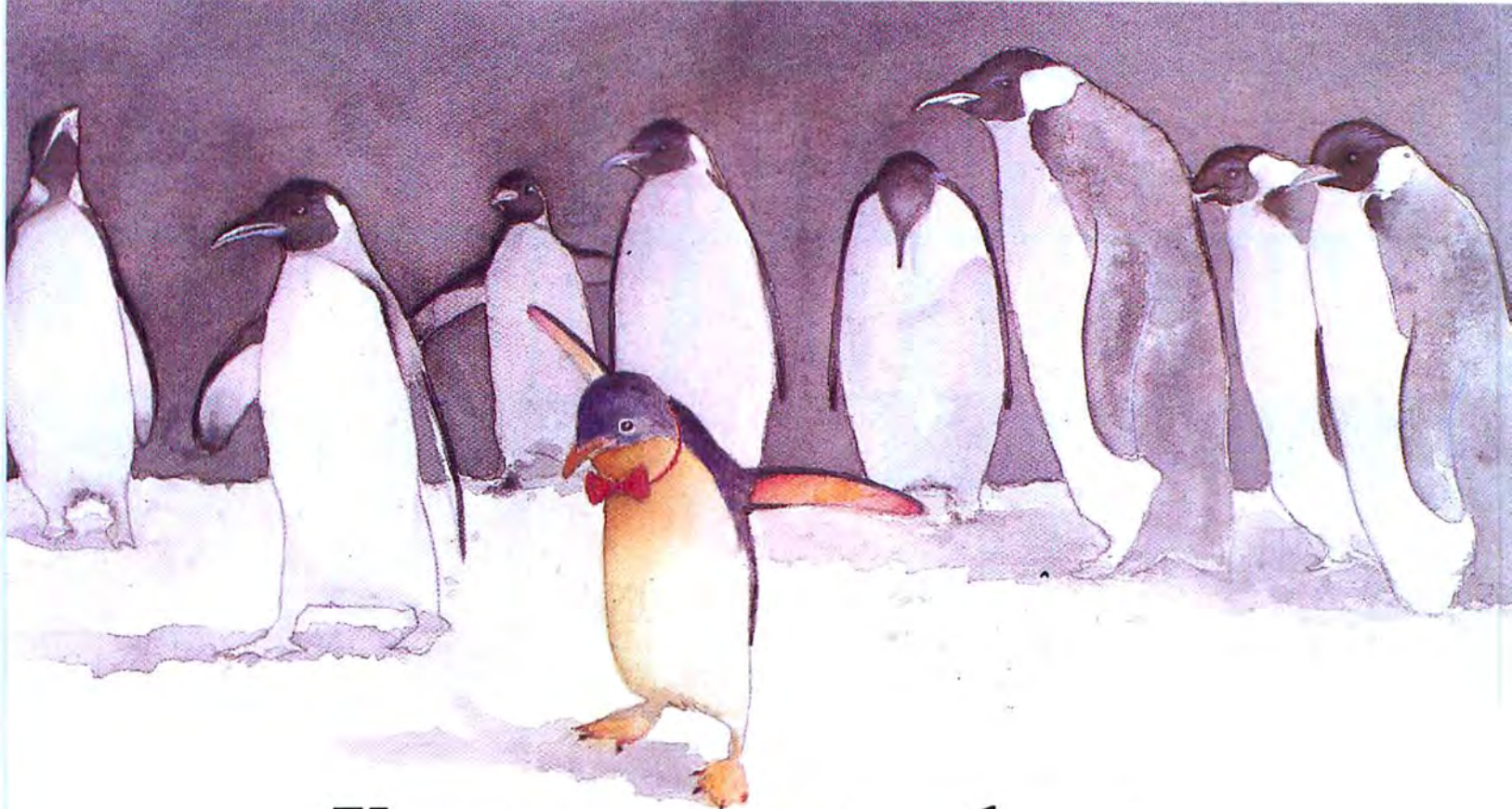
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On the Menu

With *Fontastic* or a resource editor, you can modify the names on the font menu to differentiate LaserWriter fonts—asterisked in this figure—from ImageWriter fonts.

Font

*Courier
*Helvetica
*Times
Chicago
✓Geneva
Monaco
New York
Venice

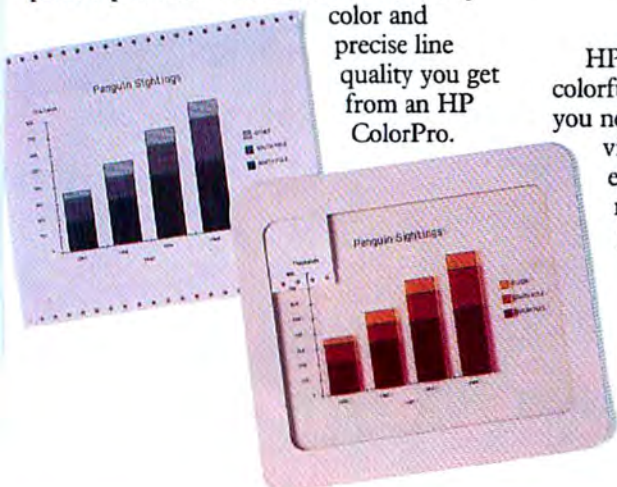


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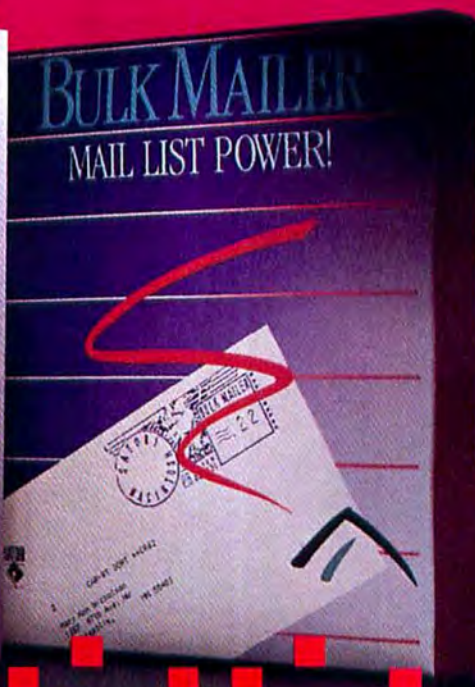
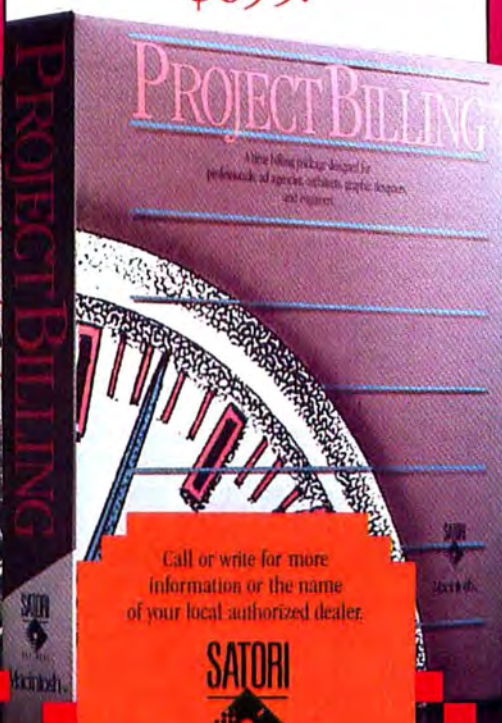
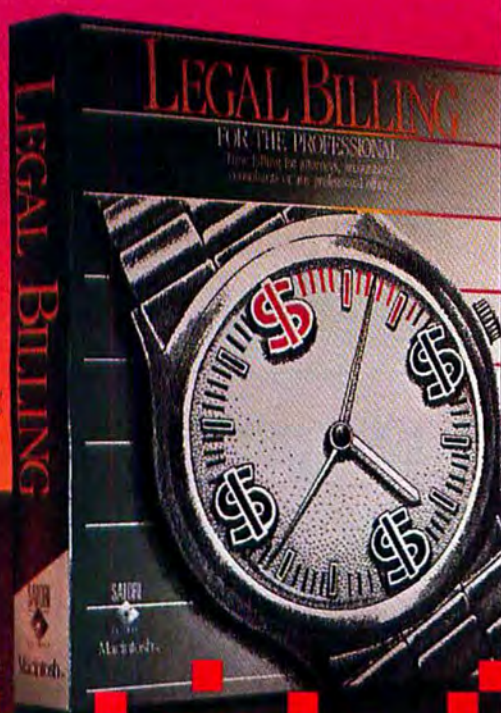
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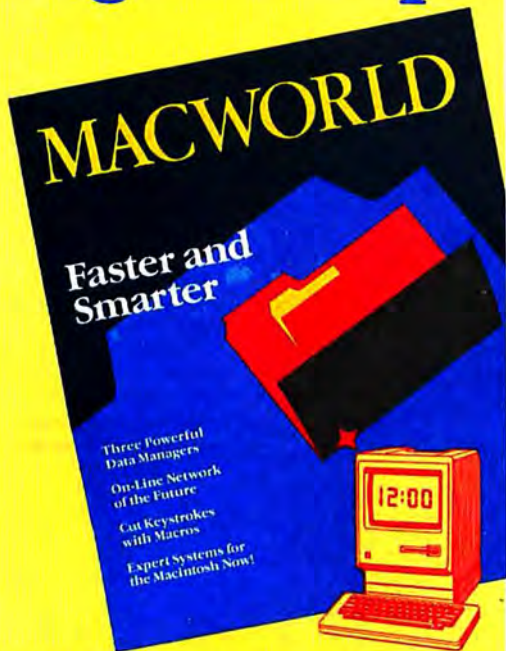


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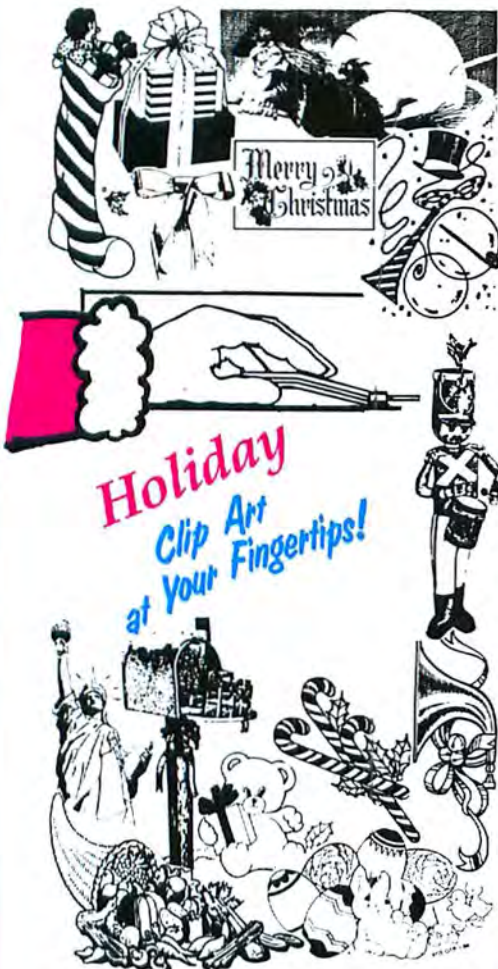
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names, and resource ID numbers. Every resource listed has an ID number, but only a few have names. Each size of a font is a separate resource, but the name for each size comes from the resource for the 0-point size. So click the 0-point size for a LaserWriter font. Then choose Get Info from the File menu to open an information window in which you can change the font name through normal text-editing methods.

A LaserWriter font usually has a FOND resource in addition to a FONT resource, and you must change the font name in the FOND resource, too. Look for the FOND resource right above the FONT resource and double-click it. In the window that opens, find the name of the font whose FONT resource name you just changed, click it, and choose Get Info again. Change the font name in the information window.

When you have finished changing the FONT and FOND resources, close the System file window. Answer Yes when ResEdit asks if you want to save changes. You can move renamed fonts from one System file to another with Apple's Font/DA Mover program.

Q Some Fonts Look Better in MacPaint than in MacWrite

Why does the exact same font, let's say 14-point Venice, print so much better in MacPaint than in MacWrite? I have enclosed samples.

Steven E. MacIntyre
New York, New York

A It's clear from your samples that you're choosing Best quality from MacWrite and Final quality from MacPaint. MacWrite and most other text applications print best-quality text by reducing a double-sized version of the font. To print best-quality 14-point Venice, for example, MacWrite looks for 28-point Venice (see "Venetian Types"). Many more dots define the double-size characters, giving them better shape, and they retain their superior shape when printed half-size. But if the double-size font is not available, the shape of the character can't be improved, and the results are often dark and blotchy.

(continues)

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Venetian Types

MacWrite and MacPaint use different methods to print the same font, in this case Venice 14-point, accounting for the slight differences in the ImageWriter output. This MacWrite sample (top) was printed at Best quality; the MacPaint sample (bottom) at Final quality.

"Are you lost, daddy?" I asked tenderly.
"Shut up," he explained.

—Ring Lardner (*The Young Immigrants*)

"Are you lost, daddy?" I asked tenderly.
"Shut up," he explained.

—Ring Lardner (*The Young Immigrants*)

MacPaint can't tell the difference between text and a taco, so it can't use the printing method just described. When you choose Print Final, MacPaint applies its own smoothing techniques to the entire document—text and graphics—to take advantage of the ImageWriter's comparatively high resolution.

So for best results in MacWrite and other applications that offer the Best/Faster/Draft or High/Standard/Draft print-quality options, use Apple's Font/DA Mover to install a double-size font before you print Best or High quality.

ber (included in MUD, \$49.95 from Spinner/Hayden Software, 1 Kendall Square, Cambridge, MA 02139, 617/494-1200); *Artisto* (shareware by Tom Taylor, available from user groups and on-line information services like GENie); and *QuickPaint* (\$49.95 from EnterSet, 410 Townsend St. #408B, San Francisco, CA 94107, 800/621-0851 ext. 305, 415/543-7644 in California). For a thorough discussion of cutting and pasting MacPaint images, see "A Clipboard Collage" in *Macworld*, January 1986.

Q Cut and Paste Whole MacPaint Pictures

How can I easily copy a MacPaint document that's larger than the MacPaint drawing window into a MacWrite document?

Daniel L. Prince
Fairfield, New Jersey

A There are scads of applications and desk accessories that allow you to select large areas of a MacPaint drawing; most of them can handle an entire 8- by 10-inch drawing. Regardless of dimensions, nothing can cut or copy (in one piece) a complex image larger than 32K, the limit of the Mac Clipboard. Two applications that can select large images are *Fullpaint* (\$99.95 from Ann Arbor Softworks, 308½ State St., Ann Arbor, MI 48104) and *Paint Cutter* (\$39.95 as part of *Accessory Pak 1* from Silicon Beach Software, P.O. Box 261430, San Diego, CA 92126, 619/695-6956). Desk accessories that select large images include *Art Grab-*

Q Downloading Tables for Spreadsheets

I download data from a database that appears on the screen as a table with rows and columns but arrives as text. MacTerminal has a Copy Table command, which changes spaces to tabs, enabling me to copy the table into an Excel spreadsheet in a usable form. I recently acquired *Smartcom II*. It has only the usual Copy command, which copies the data as text; when I paste the text into an Excel spreadsheet, the entire table appears as one entry in a single column and is therefore unusable. Is there any way to duplicate the effect of MacTerminal's Copy Table command using *Smartcom II*?

Milton Friedman
The Sea Ranch, California

A There doesn't appear to be any way to do what you want using *Smartcom II* alone. However, you can

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How To/Quick Tips

change spaces to tabs in a downloaded text file with *Microsoft Word* or with the utility *File Converter* (\$5 shareware from Phillips Software, 1633 Commonwealth Ave., West Newton, MA 02165). First change every space to a tab, and then change all pairs of tabs to single tabs until only single tabs remain. Each program represents a tab with a two-character sequence: `^t` in *Microsoft Word* and `\t` in *File Converter* (lowercase `t` in both cases). With *Microsoft Word*, choose Show & from the Edit menu to see both spaces and tabs in the file as you use the Change command from the Search menu to replace the spaces. *File Utility* doesn't display the contents of the file you're converting, so you can't monitor your progress, but it replaces text much faster than does *Microsoft Word*.

Q Remote Hard Disk

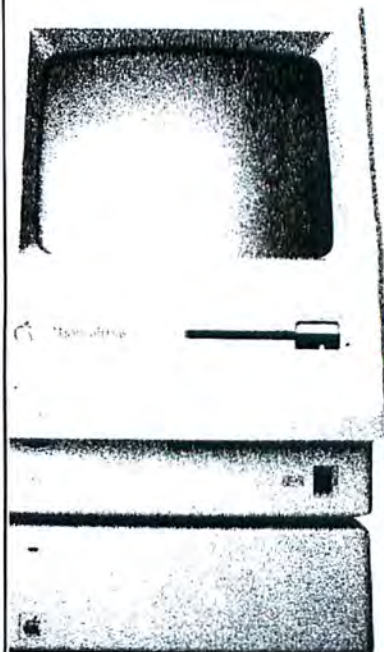
I own a Mac Plus and plan to get a hard disk soon. I use my computer primarily for business but often carry it home. Is it possible to use a less expensive Mac at home via modem with my Mac Plus and hard disk at work?

Robert K. Silbert
Indianapolis, Indiana

A What you're after is technically feasible, but the cost is high and the performance low. In addition to a second Mac, you'll need disk-server software like *TOPS* (\$149 from Centram Systems West, 2372 Ellsworth Ave., Berkeley, CA 94704, 415/644-8244) or *MacServe* (\$250 from Infosphere, 4730 S.W. Macadam Ave., Portland, OR 97201, 502/226-3620); this software allows the two Macs to share one hard disk through the AppleTalk network built into the Macs. Since your two Macs must communicate by modem, each Mac must be on a separate AppleTalk network. Bridging the two networks requires a device such as Interbridge (\$799 from Hayes Microcomputer Products, 705 Westech Dr., Norcross, GA 30092, 404/441-1617). A pair of modems will set you back \$350 to \$900 or more, depending on where you buy them and how fast they transmit and receive. Even with very fast, very expensive 9600-baud modems, you'll think your re-

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Circle 386 on reader service card

How To/Quick Tips

mote hard disk drive has been sneaking Quaaludes. And don't forget such incidents as a second phone line at home and operating costs for two Mac systems.

I recommend that you continue carrying your Mac back and forth; it's less hassle than coping with a sluggish telecommunications link, and a lot cheaper. You can safely transport a hard disk, provided you treat it with reasonable tenderness. Carrying bags are available for some drives, and the smaller drives, such as SuperMac's DataFrame, fit comfortably inside a standard Mac Plus carrying case.

Q Genealogy Software

I am a family genealogist and have been waiting for someone to come up with a genealogy program for the Macintosh. Such programs are available for many other computer systems, but that doesn't do me much good. Do you know of any?

Lois R. Evezich
Fountain Valley, California

A I have run across one genealogy program for the Mac: *Family Heritage File (FHF)*, \$149 from StarCom Software (Windsor Park E., 25 West 1480 North, Orem, UT 84057, 801/225-1480). It is a licensed version of the IBM PC program developed by the Mormon Church and accordingly has some features of particular interest to Mormon genealogists. I haven't used *FHF*, but StarCom says it records vital statistics, historical information, ordinance data, and information sources for each ancestor. It links related individuals, helps you search pedigree lines, and displays or prints family-group records and pedigree charts. Version 1.3, available now, requires 512K or more memory and runs best with two disk drives. Version 2.0, due out soon, should work on a 128K Mac and will exchange records with other systems, including IBM PCs.

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Getting Started with the Mac System

*A guided tour of the Mac's System Folder,
data disks versus system disks, and all
about version numbers*

by Jim Heid

To promote the Mac's simplicity, Apple's ads often say, "You don't have to think like a computer to use it." Taken literally, it's true: you don't have to mimic a microprocessor to use a Macintosh any more than you have to think like a crankshaft to drive a car.

However, one day you run out of disk space, you want to try a different printer, or someone asks which version of the Finder you're using. You peruse the manuals, admiring the pictures of Macs in students' bike baskets, but you find little information on the Mac's inner workings.

To get the most out of a Macintosh, it helps to understand how it works. That is *Getting Started's* charge: to introduce you to the concepts behind the Macintosh and the tasks it can perform. You won't have to hack through thickets of theory; you'll simply learn how to make the Mac work better for you.

Inside the System Folder

A good place to break ground for building your Macintosh knowledge is the System Folder, whose files contain the software that forms the Mac's *operating system*. An operating system, whether that of a Macintosh, an IBM PC, or a room-sized mainframe computer, transforms a package of chips and circuits into a working computer. Operating systems control a computer's parts and respond to external input from a keyboard and, in the Mac's case, the mouse. Disks that contain System Folders are *system disks*; the disk whose System files are currently in use is the *start-up disk* (even though you may not have actually started the Mac with that disk).

The most visible member of the Mac's operating system is the Finder, whose software stays in a file by the same name. The Finder, often mistakenly called the operating system itself, is in reality a link between you and the operating system. With the Finder, you start, or *launch*, applications, delete files, and copy, eject, and initialize disks. The Finder also provides disk-management conveniences—the Get Info command for attaching descriptive text to files, for example—and the ability to organize a disk's contents in folders.

Speaking of printing, obtaining hard copy would be considerably harder without *printer drivers* like the file called ImageWriter (see "Mac System Scorecard"). Printer drivers contain commands that control a specific brand or model of printer. LaserWriter users need two printer files: LaserPrep and LaserWriter. LaserPrep (or AldusPrep for *PageMaker* users) prepares the printer for accepting the PostScript printer commands sent by LaserWriter, the driver itself. Other printer drivers are available for controlling other printers. When your System Folder contains drivers for more than one printer, you select among them with the Chooser.

The Chooser is a *desk accessory*, a handy program that you can select from the Apple menu while you work in an application program such as *MacWrite*. Two other desk accessories have their own files in the System Folder: the Scrapbook and the Note Pad. You can copy these files to other disks or throw them away to gain

disk space (if you discard them, the Mac creates a new file the next time you use either desk accessory).

Note that when you switch system disks in the course of using different applications, you switch to different Scrapbook and Note Pad files, too.

Another member of the system team, the Clipboard file, occasionally stores the contents of the Clipboard, the Mac's mechanism for exchanging information between applications. I say occasionally because the contents of the Clipboard are often held in the Mac's memory and not stored on disk. Each application instructs the Mac to save the Clipboard on disk if it contains more information than will fit in memory.

The files I've described thus far form the System Folder's supporting cast. The lead player is the System file. The Mac's designers knew that certain portions of the operating system would change as the Mac evolved. The System file, rather than the Mac's read-only memory chips, contains these potentially fluid components, which include the software that tells the Mac how to access disk drives and networks. The System file also holds a selection of fonts and desk accessories, as well as *resource* information that lets Mac applications display currency, time, and date values in the format required for various countries.

The remaining players in the System Folder have only bit parts or do an occasional cameo, but they can enhance the performance. The MiniFinder file is a small (therefore quick-loading) substitute for the Finder that lets you move between applications faster. The MiniFinder holds up to 12

(continues)

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application or document icons that you specify; to access other applications, you click a button. On a start-up disk with a MiniFinder, the MiniFinder appears instead of the Finder's desktop when you quit applications.

Some products come with a file called StartupScreen, which contains a picture that appears instead of the "Welcome to Macintosh" start-up message. You can make your own start-up screens by creating an image in *MacPaint*, then converting that image into a StartupScreen file using Silicon Beach Software's *Paint Cutter* or a public domain program called *Screen Maker*, available through user groups.

Lastly, you might encounter specialized System files. Hard Disk 20 lets non-enhanced 512K Macs work with a new disk-management system that provides more efficient disk storage (see "Order out of Chaos," *Macworld*, May 1986). Macintosh is a *speech driver* that lets specially written applications produce somewhat convincing speech.

Brains versus Brawn

You can store the documents you create on system disks, but that fills disks quickly. A trim System Folder equipped with only a few fonts and desk accessories can eat up 200K of space—only one-fourth the capacity of the 800K disk used by a Mac Plus or an enhanced 512K, but one-half the capacity of a 400K, single-sided disk.

A better solution for 400K-drive owners is to make *data disks* for storage. It's a brains-versus-brawn issue: system disks have the brains to control the Mac and run programs, while data disks, which don't contain System files, have the storage muscle to hold more documents. You can't start the Mac with a data disk; if you try, the Mac ejects the disk, and the question mark on the "where's the disk?" icon turns into an X.

You can create a data disk by throwing away a system disk's System Folder, provided you aren't currently using that system disk as a start-up disk. (You can't remove System files that are in use; that would be like removing a car's tires while it's moving.) Or you can start with a fresh disk.

To save a document on a data disk with a single-drive Mac, choose the Save command, click the Eject button that appears in the subsequent dialog box, then

(continues)

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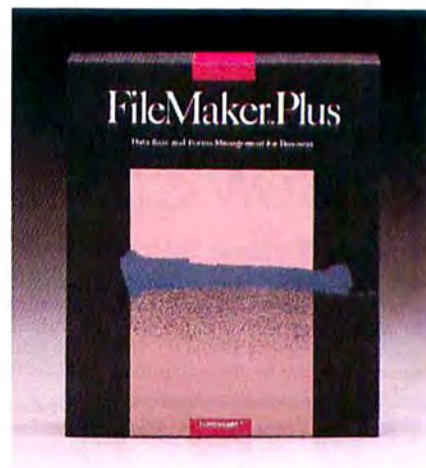
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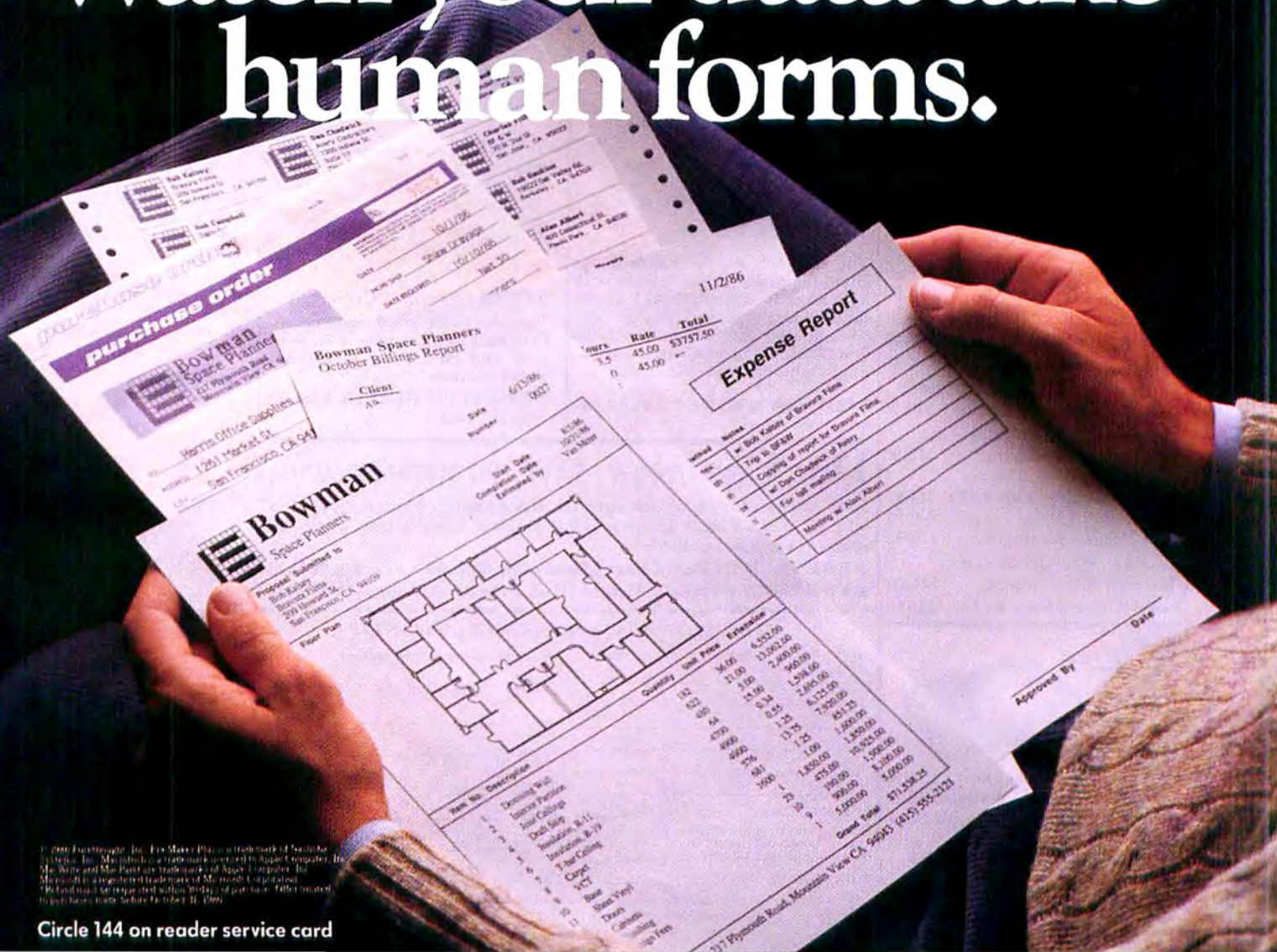
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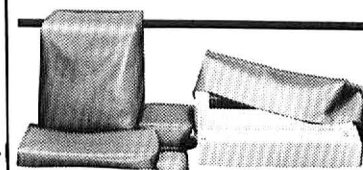
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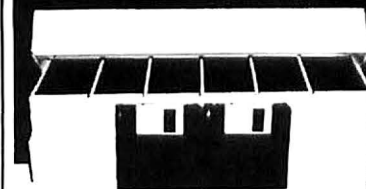
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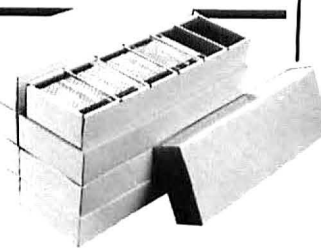
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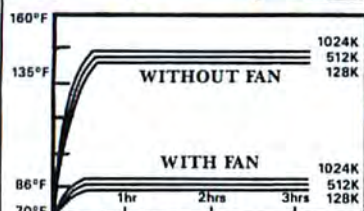
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How To/Getting Started

File Name	Purpose	Current Version
The Starting Lineup		
 Finder	Disk, program management	5.3 (choose About the Finder); 4.1 for 128K Macs
Scrapbook file	Holds contents of Scrapbook	not applicable
Note Pad file	Holds contents of Note Pad	not applicable
Clipboard file	Can hold contents of Clipboard	not applicable
System	Holds fonts, desk accessories, operating system software	3.2 (select file and choose Get Info); 2.0 for 128K Macs
MiniFinder	Allows fast movement between programs	not applicable
Hard Disk 20	Allows nonenhanced 512Ks to use HFS	1.1 (select file and choose Get Info)
Macintalk	Allows applications to generate speech	not applicable
In the Press Booth		
 ImageWriter	Allows printing to ImageWriters	2.3 (upper right of dialog boxes)
 LaserPrep	Prepares LaserWriter for printing	3.1 (select file and choose Get Info)
 LaserWriter	Allows printing to LaserWriters	3.1 (upper right of dialog boxes)
 AppleTalk ImageWriter	Allows printing to ImageWriter IIs with AppleTalk boards	2.3 (upper right of dialog boxes)
	Other printer drivers are available for accessing other manufacturers' printers. The icon shown here is that of a driver accompanying Microsoft's MacEnhancer.	
In the Bull Pen		
 Font/DA Mover	Allows removal and installation of fonts and desk accessories	3.2 (appears in program's menu bar)
	Startup screen	Its image replaces "Welcome to Macintosh" start-up message

insert the data disk, type a name, and click OK. However, the Mac may need to read the system disk during the save process, and that means the dreaded disk swap. You'll soon get the urge for an external drive, which eliminates swapping by allowing the system disk to stay in one drive. With a second drive, you click the Drive button that appears in the Save or Open dialog box until the name of the data disk appears.

Everyone's System Is Different

Using Apple's Font/DA Mover, which comes with the Mac, you can alter the System file, removing unwanted fonts or desk accessories to gain disk space or adding new ones from a wide selection. For Macs equipped with just one 400K disk drive, trimming the extras makes the system disk more practical for storage. For example, the Chooser desk accessory uses roughly 8K of disk space, while the Control Panel uses 10K; the Alarm Clock, 4K; and the

Note Pad, 2½K. Removing these frees up over 24K of disk space—enough for a document or for a few new fonts.

Awaiting installation into your System file is a massive selection of fonts, from Hebrew typefaces to special-purpose fonts containing math symbols to headline fonts for desktop publishing. Many fonts are available free through user groups; other fonts are sold by companies such as Casady Company and Miles Computing (see "Making the Most of the Mac's Fonts," *Macworld*, January 1985 and "Putting On a Good Face," July 1986). The same applies to desk accessories: games, turbocharged calculators, scaled-down word processors and spreadsheets, and disk- and file-management tools are just a few of the desktop adornments available (see "Decking Out the Mac's Desktop," *Macworld*, March 1985 and "In the Public Domain," August 1986).

(continues)



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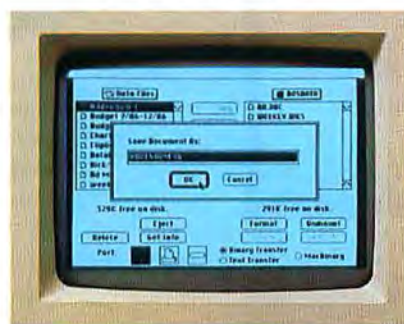
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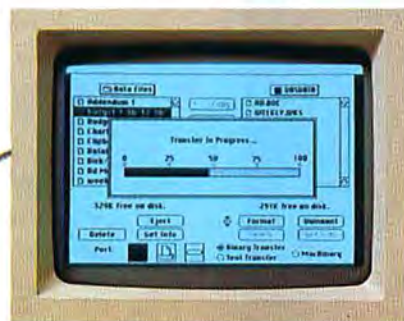
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Circle 232 on reader service card

Insights on the ImageWriter

Twenty-five tips help you sidestep printing problems, from paper jams to worn print heads.

by Charles Seiter and Daniel Ben-Horin

Dissatisfaction with the ImageWriter probably has less to do with its virtues—or lack thereof—relative to other printers than with consumers' sense of having been victimized in a proprietary boondoggle by Apple. In fact, the ImageWriter, particularly the newer Model II, is a highly competitive, even noteworthy, printer in its class. Quite apart from its symbiosis with the Mac, it is fast and provides high-quality print, particularly compared with the usual low-end dot matrix stuff spewing from the legions of IBM PCs.

Many of the ImageWriter's problems derive from the enormous scope of its operation, which of course is directly related to the scope and potential of the Mac. Like a quick shortstop, the ImageWriter gets—and occasionally muffs—balls that a more plodding printer wouldn't touch with a ten foot platen.

However, we come not to praise the ImageWriter, nor to bury it, but to provide some very concrete suggestions about how to solve or sidestep its problems.

● Drive(r), He Said

Whatever your technophobia, keep yourself up to date with Apple ImageWriter driver releases. The latest is release 2.3 (June 6, 1986), which has improvements for color. Many chronic problems, the stuff of endless back and forth on Mac bulletin boards, are fixed in new releases. (The people at Apple read the bulletin boards, too.)

● Sprocket Alert

The sprockets of the tractor come before the print head in the paper path. This makes imperative what would otherwise be common sense: don't touch the paper while the ImageWriter is printing, or blurring will result.



FRED STIMSON

● Which Fonts Are These, Anyway?

LaserWriter fonts print poorly on the ImageWriter. Not much can be done about it, so make sure you compose in ImageWriter fonts if you plan to print on the ImageWriter.

● Reset DIP Switches

One experienced user was bedeviled by a line of s's during document printing. He was sure it was a buggy ImageWriter, but it was actually his own failure to reset DIP switches after using an early version of ThunderScan.

While we're on the subject, *Versaterm* requires that DIP switch 2-3 on the ImageWriter be closed for correct operation.

● Label Law

What's less fun than a label sticking to the platen? To avoid this annoyance, invest in quality labels (for example, Avery). Some intrepid ImageWriter I users take pliers in and reposition the little black rollers to hold the labels firmly against the platen, but it's risky business because a slip of the wrist could damage the print head beyond repair.

Primrose Path

A smooth paper path is essential for trouble-free tractor-feed printing on the ImageWriter. Stack paper stock behind the printer, not underneath. Some veterans start output rolling to prevent it from bunching up and causing a jam as a long document prints.

● Don't Fight the Motor

When you want to roll paper manually, turn the printer off, so you're not working against the motor. Or leave the printer on and use the line-feed button.

● Print Head Pointers

Clean pins in the print head regularly. Cleaning is crucial in color printing (every ten pages or so), but do it often even in black-and-white work. The Clean Image head-cleaner cartridge (800/422-4949, 415/552-2440 in California) does the job without forcing you to remove the delicate print head.

On the ImageWriter I, though, what appears to be a clogged head may be an overheated one—often caused by attempts to print documents containing many solid black areas. So don't try to print pages that are more than 25 percent solid black. (The ImageWriter II has built-in protection against head overheating.)

If your ribbon snarls, the problem may be that one of the nine pins in the print

(continues)

head is out of line; a fraction of a millimeter is enough to wreak havoc. Check the print head by running a clean finger lightly over the pins (after disengaging the print head) to feel for a prominent pin. If you detect one, don't waste time trying different brands of ribbon; get a new print head.

● Reviving Ribbons

You can save some money by either reinking your ribbons or buying ribbons without cartridges and feeding these into your old cartridge(s) (see *Macware Reviews*, *Macworld*, September 1986). Reinking can be messy, and eventually the ribbon wears out, but the technique works. Incidentally, reink or replace your ribbons before they go gray; repeated contact with a dry ribbon leads to print head collapse.

● Long-Document Tests

Here's an easy test of an ImageWriter owner's sense of humor: say, "What I like best about my ImageWriter is how well it handles large tractor-fed print jobs without jamming," and note the various apoplectic shades of your friend's countenance.

To maintain your good humor, take a page from the book of industrial engineer W. Edwards Deming and try out any critical settings before you begin your marathon job. Experiment with a variety of paper qualities and thicknesses. (The speed of the ImageWriter II tractor can destroy cheap paper.) Then, when you have the paper optimized, reoptimize the thickness setting for clear and smudge-free printing. This two-step procedure will repay your patience, we guarantee.

● Paper-Handling Hints

Test paper quality by unfolding a few sheets and inspecting along the holes in the perforation strips for signs of tears.

Make sure there's a free paper path. That means no rubbing cables and, in particular, no sharp turns for the paper. It is better, for example, to stack your paper behind, rather than directly underneath, the printer. Removing the rear cover increases noise but decreases paper friction.

Clean the platen to decrease friction and smudging. Xerox makes a platen cleaner, #8R1661, which works well (but it's strong stuff, so ventilate the room and have a sealable disposal bag ready).

Make sure the tractor holds the paper with adequate horizontal tension.

Toss the first sheet if the paper has been sitting in the tractor overnight (the curve that develops in the sheet can foul the feeding process).

● Are UUUUUUUU with Us?

There are numerous reports of ImageWriters going berserk and printing streams of U's. The problem (apparently) stems from attempting to print after using a disk that was set up for a LaserWriter with AppleTalk connected. To reclaim control, use Choose Printer (if you have a LaserWriter disk) or turn off the Mac. Don't just reset it, but turn the sucker off. Conceivably, you might even have to remove the clock battery. (For a full explanation of this computeroid black hole, see *Get Info*, *Macworld*, May 1986.)

● High-Quality Overkill

If the type in your *Microsoft Word* or *MacWrite* files looks too heavy in best-quality, or high-quality, mode, you are not accessing the right "doubled" font sizes (that is, 20-point for printing in 10-point). Use the Font/DA Mover to install the correct size.

(continues)



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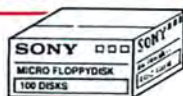
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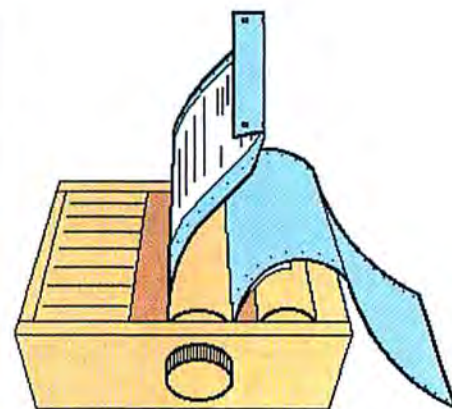
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To assure that a single sheet feeds evenly, make a carrier out of a page of tractor-feed paper. Fold a shallow lip, carefully lining up the perforations, slide the top of the single sheet under the fold, and roll the pair into place on the platen.

● Feeding Cut Sheets

As a sheet prints, it may feed through at an angle. To avoid this, one user feeds the individual sheets under the silver metal bar behind the platen while breaking the paper-error signal connection with a business card. A better method, though, is to make a carrier by folding a 1/2-inch flap on a piece of continuous-form paper, line up the cut sheet with the perforations on the side, and then insert the carrier on the pin feed (see "Feeding Frenzy"). Keep the tractor-feed rollers engaged.

Variants of this method work for envelopes, although remember that you do the actual formatting of the envelopes in your word processing program (see *Get Info*, *Macworld*, October 1986, for details).

● Magnetic Personality

Unbeknownst to many users, there is a permanent magnet in the top cover of the ImageWriter. It's not very big, but it will trash your disks if you leave them atop the printer, whether it's operating or not.

● Customize Your Paper Sizes

This is a slightly tricky but ultimately manageable process involving a resource editor such as *ResEdit*. January 1986's *Get Info* has step-by-step instructions.

● The Equal-Opportunity Printer

The ImageWriter works from the serial port of an IBM PC if the word processor or other software is installed for a C. Itoh 8510A or B, a Leading Edge Prowriter, or an NEC 8023. Graphics may not function very well, but some successes have been reported. Check out the August 1986 *Get Info* column for a step-by-step how-to. □

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Mac Business Tools

Tips and techniques for smoothing the critical path with MacProject

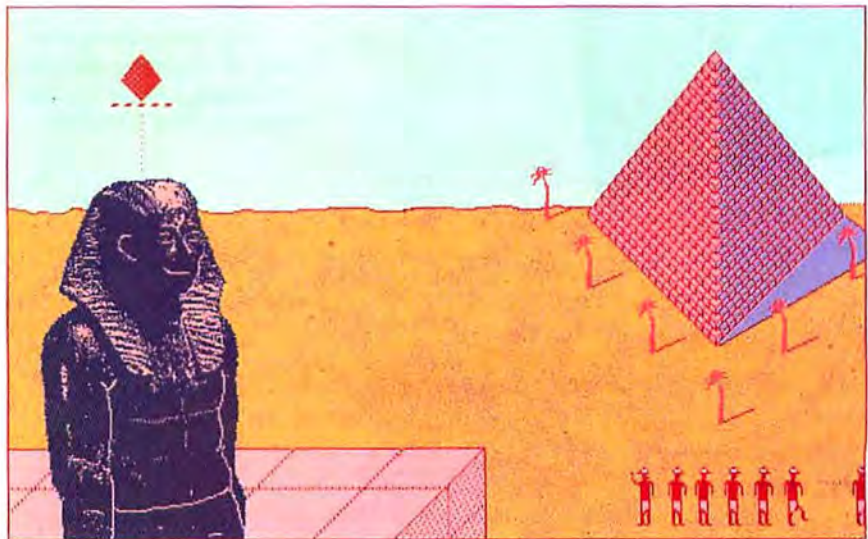
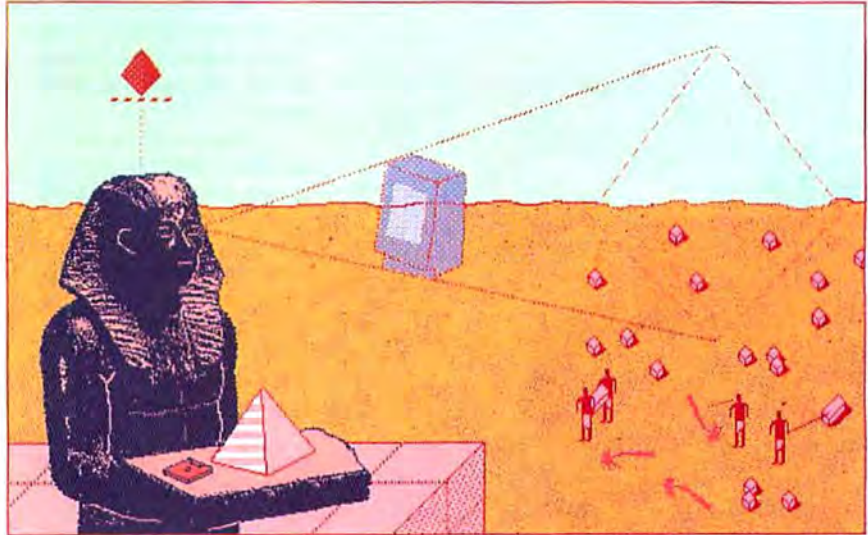
by James Halcomb

MacProject is an exceptionally easy project management program to learn and use because it lets you chart out a project directly on your Macintosh screen. But *MacProject*'s chart-as-you-go simplicity has its cost. Primarily a planning tool, it leaves you hanging when it comes to updating and revising your schedule; use it with even a moderately complex project and you'll soon find yourself bumping up against the program's limitations. This collection of tips helps you organize projects efficiently, lay out professional-looking schedules, and work around some of the program's obstacles.

Making Projects Manageable

Charts for large projects are often too big for *MacProject*'s upper limit of 2000 tasks. To circumvent this problem, first establish a summary chart of no more than 200 tasks and milestones; then create a separate detailed chart for each subproject. Make sure you also enter each subproject's dated beginning and end milestones on the summary chart. Although the summary chart does not automatically reflect changes to a subproject, you can update it by manually transferring a subproject's cost and task duration estimates. The summary chart serves as an overview, while the subproject charts allow you to track detailed tasks without creating a single, unwieldy chart.

Uniform Sizes *MacProject*'s boxes and lines can be any size or length, but uniform sizes give charts a professional look. To create a dependent task, simply drag a connecting line from an existing task to a white space; *MacProject* creates a new box the same size as the original. To create task



JOHN HERSEY

(continues)



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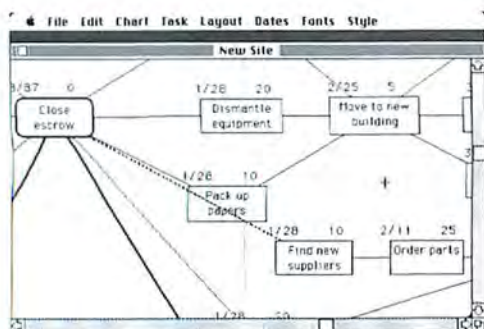
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boxes whose dependencies have not yet been determined, you need a box template. In a large milestone symbol, type any 15 uppercase characters. Press Return three times and copy the characters to fill the box with a test pattern. Shrink the box borders around the text and duplicate the box template as many times as you like. The clones will not include the test pattern.

Planning Ahead Use an outline processor to lay out the elements of your project, then copy the outline to *MacProject* through the Clipboard. You can copy each project element to a task or milestone box without rekeying the text. Outlines also help you organize your project's elements into summary and detail charts.

Confused Dependency Lines Long dependency lines often cross under unrelated task boxes, giving the dangerous impression that unrelated tasks are dependent on each other. To avoid confusion, click on any ambiguous line; it then becomes a dashed line and crosses over the task box if it is unrelated (see "Clearing Up Confusion"). Drag the unrelated task box out of the way so the dependency line no longer crosses it.

Part-Time Resources *MacProject* assumes a resource is used full-time during any assigned task. But your resource chart may show that you need a particular resource—for example, Ed Smith—for two tasks at the same time. Circumvent this limitation by creating part-time resources



Clearing Up Confusion
A confusing layout makes it appear that the task "Find new suppliers" is dependent on the task "Pack up papers." Click on the line, though, and the new dashed line passes over "Pack up papers" to show that the two are unrelated. Drag the boxes away from each other to clear up the ambiguity.

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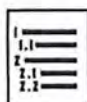
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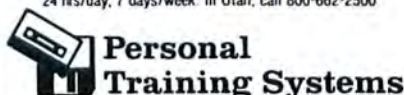
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How To/Mac Business Tools

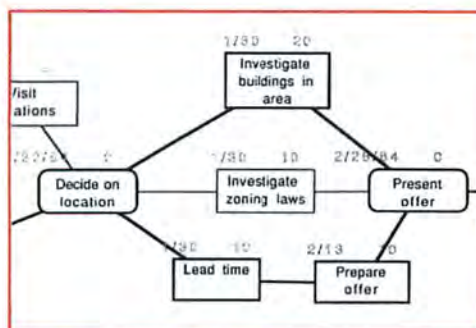
such as "0.5 Ed Smith" (with a daily rate half that of Ed Smith). You can then allocate "0.5 Ed Smith" to both tasks simultaneously without creating a conflict.

Anticipate Uncertainty Duration estimates for highly uncertain tasks, such as product development and testing, are difficult to make. In addition to the estimate you enter in *MacProject*'s Task Info window, create a text label next to any uncertain task, listing most pessimistic, most likely, and most optimistic estimates. Although *MacProject* can calculate only the duration estimate entered in the Task Info window, the call-out warns you of potential problems before they occur.

Quick Data Entry To speed up data entry for a series of tasks, select any task and display its dialog window; then press Return to move instantly to the next task without erasing the task window.

Overlapping Tasks *MacProject* connects all dependent tasks sequentially, a rigid system that does not permit a new task to begin until the preceding one is completed. To allow tasks to overlap, you must break them into smaller sequential parts (for example, "Part of task A" followed by "Task B" followed by "Remainder of task A"). There is an easier method, though. Instead of entering the second task as a dependent task, call it a parallel task and precede it with a phantom task called "Lead time." The second task will begin after "Lead time" expires but before the first task is completed (see "Fitting In Lead Time").

(continues)



Fitting In Lead Time

Phantom task boxes allow you to overlap tasks. Here, the task "Lead time" ensures that the task "Prepare offer" does not begin until adequate research has been completed on zoning laws and other buildings in the area.

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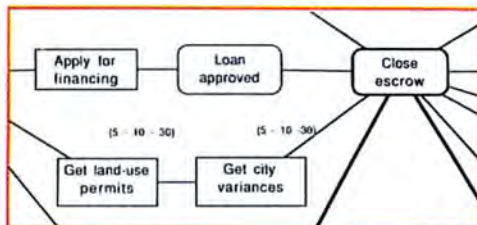
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How To/Mac Business Tools



Adding Flags

Use MacProject's text capability to create warning flags. Add a label listing optimistic, pessimistic, and most likely durations for highly uncertain factors (such as building permits and variances).

Few Warning Flags MacProject is an excellent planning tool but lacks automatic updating and status-reporting features. Few flags warn you when you're heading for trouble. At best, you can replace the schedule's estimates with actual data and let MacProject recalculate dates, costs, and the critical path. Aside from such formal revisions, the best method of tracking a project and anticipating changes is to mark up a printout of the project schedule (see "Adding Flags"). Shade in a task box to show the actual percentage completed, x on each milestone reached, and circle milestones that can be affected by unanticipated delays. Use colors to designate normal progress, minor setbacks, and serious delays. You can create professional-looking status reports by sending the schedule through the Clipboard to a graphics program such as MacDraw.

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Printing Partial Charts An unwieldy printout of a large project schedule is unnecessary and too time-consuming if all you want is an update of one section, such as the project's final stages. To print just one section of a chart, first copy the entire schedule to a new MacProject document. Delete all unrequired tasks and milestones, create a new milestone called "Project update mm-dd-yy" with the appropriate date, and connect it to adjacent uncompleted tasks. Then print the smaller chart. Cost and cash flow data must be drawn from the original chart. □

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Create personalized calendars with *CE Calendar* by printing any MacPaint document with a month. There are also programs to customize documents, select multiple files at the finder level before printing them, and convert WordStar files to MacWrite. ☐ 73...\$9.

BASIC Compiler allows you to program with the simplicity of BASIC. Type your program into a text editor (one is included) and the program converts it to machine language. Shareware. ☐ 87...\$9. NEW

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Updates

Here is a list that gives you the highlights of software updates we've just received and have not yet tested. The first price is the upgrade cost for registered owners; the second is the current list price.

Battery Pak version 1.21 adds a new desk accessory and is HFS-compatible. Batteries Included, 30 Mural St., Richmond Hill, Ontario L4B 1B5 Canada, 800/387-5707, 416/881-9941. Original disk and \$10; \$49.95 new.

FileFinder version 2.0 works with HFS. Nashoba Systems, 175 Sudbury Rd., Concord, MA 01742, 800/842-4250, 617/371-2029 in Massachusetts. Master disk plus \$5; \$24.95 new.

Gato version 1.4 works with the Mac Plus and the 512K Enhanced Mac, but no longer with the 128K. Not copy protected. Spectrum Holo-Byte, 1050 Walnut #325, Boulder, CO 80302, 303/443-0191. Original disk plus \$5 or \$10 for a fresh disk; \$49.95 new.

MacGolf version 2.0 refines scoring and viewing and allows you to save a game in progress. Practical Computer Applications, 1305 Jefferson Hwy., Champlin, MN 55316, 612/427-4789. Original disk and \$5; \$59.95 new.

MegaForm version 2.1 is faster and easier to use than the discontinued original, with the ability to select all objects at once and to change line thickness instantly. Requires a 512K Mac; two drives recommended. Megahaus Corp., 5703 Oberlin Dr., San Diego, CA 92121, 619/450-1230. \$100; \$495 new.

Tempo version 1.1 is Mac Plus- and HFS-compatible, with improvements in branching, looping, conditional comparison, and pause for interval options. Affinity Microsystems, Ltd., 1050 Walnut St. #425, Boulder, CO 80302, 800/367-6771, 303/442-4840 in Colorado. Free; \$99 new.

Top Desk version 1.4 is Mac Plus- and HFS-compatible and allows you to insert tabs, returns, π keys, and backspaces in the string macros of the Shorthand desk accessory. Cortland Computer, P.O. Box 9916, Berkeley, CA 94709, 415/845-1142. Disk swap; \$59.95 new.

Turbo Maccountant version 1.04 works faster than the previous version and allows reprinting of checks and invoices. Digital, Etc., Inc., 1750 14th St., Ste. B, Santa Monica, CA 90404, 213/452-5636. Master disks plus \$5; \$495 new.

WillWriter 2.0 allows you to establish a trust for children and forgive debts; the new version offers more formatting options. Nolo Press, 950 Parker St., Berkeley, CA 94710, 800/992-6656, 800/445-6656 in California. \$16 including 200-page book; \$49.95 new. ☐

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InfoWorld, May 26, 1986

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MACazine, May, 1986

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MacUser, April, 1986

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The Desktop Journal, a publication of the Yale Macintosh user group, Winter, 1986

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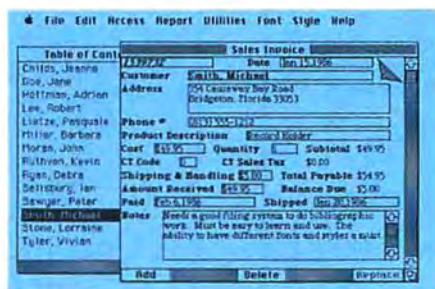
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- Full Screen Editor linked to compiler locates and identifies all errors
- 350-page manual
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- Resource Compiler
- 512K Mac, Mac Plus, HFS

Pascal and Modula-2 source code are nearly identical. Modula-2 should be thought of as an enhanced superset of Pascal. Professor Niklaus Wirth (the creator of Pascal) designed Modula-2 to replace Pascal.

Added features of Modula-2 not found in Pascal

- CASE has an ELSE and may contain subranges
- Programs may be broken up into Modules for separate compilation
- Machine level interface
 - Bit-wise operators
 - Direct port and Memory access
 - Absolute addressing
 - Interrupt structure
- Dynamic strings that may be any size
- Multi-tasking is supported
- Procedure variables
- Module version control
- Programmer definable scope of objects
- Open array parameters (VAR r: ARRAY OF REALS;)
- Elegant type transfer functions

Mac Plus Benchmarks (secs)	Compile	Link	Execute	Optimized Size
Sieve of Eratosthenes:	7.3	5.8	5.1	1257 bytes
Float	8.0	8.6	10.3	3944 bytes
Calc	6.8	5.7	4.3	1736 bytes
Null program	5.7	5.6	—	1100 bytes

```

MODULE Sieve;
CONST
  Size = 8190;
  FlagRange = [0..Size];
  FlagSet = SET OF FlagRange;
VAR
  i: FlagRange;
  Prime, k, Count, Iter: CARDINAL;
BEGIN
  FOR Iter:= 1 TO 10 DO
    Count:= 0;
    Flags:= FlagSet(); (* empty set *)
    FOR i:= 0 TO Size DO
      IF (i IN Flags) THEN
        Prime:= (i * 2) + 3; k:= i + Prime;
        WHILE k <= Size DO
          INCL (Flags, k);
          k:= k + Prime;
        END;
        Count:= Count + 1;
      END;
    END;
  END;
END Sieve;
  
```

```

MODULE Float;
FROM MathLib0 IMPORT sin, ln, exp,
  sqrt, arctan;
VAR x, y: REAL; i: CARDINAL;
BEGIN (*ST-$A-$S-*)
  x:= 1.0;
  FOR i:= 1 TO 1000 DO
    y:= sin (x); y:= ln (x); y:= exp (x);
    y:= sqrt (x); y:= arctan (x);
    x:= x * 0.01;
  END;
END float;
  
```

```

MODULE calc;
VAR a,b,c: REAL; n, i: CARDINAL;
BEGIN (*ST-$A-$S-*)
  n:= 5000;
  a:= 2.71828; b:= 3.14159; c:= 1.0;
  FOR i:= 1 TO n DO
    c:= c*a; c:= c*b; c:= c/a; c:= c/b;
  END;
END calc;
  
```

Product History

The TDI Modula-2 compiler has been running on the Pinnacle supermicro (Aug. '84), Atari ST (Aug. '85), Amiga (Jan. '86) and will soon appear on UNIX in the 4th Qtr. '86.

Regular Version \$89.95 Developer's Version \$149.95 Commercial Version \$299.95
 The regular version contains all the features listed above. The developer's version contains additional Mac modules, macros and demonstration programs - a symbol file decoder - link and load file disassemblers - a source file cross referencer - the kermit file transfer utility - a Modula-2 CLI. The commercial version contains all of the Mac module source files.

Other Modula-2 Products

Kermit - Contains full source plus \$15 connect time to Compuserve. \$29.95
Examples - Many of the programs from Inside Macintosh translated into Modula-2. \$24.95
GRID - Sophisticated multi-key file access method with over 30 procedures to access variable length records. \$49.95

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Cambridge Automation, 20200 State Rd. Cerritos, CA 90701, 800/345-8666, 800/826-9214 in California

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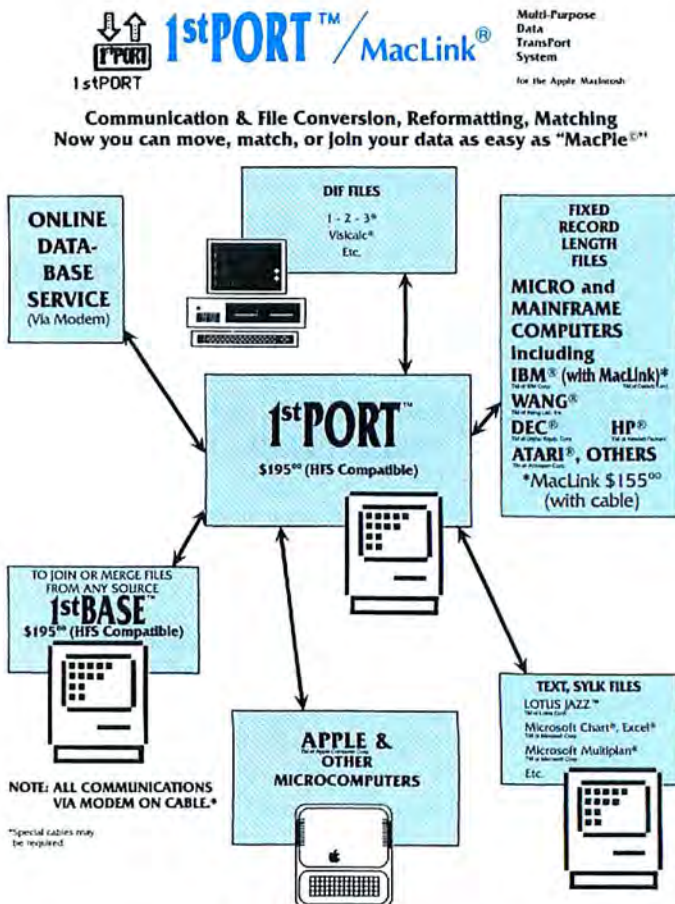
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Apple Smalltalk-80

Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 1MB minimum memory; hard disk recommended. Beta version available to developers and through Apple Program Developers Association, \$50. Final price to be announced.

ColorPaint

Computer Friends, Inc., 6415 S.W. Canyon Ct., Portland, OR 97221, 503/297-2321, 800/547-3303 orders only.*

CompuServe

P.O. Box 20212, Columbus OH 43220, 614/457-8990. Subscription \$39.95; \$6.25 to \$15.25 per hour, depending on hour and baud rate.

Copy II Mac

Version 5.4. Central Point Software, Inc., 9700 S.W. Capitol Hwy., Portland, OR 97219, 503/244-5782. 128K minimum, 512K recommended; MFS only. \$39.95.

Coral Lisp

Coral Software Corp., 336 Windsor St., Cambridge, MA 02141, 617/547-2662. 2MB minimum memory. Under development. Runs on Mac Plus in "subset" version.

Dimensions

Version 1.13. Visual Information, Inc., 16309 Double Grove, La Puente, CA 91744, 818/918-8834. Copies to hard disk but not to floppy disks. 512K minimum memory and 800K external drive required; Mac Plus recommended. Black and white: Rendering \$495, Architectural \$495, Architectural Engineering \$995. Color: Color Solids \$995. Color Architectural Engineering \$1495.

Disk Librarian

Version 1.7. Little Bit, 469 Edgewood Ave., New Haven, CT 06511. 512K minimum memory. \$20 donation.*

Disk Ranger

Version 2.4. Mainstay, 28611-B Canwood St., Agoura Hills, CA 91301, 818/991-6540, 800/824-7888 oper. 706 for orders only. 128K minimum memory. \$49.95.

DiskInfo

Version 1.42. Maitreya Design. 128K minimum memory. Shareware, available through CompuServe, GENie, and user groups. \$10 donation.

DS800

DataSpace Corp., 205 Riviera Dr. #9, Markham, Ontario L3R 2L6 Canada, 800/387-0492, 416/474-0113. 256K \$299, upgrade to 512K \$150, upgrade from 512K to 1MB \$250, upgrade from 256K to 1MB \$400.*

Dunn Color Macintosh System

Version 1.0. Dunn Instruments, Inc., 544 Second St., San Francisco, CA 94107, 415/957-1600. 512K minimum memory. Analog color monitor, graphics generator, film recorder, *Dunn Color*; Dunn version of *Cricket Graph*, programming language: \$14,599.

ExperCommonLISP

Expertelligence, Inc., 559 San Ysidro Rd., Santa Barbara, CA 93108, 805/969-7874, 800/828-0113, 800/826-6144 in California. Copy protection: user-name configured. 512K memory and external drive required; 1MB and 800K drive recommended. Price to be announced.

EZ-Draft

Version 1.01J. Bridgeport Machines, Inc., 500 Lindley St., Bridgeport, CT 06606, 800/243-4292, 203/367-3651 in Connecticut. Key disk copy protection. 512K memory and external drive required; Mac Plus and hard drive recommended. \$19.95.

Fedit Plus

Version 1.0. MacMaster Systems, 108 E. Fremont Ave. #37, Sunnyvale, CA 94087, 408/773-9834. 128K minimum memory, 200K for file recovery. \$40.

FlashBack

Version 1.2. Mainstay, 28611-B Canwood St., Agoura Hills, CA 91301, 818/991-6540, 800/824-7888 oper. 706 for orders only. 128K minimum memory. \$59.95.

Fontographer

Version 2.0. Altsys Corp., 720 Ave. F #108, Plano, TX 75074, 214/424-4888. Copy protection: finite number of copies. 512K minimum memory. \$395.

FullPaint

Version 1.0. Ann Arbor Softworks, 308½ S. State St., Ann Arbor, MI 48104, 313/996-3838. 512K minimum memory. \$99.95.

Genie

General Electric, Client Services Dept., 401 N. Washington St., Rockville, MD 20850, 800/638-9636 ext. 21. Subscription \$18; \$35 per hour, peak; \$5 per hour, off-peak.

HabaDisk 800K

Haba Systems, 6711 Valjean Ave., Van Nuys, CA 91406, 818/994-1899, 800/HOT-HABA, 800/FOR-HABA in California. \$299. Product discontinued; support still available.*

Hard Disk Backup

Version 1.0. FWB Software, 2040 Polk St. #215, San Francisco, CA 94109, 415/474-8055. 512K minimum memory; hard disk recommended. \$54.95.

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Version 1.3. PBI Software, 1111 Triton Dr. #201, Foster City, CA 94404, 415/349-8765, 800/843-5722, 800/572-2746 in California. 128K minimum memory plus hard drive. \$49.95.

HFS Backup

Version 1.00A. Personal Computer Peripherals Corp., 6204 Benjamin Rd., Tampa, FL 33634, 813/884-3092, 800/622-2888. 512K minimum memory; hard disk recommended; HFS only. \$39.95.

HFS Locater Plus

Version 1.2. PBI Software, 1111 Triton Dr. #201, Foster City, CA 94404, 415/349-8765, 800/843-5722, 800/572-2746 in California. 512K minimum memory; HFS only. \$34.95.

Laser Quill

ELI, P.O. Box 49, Ramsey, NJ 07446, 201/934-7373. Key disk copy protection for floppy disks; installs on hard disks.*

LaserWorks

EDO Communications, Inc., 63 Arnold Way, West Hartford, CT 06119, 203/233-5850. Key disk copy protection.*

MacBillboard

CE Software, 801 73rd St., Des Moines, IA 50312, 515/244-1995.*

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Version 1.9. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory. \$195.

Macintosh 800K External Drive

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Macintosh Programmer's Workshop

(MacApp, MPW Assembler, MPW C, MPW Pascal), available early 1987, Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 512K minimum memory; 1MB and hard disk recommended. Beta versions of these programming tools are now available to developers and members of the Apple Program Developers Association. Prices to be announced.

MacMap

Strategic Locations Planning, 4030 Moorpark Ave. #123, San Jose, CA 95117, 408/985-7400.*

MacPaint

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MacPerspective

B. Knick Drafting, 313 Marlin Pl., Melbourne Beach, FL 32951, 305/727-8071.*

MacPlot

CompServCo, 800 Freedom Ln., Slidell, LA 70458, 504/649-0484, 800/272-5533 orders only. Key disk copy protection.*

MacPlots II

Version 2.0. Computer Shoppe, P.O. Box 18344, Greensboro, NC 27419, 919/299-4843. Key disk copy protection. 128K minimum memory for business version, 512K for drafting version. \$295, business version \$195.*

Max Printer Server/Buffer

DataSpace Corp., 205 Riviera Dr. #9, Markham, Ontario L3R 2L6 Canada 416/474-0113, 800/387-0492.*

MacProject

Version 1.0. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory. \$195.

Magnum 800

Mirror Technologies, Inc., 2209 Phelps Rd., Hugo, MN 55038, 612/426-3276, 800/328-6795 ext. 428. \$349.*

McD-800

P.K.I., Inc., 2539 W. 237th St., Ste. E, Torrance, CA 90505, 213/539-2123, 800/821-3733. \$349.*

MDCII

Version 2.1B. New Canaan Micro-Code, 136 Beech Rd., New Canaan, CT 06840, 203/966-6969. 512K minimum memory; two drives recommended. \$49.95.

MGMStation

Version 1.0. Micro CAD/CAM, Inc., 3230 Overland Ave. #105, Los Angeles, CA 90034, 213/838-7851. Hardware key copy protection. 512K minimum memory; external drive recommended. \$799.*

MicroGrade

Chariot Software Group, 3659 India St., San Diego, CA 92103, 619/298-0202, 800/CHARIOT.*

Microsoft Chart

Version 1.0. Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206/882-8088. Key disk copy protection. 128K minimum memory. \$125.

Microtech Mac535

Microtech International, Inc., 29 Business Park Dr., Branford, CT 06405, 203/488-7744, 800/626-4276, 800/345-1314 on the West Coast. \$295.*

MicroTest II

Chariot Software Group, 3659 India St., San Diego, CA 92103, 619/298-0202, 800/CHARIOT.*

MiniCAD

Version 2.01. Diehl Graphsoft, Inc., 3246-K Normandy Wood Dr., Ellicott City, MD 21043, 301/461-9488. Key disk copy protection. 512K minimum memory; external drive recommended. \$395.

Neon

Version 1.8. Kriya Systems, Inc., Six Export Dr., Sterling, VA 22170, 703/430-8800, 800/345-7492. 128K minimum memory; 512K recommended. \$195.

Object Logo

Beta test version. Coral Software Corp., 336 Windsor St., Cambridge, MA 02141, 617/547-2662. 512K minimum memory. Under \$100.

Phaser 800

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PosterMaker

Strider Software, Beecher Lake Rd., Pembine, WI 54156, 715/324-5487.*

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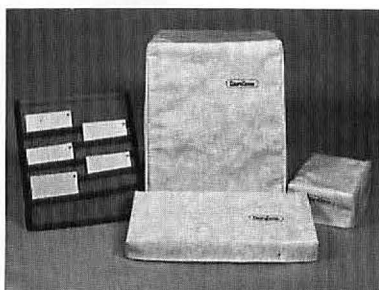
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Silicon Beach Software, Inc., P.O. Box 261430, 9580 Mountain Rd., Ste. E, San Diego, CA 92126, 619/695-6956.*

The Source

Source Telecomputing Corp., 1616 Anderson Rd., McLean, VA 22102, 800/336-3366. Subscription \$49.95; \$8.40 to \$25.80 per hour, depending on hour and baud rate.

ThunderScan

Version 3.2. Thunderware, Inc., 21 Orinda Way, Orinda, CA 94563, 415/254-6581. 512K minimum memory plus printer or Mac Plus and printer. \$229, \$258 for Mac Plus version.

TML Pascal

Version 2. TML Systems, Inc., 4241 Baymeadows Rd. #23, Jacksonville, FL 32217, 904/636-8592. 512K minimum memory; external drive recommended. \$99.95.

True BASIC

True Basic, Inc., 39 S. Main St., Hanover, NH 03755, 603/643-3883, 800/TR-BASIC.*

VM-8860 Intelligent Monitor

Vermont Microsystems, Inc., 11 Tigan St., Winooski, VT 05404, 802/655-2860, 800/354-0055. Requires 512K plus modem cable, hard disk, and modem. 13-inch, \$2195; 19-inch, \$4495.

World Builder

Silicon Beach Software, Inc., 9580 Black Mountain Rd., Ste. E, San Diego, CA 92126, 619/695-6956.*

X-10 Powerhouse

X-10 (USA), Inc., 185 A Legrand Ave., Northvale, NJ 07647, 201/526-0027.*

XLisp

Version 1.7. BCS Mac, Boston Computer Society, 1 Center Plaza, Boston, MA 02108, 617/367-8080. 512K minimum memory. Education 1 package \$5 members, \$10 nonmembers. □

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Macworld Best-Sellers

Months on chart	Last month	This month	Business Software
17	1	1	Microsoft Word <i>Microsoft</i>
9	2	2	Microsoft Excel <i>Microsoft</i>
1	-	3	MacPaint <i>Apple Computer</i>
1	-	4	MacWrite <i>Apple Computer</i>
5	3	5	PageMaker <i>Aldus</i>
14	4	6	MacDraw <i>Apple Computer</i>
16	5	7	Microsoft File <i>Microsoft</i>
17	12	8	Microsoft Multiplan <i>Microsoft</i>
2	8	9	MacDraft <i>Innovative Data Design</i>
7	9	10	Omnis 3 <i>Blyth Software</i>

Education Software

1	-	1	Math Blaster! <i>Davidson and Associates</i>
1	-	2	MacEdge II <i>Think Educational Software</i>
1	-	3	MasterType <i>Scarborough Systems</i>
1	-	4	Typing Tutor III <i>Simon and Schuster Computer Software</i>
1	-	5	Kids' Time <i>Great Wave Software</i>

Entertainment Software

1	-	1	Flight Simulator <i>Microsoft</i>
1	-	2	MacGolf <i>Practical Computer Applications</i>
1	-	3	The Ancient Art of War <i>Broderbund Software</i>
1	-	4	Wizardry <i>Sir Tech Software</i>
1	-	5	Balance of Power <i>Mindscape</i>

Networking/Data Communications

1	-	1	AppleTalk <i>Apple Computer</i>
9	-	2	MacTerminal <i>Apple Computer</i>
1	-	3	MacServe <i>Infosphere</i>
1	-	4	Smartcom II <i>Hayes Micro-computer Products</i>
1	-	5	Apple Personal Modem <i>Apple Computer</i>

Months on chart	Last month	This month	Hard Disk Drives
1	-	1	Apple Hard Disk 20 <i>Apple Computer</i>
1	-	2	LoDown-20 <i>LoDown</i>
1	-	3	DataFrame 20 <i>SuperMac Technology</i>
1	-	4	MicahDrive AT 20 <i>Micah</i>
1	-	5	HyperDrive <i>General Computer Corporation</i>

Books

1	-	1	Excel in Business <i>Douglas Cobb, Microsoft Press</i>
1	-	2	Inside Macintosh <i>Addison-Wesley</i>
1	-	3	The Printed Word <i>David A. Kater and Richard L. Kater, Microsoft Press</i>
1	-	4	MacBook <i>Arthur D. Naiman, Hayden Book Company</i>
1	-	5	Microsoft Macinations <i>Mitchell Waite, Robert Lafore, and Ira Lansing, Microsoft Press</i>

Product Watch

Editors' choice:
Other recent products of particular interest

Radius Full Page Display *Radius Monitor*

WriteNow T/Maker
Word processor

ReadySetGo version 3.0
Manhattan Graphics
Page layout

Source: Exclusive InfoCorp survey of more than 100 Macintosh retailers and selected mail-order suppliers

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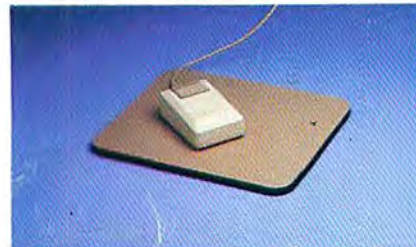
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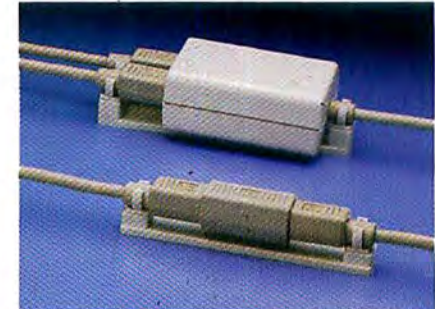
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