

MACWORLD

October 1988 \$3.95

Canada \$4.95

The Macintosh® Magazine

Desktop Publishing

Is it worth it?

**5 Relational
Database Managers
Compared**

**New! CD ROMs
in Our Annual Review
of Clip Art**

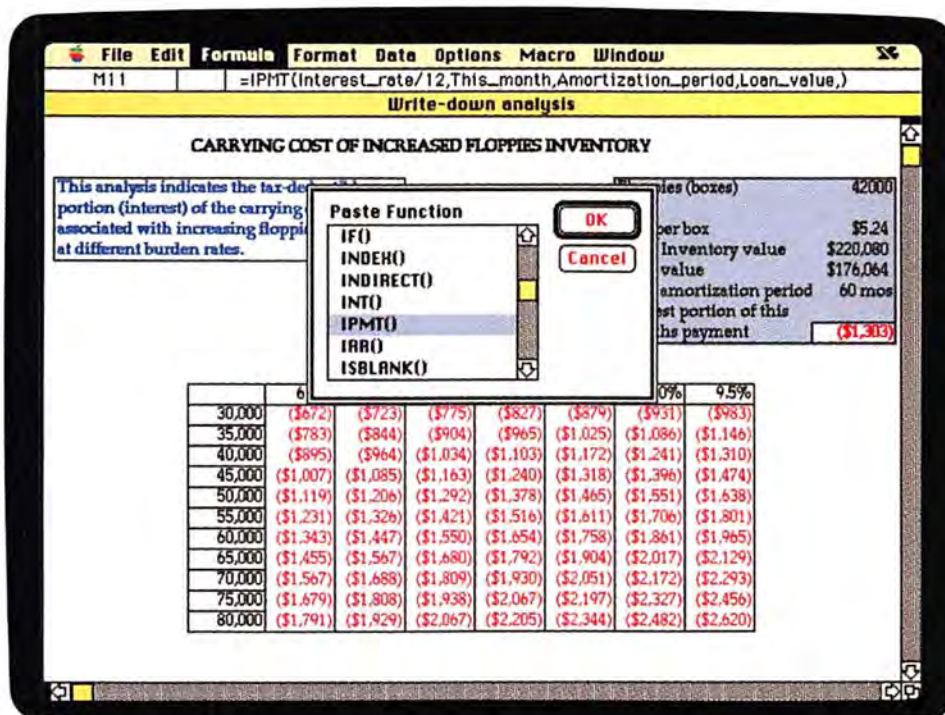


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the Mac:
What's Available**

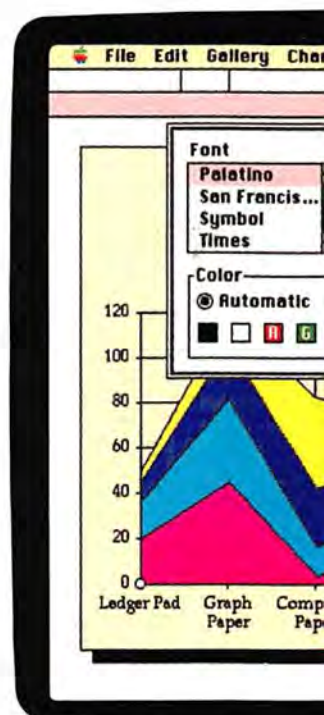
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Gray Scale**



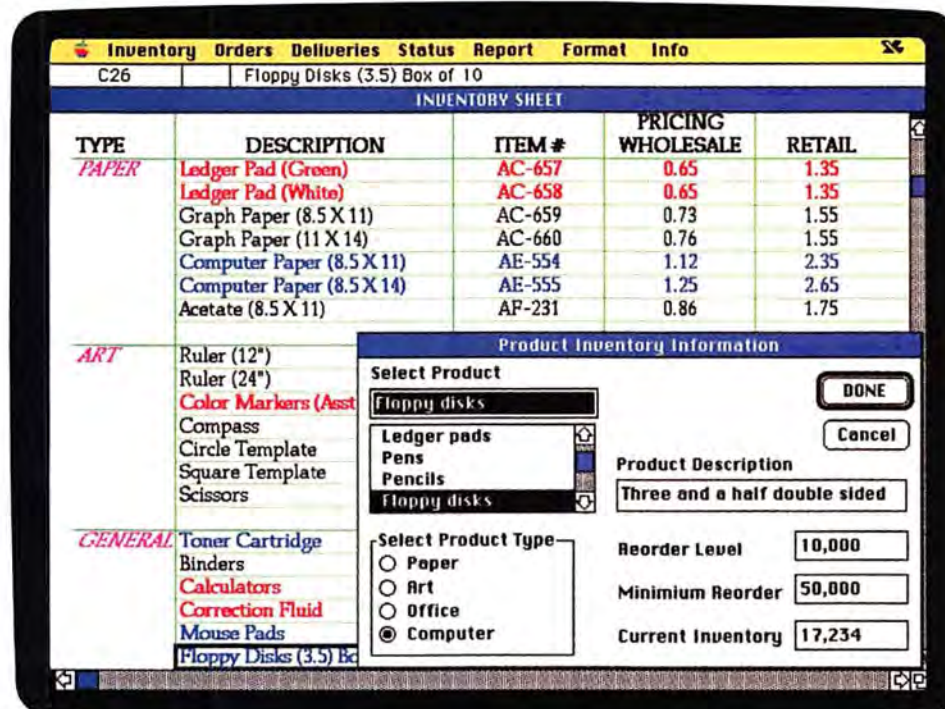
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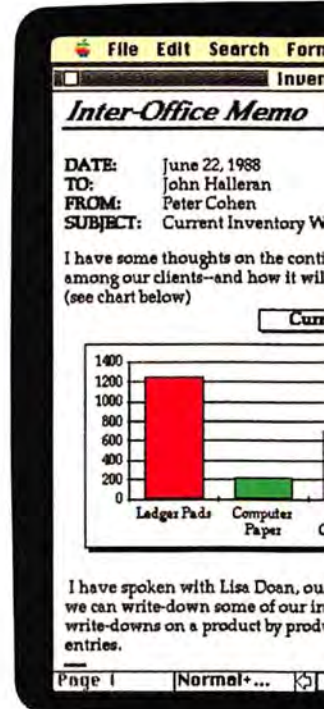
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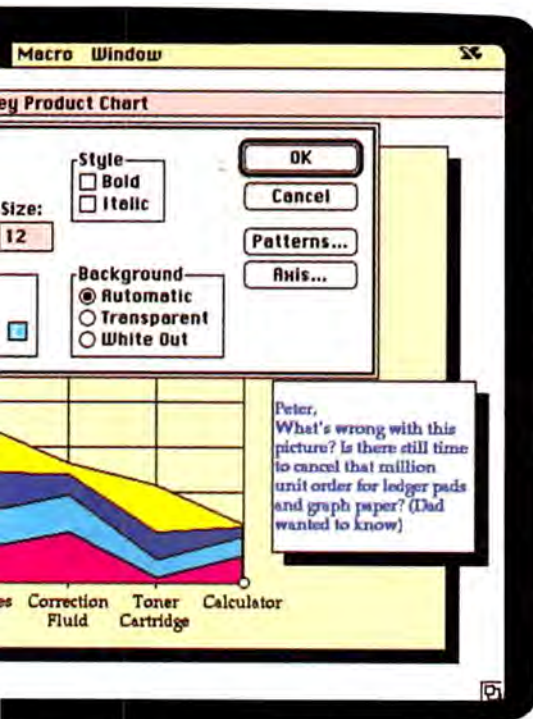
Microsoft Excel can be customized to meet your particular business needs. You can completely customize the program with new menus and dialog boxes to prompt users unfamiliar with the program.



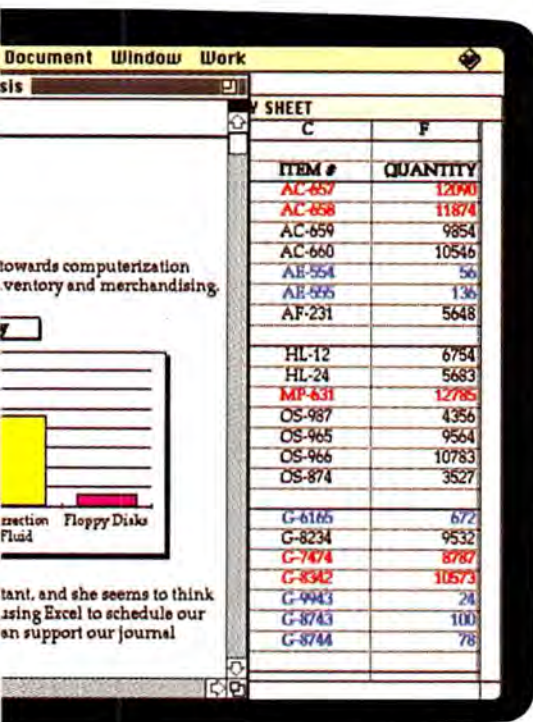
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MACWORLD

October 1988

The Macintosh® Magazine



On the Cover

Desktop publishing—does it spell the end to all your publication woes or is it just the beginning of another technological nightmare? To find out if DTP is the answer, see p. 106. (Photo by Fred Stimson.)

Departments

- 13 **Mac Bulletin**
Late-breaking news.
- 19 **David Bunnell**
- 27 **Letters**
- 41 **Commentary/Jerry Borrell**
- 53 **Steven Levy**
- 73 **Verbatim**
DTP pioneer Paul Brainerd of Aldus looks to the future of desktop publishing.
- 197 **New Products**
A quick look at new Macintosh software, hardware, and accessories.
- 215 **How To/Quick Tips**
Slanting margins in Quark XPress, typographic effects in Illustrator 88, combining values in Excel charts, and more.
- 231 **How To/Getting Started with Word Processing**
Tackling common formatting tasks in the most popular writing packages.
- 255 **How To/Insights on Excel**
A collection of version 1.5 tips for numbers, charts, color—and customizing Excel.
- 271 **Updates**
The latest software upgrade news.
- 299 **Where to Buy**
Contact information for products in this issue.
- 312 **Best-Sellers**

87 Macworld News

- *French TV Spawns Color Paint Program* Manipulating color images with new tools.
- *Three for Presentations* Innovative ways to create overheads and 35mm slides.
- *Four Color Monitors from E-Machines* Opening a wider world to Macintosh color.

Plus, readers cope with software viruses, an affordable laptop, scanning in color, how Broadway composes on the Mac, and more.

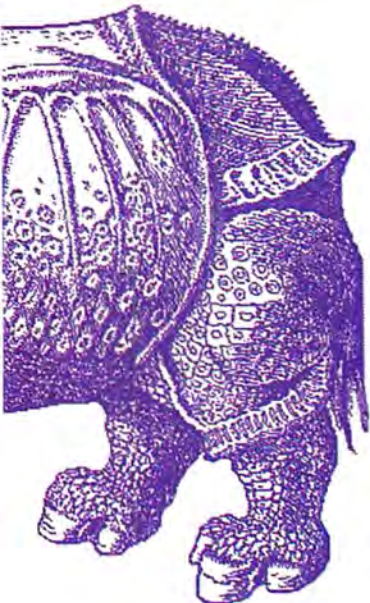




Zoo-Ink's striking Mac-made fabric designs have found their way to Queen Elizabeth's palace (p. 95).

Features

- 106 Is Desktop Publishing Worth It?**
Taking a hard look at DTP—when it makes sense to desktop publish and when it doesn't.
- 116 A Halftone Handbook**
Gray-scale scanning—are we there yet?
- 124 The Clip Art Collector**
Samples from 35 collections—bitmapped, PICT, and PostScript—rated by our clip art connoisseur.
- 132 Getting Smart**
LISPs, Prologs, and expert-system shells—compare the tools you need to build an expert system.
- 140 A Full House**
How five relational database programs handle challenging applications.
- 148 Unix à la Mac**
Interpreting A/UX—find out how it differs from the familiar Mac operating system.



From rhinos to bicycling nuns, you can find just the right image to jazz up your text from more than 30 clip art collections (p. 124).

Reviews

- 154 Illustrator: This Year's Model**
Adobe's PostScript graphics.
- 156 Mapping Your Business**
GeoQuery map/pushpin database.
- 158 A Color Presentation**
Cricket Presents for presentations.
- 160 A Publisher's DEST Friend**
DEST's PC Scan 2020 scanner.
- 164 Low-Volume Color Printing**
Tektronix Color Image Printer.
- 166 Golf as a Matter of Pixels**
MacGolf video-style game in color.
- 168 Attack of the Giant Monitor**
Mitsubishi 37-inch color monitor.
- 170 Evolution in Action**
Blind Watchmaker simulation.
- 172 A Machine-Independent BASIC**
TrueBASIC programming language.
- 176 PCBs from A to Z**
Douglas CAD/CAM package.
- 178 Long-Distance Control**
Timbuktu conferencing system.
- 180 Fast Financial Feedback**
Simply Accounting for finances.
- 184 Math Whiz**
Radius 25-MHz Accelerator for SE.
- 186 Man the Battle Stations**
PT-109 combat simulator.
- 188 Say It with Numbers**
Data Desk statistical data handling.
- 190 Window Shopping**
A bunch of productivity programs.



So you want a large screen—is this 37-inch monitor big enough for you? (See p. 168)



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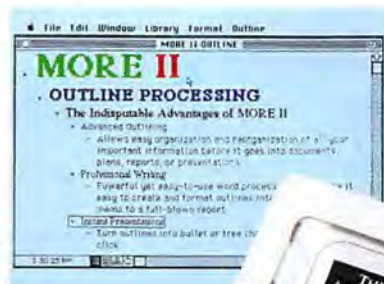
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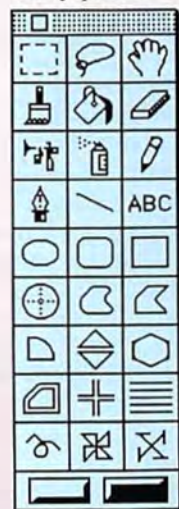
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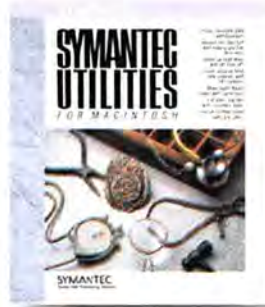
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Circle 237 on reader service card

AppleFax Modem Now Available

▶ Apple's long-awaited AppleFax Modem offers Macintosh users a convenient method of sending and receiving integrated graphics and text files between the worldwide network of facsimile machines and other AppleFax-equipped Macintosh computers. The AppleFax Modem is compatible with Group 3 international standard facsimile machines and operates at a transmission speed of 9600 baud.

The product includes two pieces of software: AppleFax Resource converts any Mac file into facsimile format for storage or for immediate transmission to Group 3 facsimile machines; AppleFax Application Program allows Macs to send and receive facsimile and Mac files while providing the functionality and programming capability of high-end facsimile machines.

The AppleFax Modem is also compatible with the Mac II, SE, or Plus. It requires System 6.0, an Apple System Peripheral-8 Cable, and a standard single-line telephone outlet with an RJ-11 modular jack. For further information, call Apple at 408/973-5448.

VAX-Compatible Desktop FORTRAN

▶ Scientists and engineers no longer need depend on remote or batch machines to run FORTRAN programs. With Language Systems' VAX-

compatible FORTRAN Compiler 1.1, they can write and test FORTRAN programs at their desktop and run those same programs with larger data sets on mini or main-frame computers.

Language Systems' FORTRAN builds on FORTRAN's strength in numerical calculations by adding the capabilities of the Standard Apple Numerics Environment (SANE), Apple's implementation of the Institute of Electrical and Electronics Engineers (IEEE) Standard 754 for binary floating-point arithmetic.

The FORTRAN Compiler runs in the Macintosh Programmer's Workshop (MPW) environment, which is included in the list price of \$345. For further information, contact Language Systems Corporation at 703/478-0181.

Desktop Photography Arrives

▶ Comstock Photo Agency is offering the first collection of stock photographs on CD ROM. Comstock Desktop Photography lets you instantly call up any of its 500 photographs, insert them anywhere in a document, layout, or presentation; then resize or reposition them without losing resolution. Comstock almost completely eliminates the delay between the moment that you have an idea, and the moment that it's implemented.

While the photographs on CD ROM will seldom be used

as final artwork, they are ideal for comprehensive renderings, in-house presentations, and client presentations. The Comstock CD ROM is compatible with leading desktop publishing software. For further information, call Comstock Desktop Photography at 212/353-8686.

Connections in High Places

▶ SynOptics Communications and Kinetics have made it possible to use Macintosh IIs and SEs with IBM PC ATs and XTs, Sun workstations, and VAX computers to create homogenous networks using a simplified and streamlined approach to Ethernet. SynOptics's telephone-wire implementation of its LattisNet Ethernet transceiver chip is now integrated with the Kinetics EtherPort III network interface card for the Mac II. Earlier this year, the same technology was integrated with the Kinetics EtherPort SEL network interface card for the SE. These new network interface cards will help Apple penetrate the Fortune 500 marketplace, which requires 10-megabits-per-second LAN connectivity.

For further information, call Kinetics at 415/947-0998.

ReadySetGo Farther, Faster

▶ Letraset is now shipping version 4.5 of its easy-to-use page-layout program, ReadySetGo. Version 4.5 adds the

kind of precise control over typographic elements that professional designers expect.

Features in the new version are numerous: fractional kerning, tracking, and letter spacing specified to .001 em, fractional font sizes, line spacing and baseline shifts to .01 point, thumbnail views of documents for quick review and individual page access (as well as page-level editing and printing), a move command for moving a group of objects a precise distance, user-adjustable alignment guides (in addition to the design grids), color registration marks for spot-color separations, additional line or rule styles, case conversion for selected text, style sheets, user-retained defaults, new command keystrokes for speed, gray-scale image editing with contrast and brightness control, gamma-curve correction capability, creation of negatives, vertical and horizontal rotation, posterization, and halftone setting capabilities.

A free upgrade is available to all owners who purchased ReadySetGo 4.0 after July 5. The cost to other owners of version 4.0 will be \$49.95; to owners of previous versions \$85. Upgrades to Letraset's 13 foreign-language versions of ReadySetGo will ship by the end of November. For further information, contact a Letraset dealer, or call Letraset at 201/845-6100.

(continues)

WriteNow 2.0

► T/Maker has released version 2.0 of its easy-to-use word processing program, WriteNow, with over 50 improvements to version 1.07. New features for writers include word, character, and paragraph counts; smart quotes; fixed line spacing; case conversion; and All/Odd/Even/Reverse Order printing options. Users in small businesses will appreciate mail merge, network compatibility, complete MultiFinder capability, and a 100,000-word dictionary. For desktop publishers, version 2.0 includes cursor key support, a hide pictures option, and a window menu for managing open documents. The product also directly opens standard file formats including text-only (with or without line breaks), MacWrite, and RichText format (compatible with Microsoft Word, Write, and Works).

The list price of version 2.0 is \$195. Upgrades are free to users who purchased WriteNow after January 15, 1988, \$25 to others.

For further information, call T/Maker at 415/962-0195.

A New InBox

► Symantec has upgraded its electronic mail and file-transfer program. InBox version 3.0 offers new message-organization features and new message-center architecture which provides built-in support for gateways developed by third-party developers, allowing access to other E-mail systems and applications. InBox 3.0 will be available by the end of the year. For further information, call Symantec at 617/275-4800.

Think's LightspeedC Upgrades

► Symantec has upgraded Think's LightspeedC and Lightspeed Pascal; it has also introduced Just Enough Pascal, an add-on learning tool for Think's Lightspeed Pascal programming environment.

Think's LightspeedC version 3.0, a fully integrated C development environment, now includes a Mac-style source-level debugger. Think's Lightspeed Pascal, a fully integrated Pascal development environment, offers new support for Object Pascal, commercial-quality code generation, and an enhanced source-level debugger.

Just Enough Pascal is a new program that teaches the fundamentals of Pascal programming, using Think's Lightspeed Pascal environment, by letting you build a real application. All instructions and explanations are online and interactive, so you don't need manuals.

The list price of Think's LightspeedC 3.0 is \$175. Upgrades are free to users who purchased the previous version after January 31, 1988, \$69 to others.

The list price of Think's Lightspeed Pascal is \$125. Upgrades are free to users who purchased the previous version after July 1, \$49 to others. The list price of Just Enough Pascal is \$75. It requires Think's Lightspeed Pascal version 2.0. For further information, call Symantec at 617/275-4800.

College Goes Mac

► Carnegie Mellon's College of Humanities and Social Sciences has named the Mac II as one of two standard campus PCs for students and faculty. During the 1988-89 academic year, the College of Humanities and Social Sciences will install approximately 120 Mac IIs for faculty and student use in labs and classrooms.

Carnegie Mellon will also convert a large body of its UNIX-based software, called MacMach, to run on the Mac II. In addition, faculty members are expected to develop course-specific tools and broad-based applications on the Mac II. The college also expects to choose a second campus computer made by IBM.

BMUG on HyperCard

► BMUG (the Berkeley Macintosh users group) has published *BMUG on HyperCard*, a 214-page book on publicly distributable stacks. This handy reference catalogs every stack in the BMUG library—over 80 disks, containing nearly 700 stacks—giving a sample card from each stack and a description. The 54-page appendix contains articles by HyperCard heavyweights Raines Cohen, Dan Shafer, Dan Wood, Eric Alderman, Steve Michel, and others, ranging from discussions of the state of HyperCard stackware to a primer on XCMDs.

The book (which includes a best-of-library sampler disk) is \$15 library postage rate, \$20 first class. Order from BMUG, 1442A Walnut St., #62, Berkeley, CA 94709.

Bigger Is Better

► Who would be willing to pay an extra \$100 and use up 2 megabytes of hard disk space just to get an online dictionary? Lots of people, apparently. The only difference between Deneba Software's Spelling Coach (\$99.95) and Spelling Coach Pro (\$199.95) is that Spelling Coach Pro has a thesaurus and an online dictionary and is outselling Spelling Coach by almost ten to one. As a result, Deneba is even considering dropping the less expensive model.

The company has also replaced the original Spelling Coach Pro thesaurus with Merriam-Webster's giant thesaurus—referred to around campus bookstores as "Big Yellow." Now we'll see how many people are willing to dedicate 3MB of hard disk space to a spelling checker/dictionary/thesaurus.

Released in September, the new thesaurus is the biggest available for the Mac, raising the number of root words from about 16,000 to 100,000. It now includes related words, compared words, contrasted words, and antonyms, as well as synonyms. The thesaurus lists as a stand-alone unit for \$99.95 and as an upgrade to the previous thesaurus or to Spelling Coach Pro 3.0 for \$15. The upgrade will be free to owners of the old thesaurus or Spelling Coach Pro 3.0 for 90 days after their purchase. Deneba will bundle the new thesaurus with Spelling Coach Pro 3.1 with no increase in price. For further information, call Deneba Software at 305/594-6965. □

Reflex Plus can show you more about relationships than Dr. Ruth

The relationships between different pieces of data within your database are all important ones.

Because Reflex Plus is truly *relational*, it can "relate" and cross-reference your data.

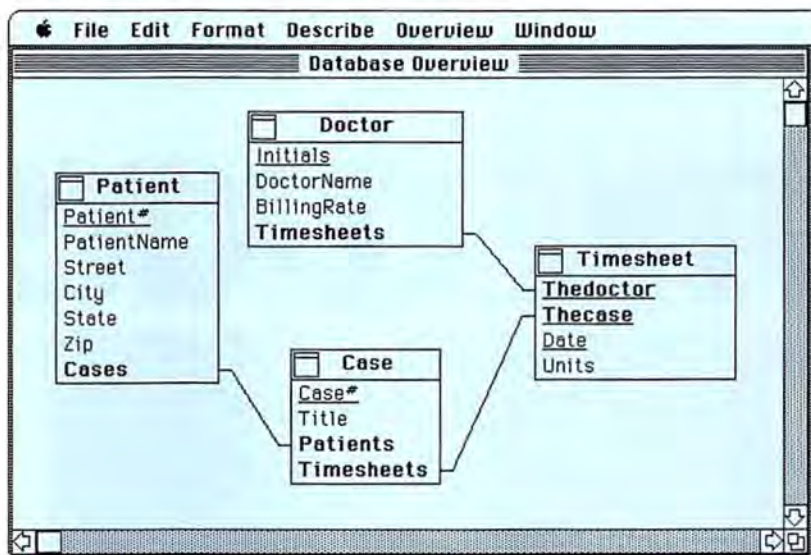
Many "database managers" are not much more than "list managers"—simple lists that can't connect and cross connect one item with another. So while they can "list," they can't really "manage."

What your data tells you depends on how you look at it

It's easy to customize your output with Reflex Plus. Whatever you're working on—letters, invoices, quotations or data entry screens—Reflex Plus lets you add graphics, position them wherever you want, change sizes, change fonts and produce truly professional results. Reflex Plus lets you make the most of your Macintosh.

Some of the power pluses of Reflex Plus

- Visual database design—a "natural" for your Macintosh
- WYSIWYG ("What-you-see-is-what-you-get")
- Truly relational database manager
- Auto-Save—which means you'll never lose data again



You simply draw connecting lines to relate one item to another.

- Paste Choice command that saves you enormous amounts of time
- Context-sensitive online Help
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“ Borland's new relational database, Reflex Plus, is the best Macintosh database . . . It is simple to use and operate, very flexible in design, low cost (only \$279 compared to \$500 for dBase Mac), and small in size (250K versus 730K for Fourth Dimension) . . . We converted an Omnis 3 database that took two weeks to design into Reflex Plus in two days . . . We think Borland is right on target with their approach.”

David Smith, MacTutor ”

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Reflex Plus is the super-power of truly relational databases, and it's only \$279 plus shipping and handling.



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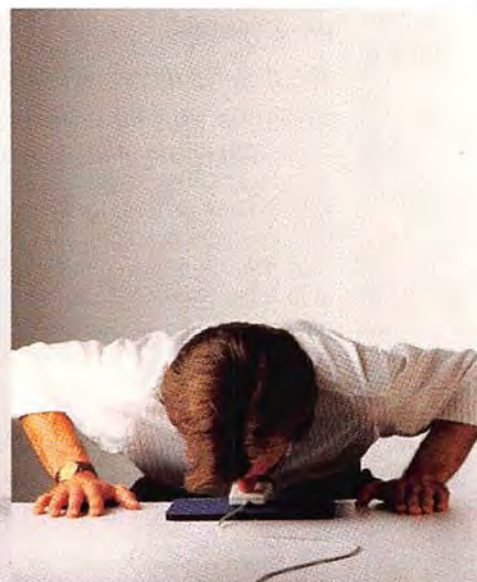
FIVE CLICKS TO SUPE



"...Folks, in all my years in broadcasting, I've never seen any network installation like it. Just look at the control."



"He's on the table. He clicks again...This guy is taking some risks today."



"Looks like he's going in for the most difficult move yet, the Goldhaber Nose Click. And it's good!"

NOW, AN UPDATE ON THE TOPS NETWORK CHALLENGE...

Frank: You know Chet, since people have discovered how quick and easy it is to install a TOPS Network, things have gone wild in offices all over the U.S. It seems like installation techniques are getting wackier all the time!

Chet: And faster, too, Frank. It's hard to believe that with only five clicks of the mouse you can turn your Macintosh* into a LAN workstation. In a total elapsed time of less than one minute.

Frank: It's all because TOPS is the easiest to use network in the Mac and PC worlds. If you already have AppleTalk* cabling in place, all you have to do is insert the TOPS diskette, click the mouse five times, and you're ready to start sharing information.

R STARDOM.



"Chet, I'd say this installation could put him into the TOPS Hall of Fame. He spins... there's the click! Can you believe this performance?"

"And he's up, on one finger. It's installed! I've never seen this before... A new record of 59.6 seconds!"

Chet: And with just a few more clicks, you get print spooling. It's no wonder these folks have the time to develop such incredible maneuvers!

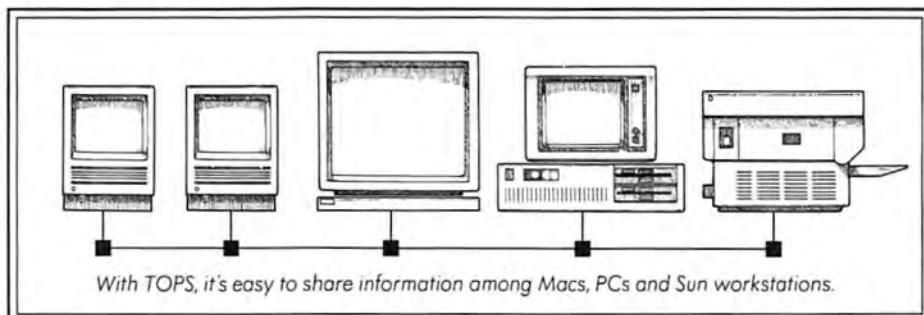
Frank: Right you are. And that means users not only share their printers, but with TOPS they can share their hard disks and MS/DOS files too.

Chet: But you know me Frank. The thing that excites me the most is the price. TOPS/Mac costs only \$249 per node, and there's no need to purchase an expensive dedicated file server.

Frank: You bet, Chet. With the lengths people are going to, I'm sure this is going to become a major international event...

Want to try it yourself? For more information call us at 800-445-TOPS (from outside the U.S. and Canada, call 415-769-8700). Or write to us at TOPS, 950 Marina Village Parkway, Alameda, California 94501. And get ready to become a network star.

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Telecommunications software for the Macintosh, a new version.

Soar to New Highs, Effortlessly

When Software Ventures set out to create MicroPhone, it had a simple mission: to develop the most intuitive communications software ever written. Indeed, when MicroPhone was born, it was universally hailed as a breakthrough in communications software. A product so friendly, it turned novices into experts. So sophisticated, it became, in the words of MacUser, a power user's delight.

MicroPhone is a legend. One of those precious software creations that single out the Macintosh as a superior computing machine.

With MicroPhone II, Software Ventures has set out to surpass itself: redefine power in telecommunications for years to come.

MicroPhone II is so revolutionary that PC Magazine was moved to say: "MicroPhone II is arguably the best

comm software ever written." We won't have it any other way. MicroPhone II. The freedom to be yourself. At the top.

Critics' Choice

Stewart Alsop, P.C. Letter:

"MicroPhone . . . sets the standards that general-purpose communications software will have to follow."

The New York Times:

"MicroPhone is a breakthrough in communications software . . ."



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MultiFinder compatible. Supports background file transfer and script execution. Offers a full-featured script language: variables, counters, and expression-analyzer for string and arithmetic operations. Scripts allow: control of all communications settings; screen addressing and text editing; filtering of incoming text.

Supports import and export of scripts as text files. Allows control of PBX's, Hayes and non-Hayes modems through flexible modem drivers. Runs at 50 to 57,600 baud. Emulates DEC VT52, VT100, and TTY type terminals. Mac II and LaserWriter compatible. Works with all Mac large screen monitors. Supports the extended keyboard. Built-in text editor. Includes Glue, licensed from Solutions, Inc.

Taking It to the Streets



Computers & You is about people taking control of their lives. Here's how you can help.

Less than ten years ago, the personal computer was heralded as a panacea for all social ills. It was going to create a more democratic society, promote equal opportunity across class, age, race, and every other kind of line. It might even help save the whale, the condor, the kit fox. The advent of the Macintosh only intensified this vision of what the computer could do.

The reality has proved to be a far cry from those heady expectations. Instead of breaking down barriers, the computer has created a powerful new information elite. The rich are getting richer in information as well as money. But the poor are still among us, and they are increasing in number—and in their hopelessness.

Every so often, readers who are concerned with the computer's social value write to ask, "Can't you do something to make computers more useful to society?"

Well, I have. I met recently with Pat McGovern, chairman of International Data Group, the parent company of PCW Communications. We shared our ideas about setting up a computer learning center in a poor neighborhood. Lore Harp, Pat's wife, suggested that the center be called *Computers & You*.

We knew where to launch such a project—the Tenderloin area of downtown San Francisco. Near City Hall, this 50-block neighborhood is home to about 25,000 people, almost half of them Southeast Asian refugees. Another 20 percent are black, 20 percent are white, and the rest are Native American, Central American, Pacific Islanders, or East Indian. The homeless population is estimated to be about 8000, and growing. Most residents have an annual income of under \$9000—sometimes very far under.

An old neighborhood church serves as community hangout, drop-in center, and social service agency. Glide Memorial Church has been at the forefront of street-wise churchgoing for 25 years. The perfect shepherd for *Computers & You* is the Rev-

erend Cecil Williams, the energetic and charming minister who guides Glide's numerous service programs.

The message at Glide is one of self-esteem, cooperation, and positive change. Its spirit-lifting Sunday worship (complete with electric bands, gospel choir, and light show) is backed up by a week of real-life offerings: hot meals, nightly shelter, free used clothing, crisis and job counseling, preschool and tutoring programs—even singing, dancing, and writing groups.

An estimated 1 million people come through Glide's doors every year. Glide serves 100,000 meals a month. About 300 families participate in the Glide Children's Program every month. Over a thousand people have attended the Parents' Program, which teaches skills for developing family life.

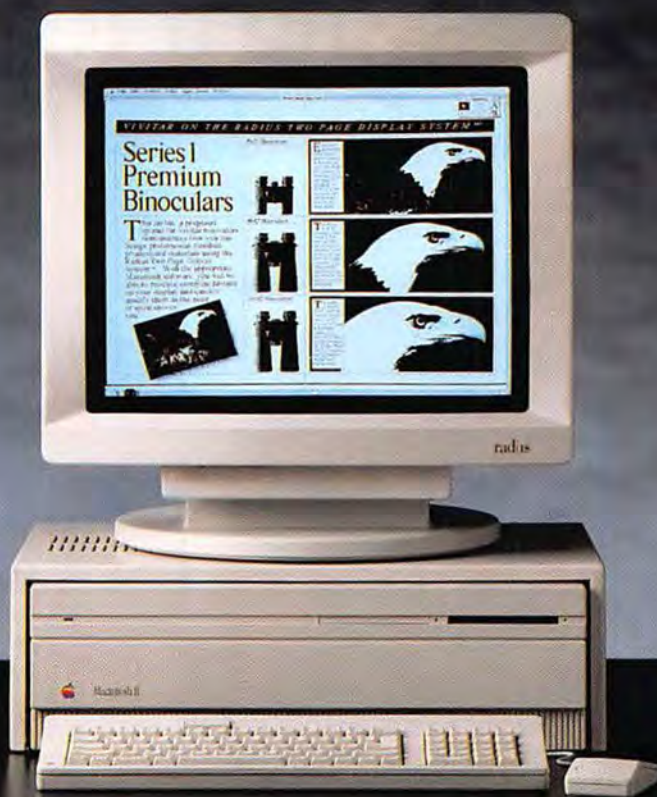
I have had many occasions to observe Glide's programs since I moved to San Francisco in 1978. I always come away feeling grateful that there's someplace providing a daily dose of hope and energy, along with some basic necessities like food, shelter, and clothing, to the poorest among us.

When I got Pat McGovern and Cecil Williams together, they found that they share a vision of empowering people. Giving poor people access to personal computer technology can give them some options: literacy or job skills, confidence, a bigger picture than they might have had.

No, I'm not wearing rose-colored glasses. I don't think learning how to key in database entries or process words ends poverty or liberates the soul. But it is a step toward a paying job and higher aspirations.

"Computers & You will help adults get unstuck," Williams enthused, and the kids playing with educational software "will take off and fly." The program will deal with external realities and internal values, too: dignity, self-respect, greater control over one's life.

(continues)



FOUR CLEAR YOU SHOULD BUY YOUR RADIUS AUTHO

Now you can buy your Macintosh II with a powerful tool which will dramatically increase your productivity with every use.

A Radius Display.

Radius offers displays for every type of Macintosh user and every Macintosh software application.

If you're involved primarily in intensive word processing and database management, we heartily recommend our FPD.

The Radius Full Page Display™ shows you an entire 8½" x 11" paper-like page. With a refresh rate of 69 Hz, you have a virtually flicker-free

display ideally suited for working with software like Microsoft Word and 4th Dimension.

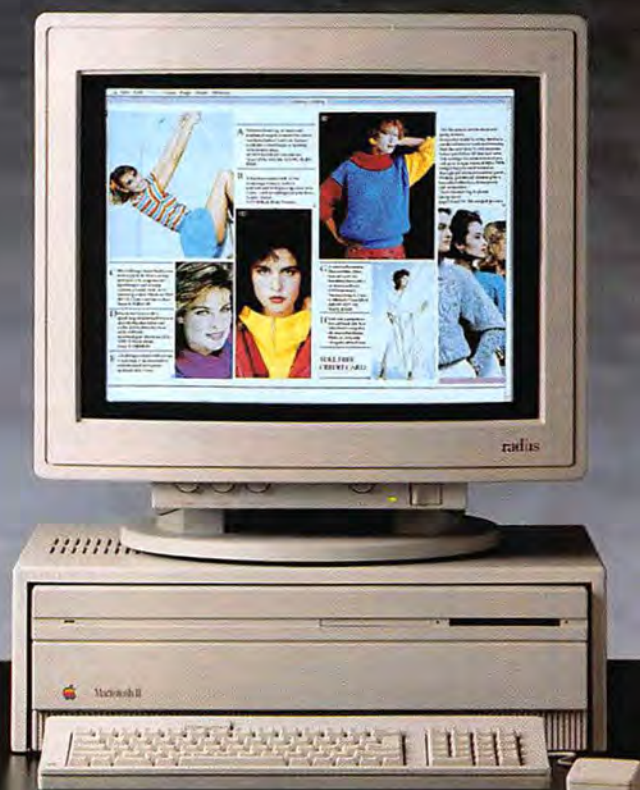
If you're incorporating your word processing into page layout and design, we suggest that the Radius Two Page Display™ is clearly the choice for you.

You have the same flicker-free resolution of the FPD together with a full two-page horizontal layout. The ideal environment for viewing a magazine spread created in

PageMaker or architectural plans drafted in MacDraft.

Or, if you're putting photographs into your Macintosh, our Radius Gray Scale Display™ lets you create and manipulate life-like images in 256 shades of gray across the same expansive TPD.

Scan your photographs, then do your own retouching using Image Studio or Digital Darkroom. When you're ready, just print out on a LaserWriter or download to a Linotronic.



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Displays allow you to create bit-map screen dumps. And our Gray Scale and Color Displays allow you to save any portion of your screen in a PICT file for later use.

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Grandma's old stick had her in a tailspin. She was even about to hang up her goggles!

But her grandson stopped her just in time. "It's not your reflexes, Grandma. It's this unresponsive control stick."

The next day he hooked up her MAC with a brand new Flightstick™ and Mirage Adaptor.

"This is the stick professional pilots use, Grandma."

She noticed the difference on takeoff. Instead of skidding off the runway she was airborne with correct speed and altitude.

"And I thought I'd lost my touch!"

Hardly. With Flightstick's fingertip responsiveness she was doing barrel rolls and loops with the greatest of ease.

"Bring on the MIGs," she said.

Thanks to Flightstick's super-accurate trigger with tactile and audio feedback, Grandma downed four MIGs in a wild dogfight.

No wonder Flightstick is the stick



of choice for Falcon, Chuck Yeager's Advanced Flight Trainer and Microsoft's Flight Simulator.

So take a flying tip from a senior ace. "Get Flightstick. Or get a real good parachute."

Use Flightstick with the Mirage Adaptor on MACs; without Mirage on IBM PCs and APPLE IIs.



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MACWORLD

The Macintosh® Magazine
An IDG Communication Publication

David Bunnell

The basic setup of Computers & You will be simple. A big room on the top floor of Glide's six-story building is dedicated to the project. It's already got the proper wiring, ventilation, and lighting. In other words, it's ready to go.

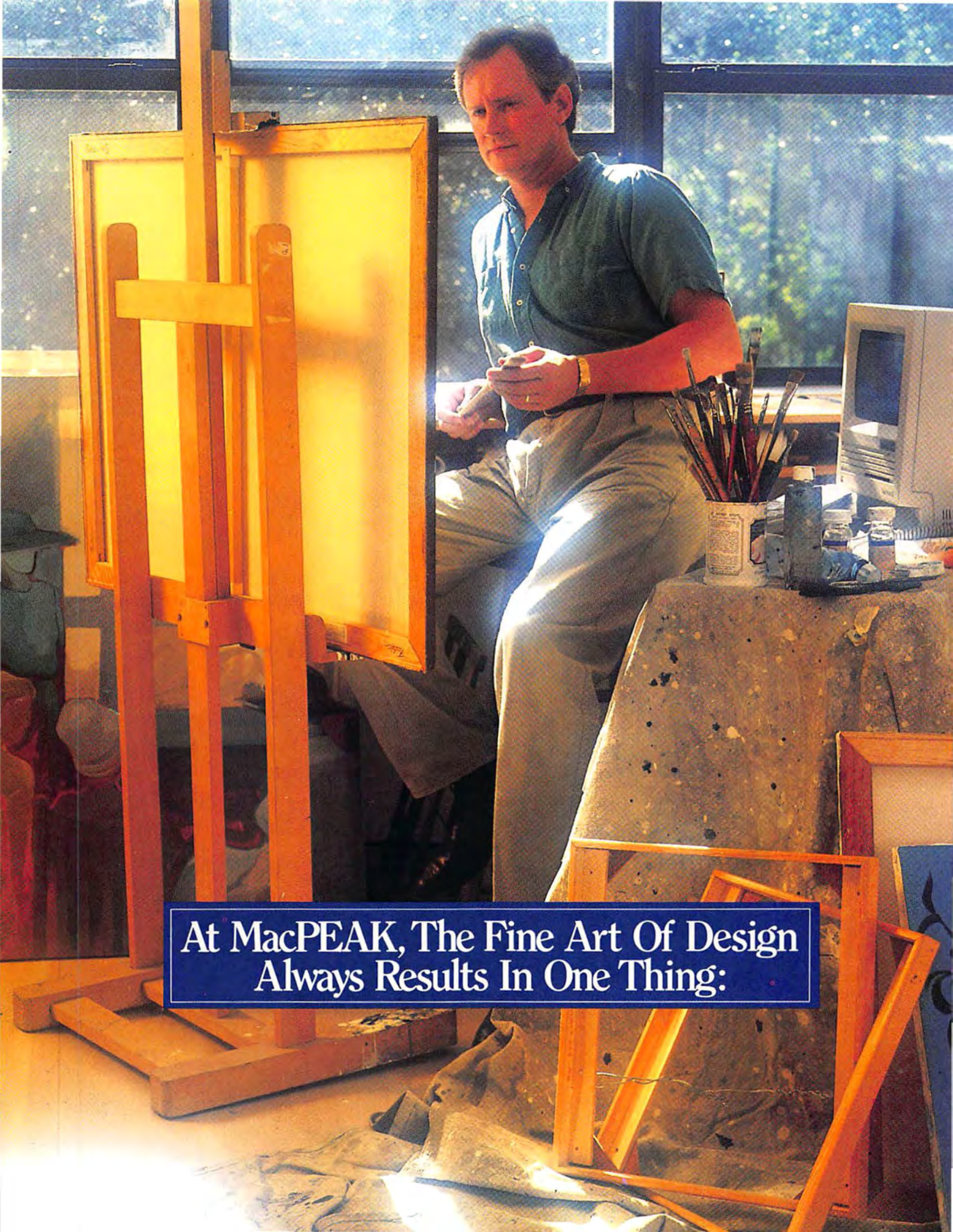
PCW Communications, IDG, Pat McGovern, and I have jointly pledged \$100,000 to hire a small staff who will formulate the program and pursue additional fund-raising. And a number of industry leaders have committed, as of this writing, to joining the project's advisory board, including John Warnock, president of Adobe Systems; Heidi Roizen, president of T/Maker; and Adam Osborne, chairman of Paperback Software International.

The program will offer daily classes and practice time using a variety of reading, writing, math, and language programs. I'm certain that kids of all ages and colors will be there every hour they're allowed to be. Older people with poor reading or comprehension skills may find their aptitude increasing dramatically after working with volunteer tutors and an easy-to-use literacy software program. People who are more skilled, but jobless, can learn about databases, data entry, and word processing to gain the experience necessary for landing a steady job.

What else do we need? We need your support in the form of cash or computer equipment and software. We'd like to see Macs, of course, but also Apple IIs, IBM PCs, Atari STs, and Commodore Amigas in peaceful coexistence, and all of them in use night and day. Music synthesizers, keyboards, modems, shareware, and public domain software should be available. I want the center to have a comprehensive collection of educational software and other computer learning tools. Then, of course, we'll need a steady stream of tutors and volunteers to really make the place hum.

Most of all, I want this project to generate some inspiring success stories. If Computers & You becomes a ticket out of hopelessness for even 10 percent of its participants, it will be well worth the effort.

If you can help, please write to: Computers & You, c/o Corporate Development, PCW Communications, 501 Second St., San Francisco, CA 94107. Let me know what kind of software or hardware you can contribute, or what other kinds of resources you are willing to share. By giving just a little of ourselves, we can become richer in ways we can't even imagine. Then we can lay to rest, once and for all, the myth that the personal computer revolution is not all it's cracked up to be. □



At MacPEAK, The Fine Art Of Design
Always Results In One Thing:

A Stroke Of Genius.



MacPEAK Unveils A New Collection Of High Performance Peripherals For The Macintosh® Family.

The artists at MacPEAK have been at it again. Designing the most innovative products for Macintosh computers on the market today. Our palette features a wide variety of high performance upgrades, colored with an eye for attractive pricing. Simply stated, no one offers you a better product—at any price—than MacPEAK.



The Orion™ SE^{20/25} Accelerator. A full-featured multispeed accelerator card for the Macintosh SE, the Orion SE replaces the SE's standard 8 MHz 68000 microprocessor with a 68020 processor, running at either 20 or 25 MHz.

The Orion SE also supports two co-processors: the 68851 Memory Management Unit, and either a 68881 or a 68882 Math Co-processor. The Math Co-processor performs math operations up to 100 times faster than a stock SE. Additionally, using the Orion SE's 8 standard SIMM sockets, users can expand to a full 8 megabytes. The result of all this power is a machine that's able to outperform a Mac II by as much as 3 times!



The Orion One Accelerator. The Orion One is an entry-level accelerator card for the Macintosh Plus or Macintosh SE. The Orion One replaces the native 8 MHz 68000 with a faster 16 MHz 68000 and 16k of zero-wait-state static RAM. The result: up to 2.5 times better performance. The Orion One also supports an optional 68881 Floating Point Math Co-processor. Using the optional 68881, math-intensive applications can see performance increases in excess of 30 times.



The Orion II^{30/25} Accelerator. The Orion II is a state-of-the-art accelerator for the Macintosh II.

Using NuBus, it replaces the Mac II's 16 MHz 68020 with a 25 MHz 68030, supported by 256k of zero-wait-state static RAM. Users can optionally add up to a megabyte of static RAM, and the new 68882 Floating Point Math Co-processor. The static RAM serves as a general function cache, greatly enhancing the performance of all applications, including A/UX. The advanced cache technology also works with other NuBus cards, like 24-bit video cards, thereby substantially increasing their performance as well. The Orion II is able to boost a Mac II's performance by 2–4 times. With supporting applications, the 68882 is able to do floating point calculations up to twice as fast as the 68881.



Galaxy™ ECL Video Option. Available for the Orion One and Orion SE accelerators, the Galaxy Video Option provides a crisp 19" 1024 × 890 ECL display with lightning-fast refresh times.

Using advanced C-DEV software, the user is able to choose from a full array of features, such as one screen only, big screen only,

both screens with big screen on either side (left or right-hand flexibility), image magnification, and more.



Galaxy II. Galaxy II is MacPEAK's 19" Monochrome Video Controller for the Macintosh II, using the most advanced high-speed ECL technology.

With its bright, stable 1024 × 890 image, the quality of the Galaxy II equals the original Macintosh screen. One look and you'll see the difference!



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The result is an incredibly bright, crisp large-screen display that's every bit as good as the original. Fast? You bet. With its 16 MHz 68000 microprocessor and zero-wait-state static RAM, refresh and re-draw times are up to 3 times faster than an ordinary large screen monitor. Pegasus works wonders for PageMaker® and other layout programs!

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The PLP gives you unlimited free-



dom in reducing and enlarging documents (critical for applications such as Excel and PageMaker®).

The LaserWriter II SC doesn't.

With the PLP, italics are true *italics* and bolds are true ***bolds***

—because the PLP uses true outline fonts. The LaserWriter II SC doesn't.

All this begs an obvious question: how can we offer so much functionality and still charge less for it?

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But there's another reason the PLP performs better: it has to.

After all, in a market saturated with laser printers, there are plenty of opportunities to compare price and performance. The PLP simply provides a higher standard of comparison.

For a PLP demonstration—or information on our ImageWriter® trade-in program—see your authorized GCC Technologies dealer. For the one nearest you, call (617) 890-0880.†



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Circle 177 on reader service card

Letters

A forum for Macworld readers

Shark-Infested Waters

Several facts stand out about Eric Winn's article on Apple's pricing policies ("How Much Does a Mac Cost?" June 1988). First, Apple's operating profit margin (about 17 percent of sales) is not particularly high; it only seems so in comparison to the PC clone market. Second, Apple's high return on equity (most recently 28 percent) is caused by rapidly rising sales and good management keeping costs under control.

The barracudas have noted Apple's situation and have mounted the most menacing pincers movement in recent business history: IBM and Microsoft on the one hand, and AT&T and Sun Microsystems on the other, want to invade Apple's claim on graphical operating systems. Apple will have to cut prices to survive.

Carl E. Wittnebert
Petaluma, California

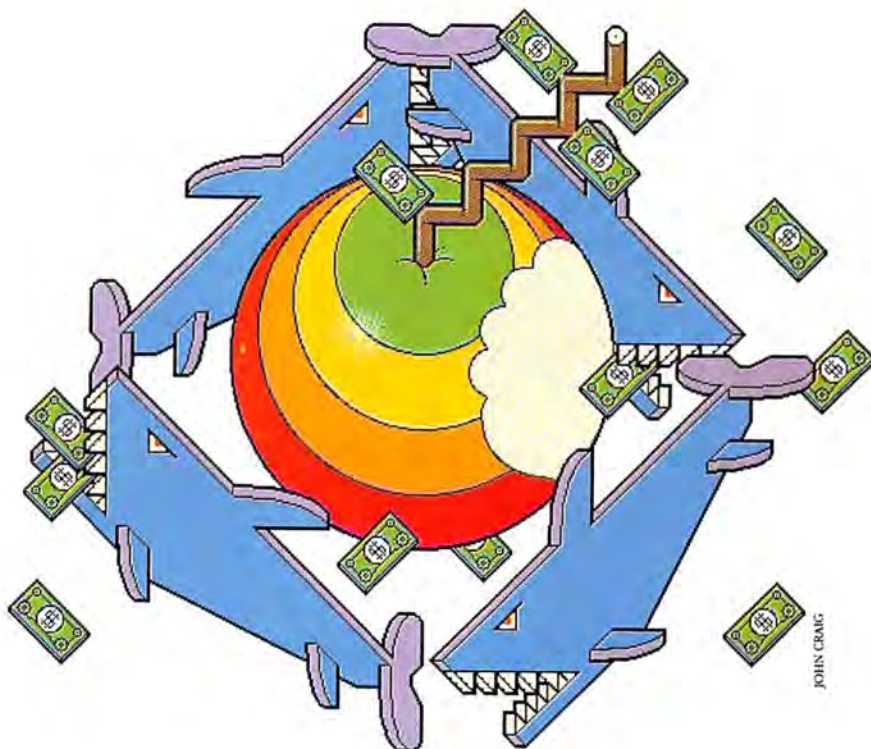
Corrections

Conversion Dynamics (Macworld News, June 1988) developed the Mac interface for Palantir's Recognition Server. The company has produced no programs for IBM or Sun.

Harpoon, a war-simulation game by Three-Sixty (New Products, July 1988), is set for release by the end of 1988. Three-Sixty's phone number is 408/879-9144.

Medina Software's phone number (Letters, July 1988) is 407/260-1676. Medina's Spanish spelling dictionary, *Correcamente*, sells for \$32.95; its Spanish/English dictionary for \$36.95.

The phone number for Full Phase Software, maker of MacAstrologer (Where to Buy, August 1988), is 206/325-2112.



The Going Rate

I got a big kick out of Eric Winn's article, "How Much Does a Mac Cost?" It reminded me of the "What Is a Human Being Worth?" stories that set our own value at something like \$1.68 (probably a bit more now, thanks to inflation).

Charlotte I. Frye
Stockton, California

Shareware—At a Price

Recently I purchased from Educomp a set of disks comprised of both free and shareware products, including a shareware desk accessory by CE Software called DiskTop v. 1.2. I was ready to send CE the \$39.95 fee when I saw a newer version of the same product advertised elsewhere for \$29.95. Had I bought the older, more expensive version before finding out about the

cheaper one, I would have felt ripped off. I also now have less respect for the software manufacturer.

Robert H. Burkert
Pennsauken, New Jersey

Although the older versions of DiskTop were shareware, it is now a commercial product sold by dealers, which are free to discount it as they please. CE Software has no control over shareware and public domain distribution channels, which continue to make older versions available.—Ed.

(continues)

Scan Anything...



Let's Not Mince Words...

Let's face it, the art of *Page Recognition* has not advanced all that much since the days of the Egyptian Pharaohs. Text and graphics never seem to come out right. M's looking like inverted W's. Multi-column documents looking like Sanskrit. It's virtually impossible to mind your P's and Q's when the level of technology has not advanced beyond *electronic alphabet soup*.

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OmniPage,[™] the most advanced page recognition software available today, lets you transcend the clutter

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decree of Ptolemy
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in Greek, Egyptian
hieroglyphic, and
Demotic. Discovered
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*Note: Excessive Key Stroking (EKS) has been known to cause "spastic quivers" and even so slight knee jerks in software engineers, data entry clerks and desktop publishing fanatics. Avoid whenever possible by using *OmniPage*.

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Letters

Cleaning Up Mail Order

In your December 1987 issue, you took a laudable stand on mail order ("What's Wrong with Mail Order?" and *Commentary*). However, long before computer mail-order existed, there were similar problems with photo mail-order stores. As a result, *Modern Photography* began setting down strict guidelines for its advertisers, with the threat of ad removal if those rules were broken. A shopping staff also began buying equipment from sources and checking for further violations. Perhaps *Macworld* should consider a similar strategy.

Rei Shinozuka

Ridgewood, New Jersey

Macworld's mail-order section now carries a consumer-protection statement that outlines Federal Trade Commission (FTC) rules governing mail order (see page 249). We also monitor mail-order firms by tracking readers' complaints; if we see signs of consumer abuse, we may refuse to run ads, as we did in the cases of *Northeastern* and *Your Mac Source*.
—Ed.

How Do You Spell Irony?

I just received my copy of FullWrite Professional and was quite amused to find that FullWrite's dictionaries know what a LaserJet is but not a LaserWriter—going so far as to offer LaserJet as a possible correction for the "misspelled" *LaserWriter*. This is irony at its best.

Neil S. Ticktin

Encino, California

In Bad Form

We take issue with Jim Morton's review of our product TrueForm ("Form Wars," June 1988) and his article "Forms of Intelligence" (July 1988). Morton incorrectly states that TrueForm neither lets you import data nor lets you specify delimiters when exporting text. Both features are documented in the manual and are referred to in the index (which he claims has "serious omissions") and in the table of contents. He also complains about misalignment of scanned forms. But because of the difference in dots per inch between printed and screen images (300 dpi versus 72 dpi), forms that appear jagged on screen will print out fine. He gives TrueForm bad marks for being unable to search

(continues)

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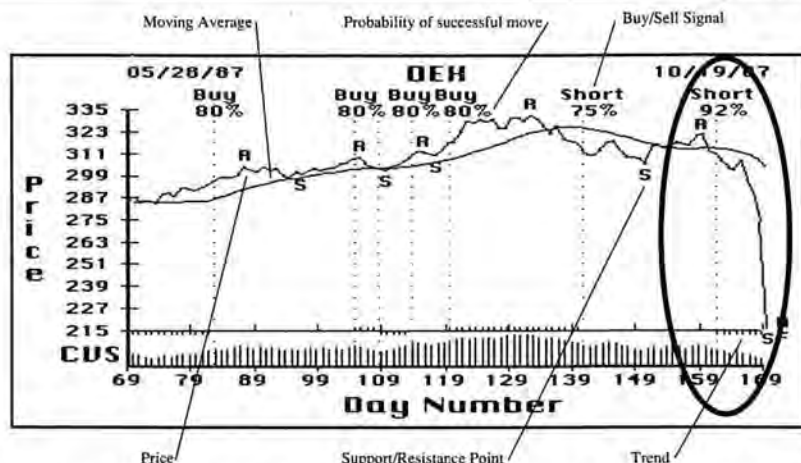
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Circle 41 on reader service card

Letters

stacks of forms or print a single form instead of all. Since these features were added to version 1.1, which Morton received in prerelease form, they should have been mentioned in the review.

Ross Yabnke
Spectrum Digital Systems
Madison, Wisconsin

You're right—TrueForm does offer those import-export features. The author continues to believe that a jagged on-screen image—especially if it contains hairlines or thin boxes—is likely to be noticeably misaligned in the printout. Finally, the changes planned for version 1.1 were mentioned in Morton's manuscript but were edited out of the final copy. Our apologies.—Ed.

Praise for Layered

While using Layered's Insight Accounting, I recently went through a hair-raising experience. After discovering that my posting was wrong even though I'd entered everything correctly, I sent my data to Layered. Three days later I got it all back, completely corrected. I cannot recommend Layered's technical and customer support people too highly. Now everything is back to normal, and I can go back to running my business.

Bob Harris
Inverness, California

Consultants Unlimited

Having read Victoria Wingard's request for services that match consultants and trainers with users (Letters, June 1988), I think the HyperCard Guide to Mac Consultants may be exactly what she's looking for. It's a freeware stack that lists Mac consultants and enables users to find those who meet their needs. Available on several major information services and on many bulletin boards, the stack can also be obtained by sending a formatted 800K disk and self-addressed stamped envelope (or \$3) to Answers Unlimited, 917 Woodland Dr., San Ramon, CA 94583, 415/275-1064.

Don Rowlett
San Ramon, California

CAD Spelled Out

Your comparison of CAD packages in the July 1988 issue ("2-D CAD: A Landscape View") listed inaccurate prices and did not properly reflect features and capabilities available in MGMSation CAD version 2.5.

(continues)

The VT600's resolution of six hundred dots per inch insures smooth curves and sharp detail both at large sizes and in small text—as shown in this block of eight-point copy.

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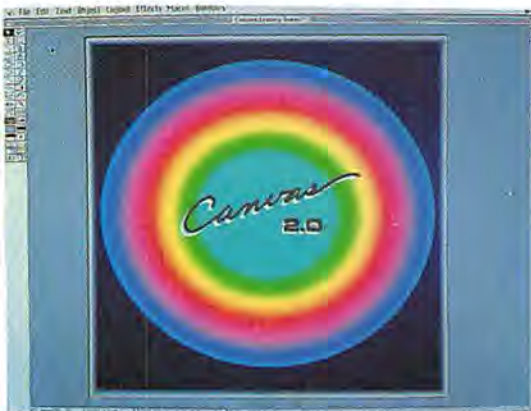
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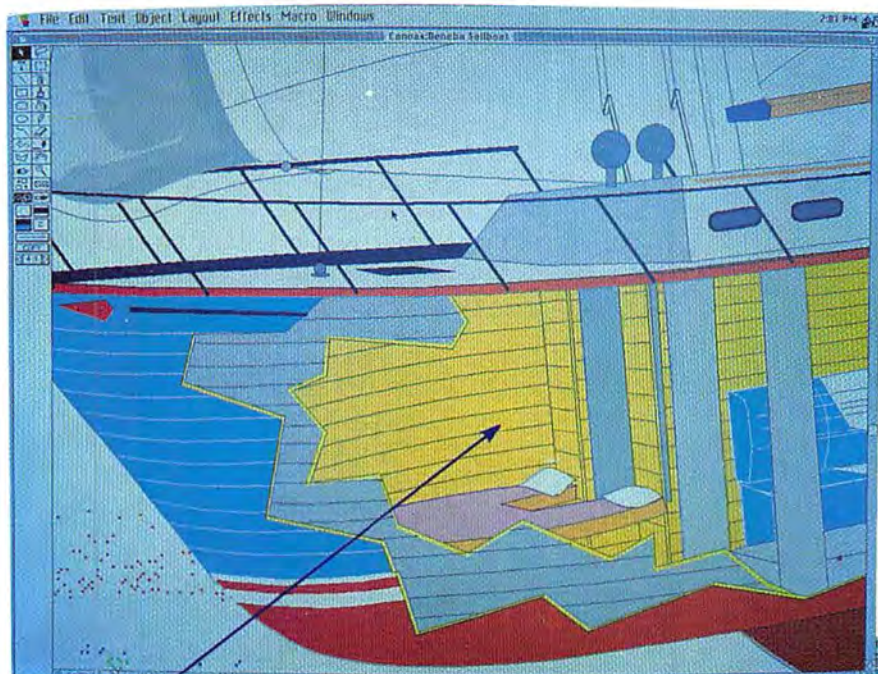
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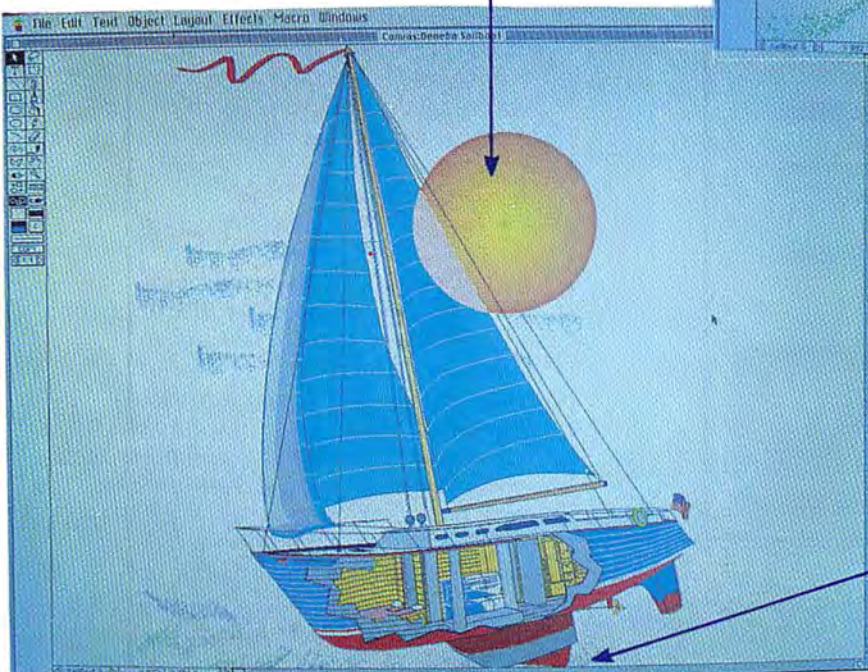
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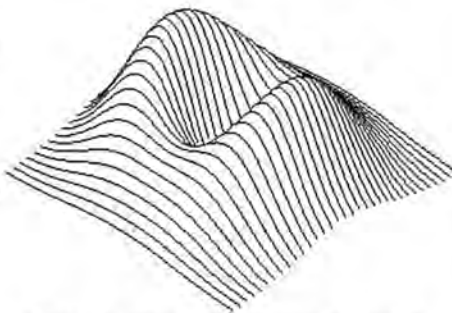
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—MacWEEK, March 29, 1988

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Letters

Contrary to the comparison table that accompanied the article, our product does store attribute information, supports 56 layers, allows alignments of objects through a repeatable function under the Move and Rotate tool, creates freehand lines, creates rectangles, and provides DXF Import/Export in the optional MGMS IGES package.

In addition, the author failed to mention unique and powerful features of MGMSStation CAD, such as Fillet All Corners, Contour Offsets, and text table and comment generation.

Avi Lipski

Micro CAD/CAM

Los Angeles, California

The Mac II version of MGMSStation CAD costs \$1399; the updated price of the SE version is \$999. Although DXF was not available when the article was written, it has since been added to the MGMS IGES package. We did miss MGMS's rectangle function, which is found under the Shapes tool rather than where we expected to find it.

In the case of the other features, the author felt that they didn't conform to the definition of those functions most widely accepted in the CAD field today. For example, MGMS's Free Lines drops a connected vector end point at each free mouse-click location, whereas we were looking for a freehand line feature that drops a series of many short vectors along the cursor's path.—Ed.

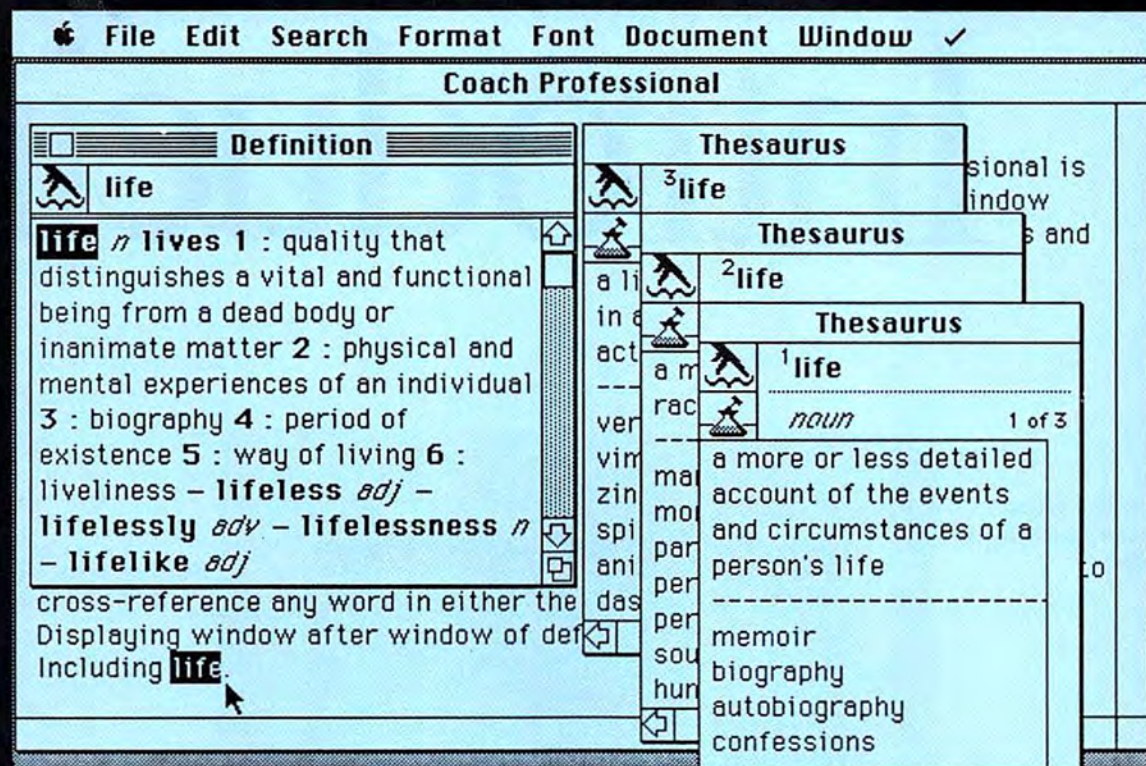
Good Reflexes

Your June 1988 database review ("Data Basics") finally does Reflex justice. In addition to spelling out what novices should look for, Charles Seiter calls Reflex Plus "the best intermediate-level product available." A person looking beyond flat files for information management will get results with Reflex Plus.

Charles Duane

Marion, Massachusetts

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Circle 180 on reader service card

Introducing

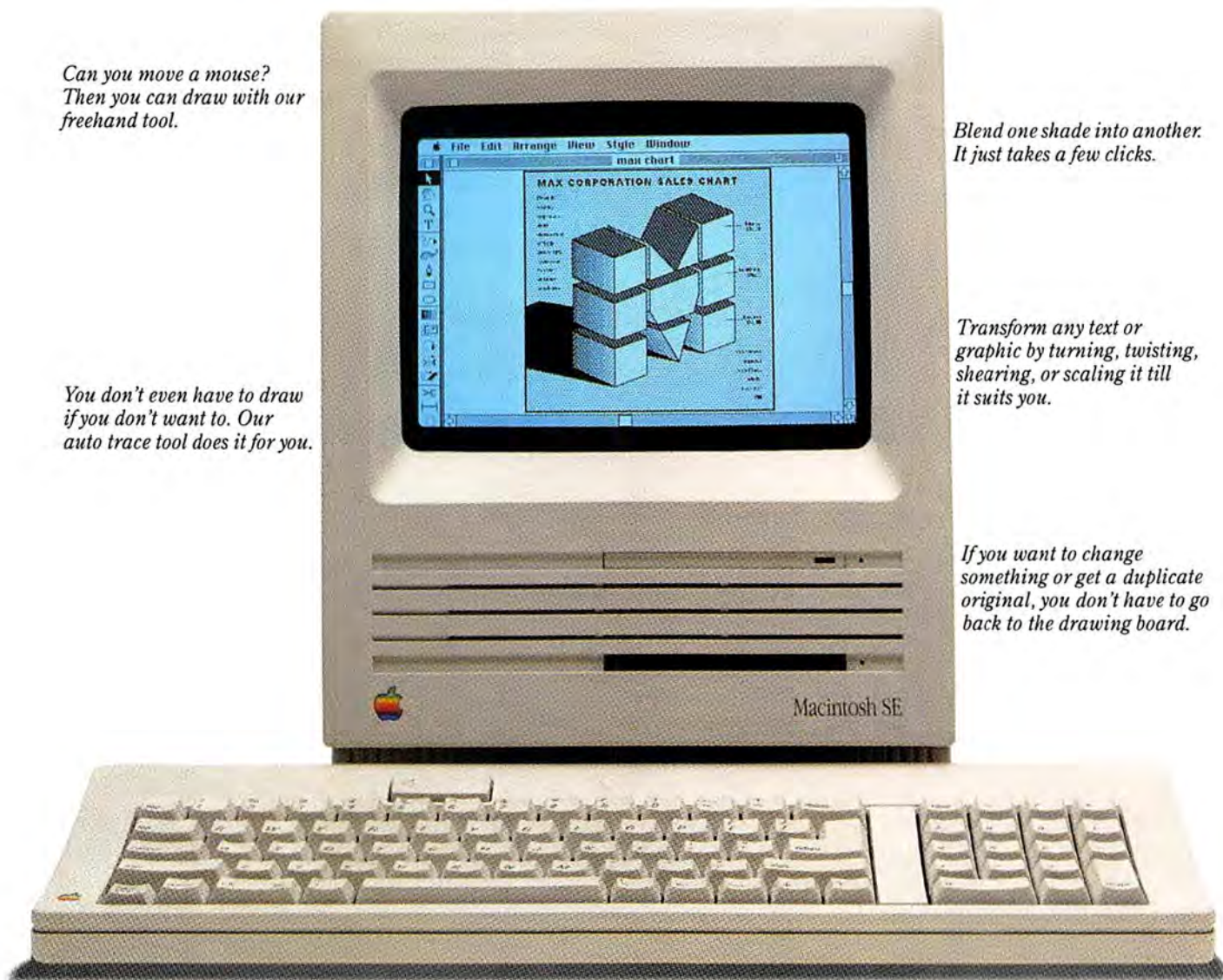
*Can you move a mouse?
Then you can draw with our
freehand tool.*

*You don't even have to draw
if you don't want to. Our
auto trace tool does it for you.*

*Blend one shade into another.
It just takes a few clicks.*

*Transform any text or
graphic by turning, twisting,
shearing, or scaling it till
it suits you.*

*If you want to change
something or get a duplicate
original, you don't have to go
back to the drawing board.*



What could be easier?

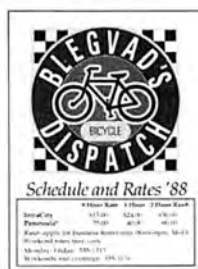
Maybe if you could push a button labeled
"Sales Chart" and get a sales
chart, that would be easier.

But it wouldn't be reality.
This is.

Presenting Adobe
Illustrator 88™ software.

A program so powerful, it
makes making art effortless.

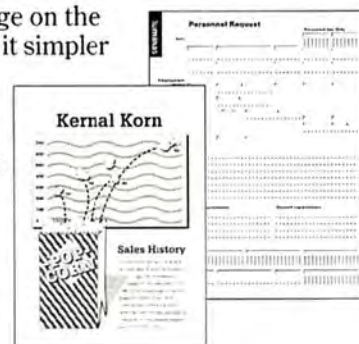
Begin anywhere you like.
Like to start from scratch?



Just move the mouse to create an image on the
screen. Our new freehand tool makes it simpler
than ever.

Rather start with a rough sketch
or existing line art? No problem.

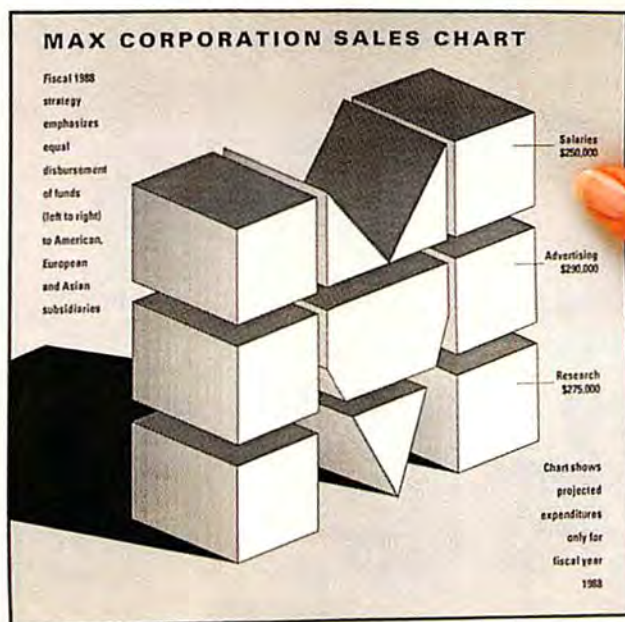
Adobe Illustrator 88 software lets
you scan all sorts of existing images
so they appear directly on your com-
puter screen. Then, our new auto
trace tool takes over. Just click on or
near a portion of the scanned image,
and bingo, instant line art.



Automatic Art.

Creating exciting business graphics is an art. But now, you don't have to be an artist.

With a Macintosh® Plus, SE, or II, and any PostScript® printer you can get high quality Adobe Illustrator 88 art, automatically.



Adobe Illustrator 88 software can produce black and white, color, or color separated film. Just tell it what you want.



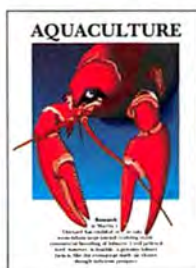
About that fast, too.

Or let's say you've been using other programs and want to work with the art you've created.

The Adobe Illustrator 88 program can convert MacDraw® files instantly. Or auto trace your MacPaint® files. Click. Done.

Maybe you want to do more. A lot more.

Like airbrushing effects



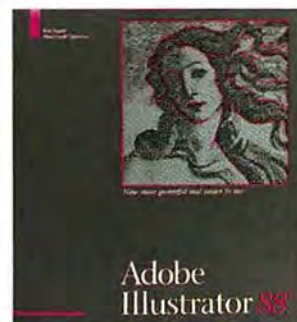
and shading and masking and blending and color separations and printing. But you don't know a thing about them.

That's okay. Now you don't have to.

All you have to know is where to buy Adobe Illustrator 88 software. And that's easy, too. Just call us at (800) 29-ADOBE. Or (415) 962-2100 in Alaska and Canada.

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40MB	\$699	3 1/2" SCSI Hard Disk	2 3/4" x 6 1/2" x 9 1/4"	25 ms	4 1/2 lb
70MB	\$899	3 1/2" SCSI Hard Disk	2 3/4" x 6 1/2" x 9 1/4"	25 ms	4 1/2 lb
NEW! 80MB	\$1099	3 1/2" Quantum SCSI Hard Disk Includes DisCache™	2 3/4" x 6 1/2" x 9 1/4"	18 ms	4 1/2 lb
NEW! 100MB	\$1249	3 1/2" SCSI Hard Disk	2 3/4" x 6 1/2" x 9 1/4"	25 ms	4 1/2 lb

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Cirrus hard drives deliver power and speed without compromising reliability, ergonomics or desktop real estate. Superior 3 1/2" drive technology and high-volume half speed fan provide cool, quiet operation you can rely and rely on.

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Circle 145 on reader service card

What's in a Name?

Anthropomorphism, software modules, groupware, E-mail, and more new products



Talk show host in silly hat with letter held to forehead. "The answer is Anthro-pomorphs, agents, knowledge navigators, and talking heads." (Answer is repeated by gormless sycophant next to host.) "The question: What would Max Headroom be like if he were generated on a computer?"

The question of what the genie in the computer will be like has been asked repeatedly during the last decade, and we're coming close to an answer. We've seen many iterations of anthropomorphism in computers: in Michael Crichton's film, *Looker*; Information International's animated juggler, the first animated representation of a person on a computer; Kubrick's disembodied HAL; the genial bow-tied research assistant that pops up in Knowledge Navigator, made famous in Apple's 1988 video speculating about its future; and dozens more. All are attempts to replace the cursor with an audiovisual, artificially intelligent intermediary that resembles *Homo sapiens*. You turn on the computer and up pops a "person" who knows your computing preferences—in fact, knows more about you than you might ever want it to. Instead of launching a program, you simply converse with the anthropomorphic interface, and it beetles away in the background doing whatever you have in mind.

Of course we don't want to carry the idea too far. After all, the machine could decide to add panache to itself. Develop strange mannerisms or idiosyncrasies. Start calling you by nicknames, making fun of the shirt you're wearing. What if your anthropomorph developed a Corporal Klinger personality? Come to think of it, anthropomorphism is pretty much a can of worms (now that's a graphic image—or maybe a morph of another color).

The latest step in this direction comes from BrightStar, a little Seattle company that produces what owner Bill Correll calls HyperAnimation. Combining animation and HyperCard, Bill and his colleagues give digitized talking heads life on the Mac. At least a verisimilitude. BrightStar's talking heads recite scripted material that corresponds to dialog boxes. Facial expression is tuned to the script; movement and expression are rendered on the fly by the CPU, so it's not elaborate, but there is little else to compare it to on a personal computer. (The best two examples I've seen to date are the work done at New York Institute of Technology and the Tony De Pettrie piano player animation short done at the University of Montreal.)

Modular Software

Stepping out of the human interface for a moment, here's another idea that's been around for a while: modular software.

For some time, mainframe software producers have allowed users to extend their programs by adding modules. Let's say you own a CAD system from Computervision running mechanical design software, and you broaden your business so that you suddenly need architectural design software as well. Computervision (or another company like it) will sell you an architectural module that runs on the system that you already have. The mechanical and architectural modules can then exchange data. For that matter, you might buy Mac accounting software from Layered and acquire additional modules for inventory, billing, and so on, as your business grows.

These days Charlie Jackson at Silicon Beach Software is talking along similar lines. Silicon Beach is opening up its Digital Darkroom and best-selling SuperPaint

packages for software modules. Charlie's approach differs from the other cases I mentioned in that Silicon Beach provides the software facilities for *other developers* to add feature modules. For example, I've seen about a dozen SuperPaint modules from outside developers that enhance its capabilities—offering paint features, drawing tools, animation, special effects, and more. Because Silicon Beach is publishing the specifications that allow programmers to add features, Charlie is encouraging small developers to contribute to the success of SuperPaint. (We're not talking about publishing source code, mind you, just specific parts of the code.) On a pragmatic level, this move could mean the migration of talented developers to SuperPaint, and a corresponding migration of more customers, but I think this is more than a clever marketing concept.

Charlie hopes that all applications designers will see the advantages of modularity and leave hooks for other developers to hang new features on. Then each of us would be able to pick one from column A and one from column B to create the program we've always wanted. Want to add paint features to a word processor? Or a phone dialer to that one application that you keep open all day long?

The downside from the user's point of view is that software could become more homogenous. From the developer's point of view, modular software could reduce the incentive to bring out new stand-alone software. On the other hand, it could revive the lively spirit of innovation that came from desk-accessory developers in the first

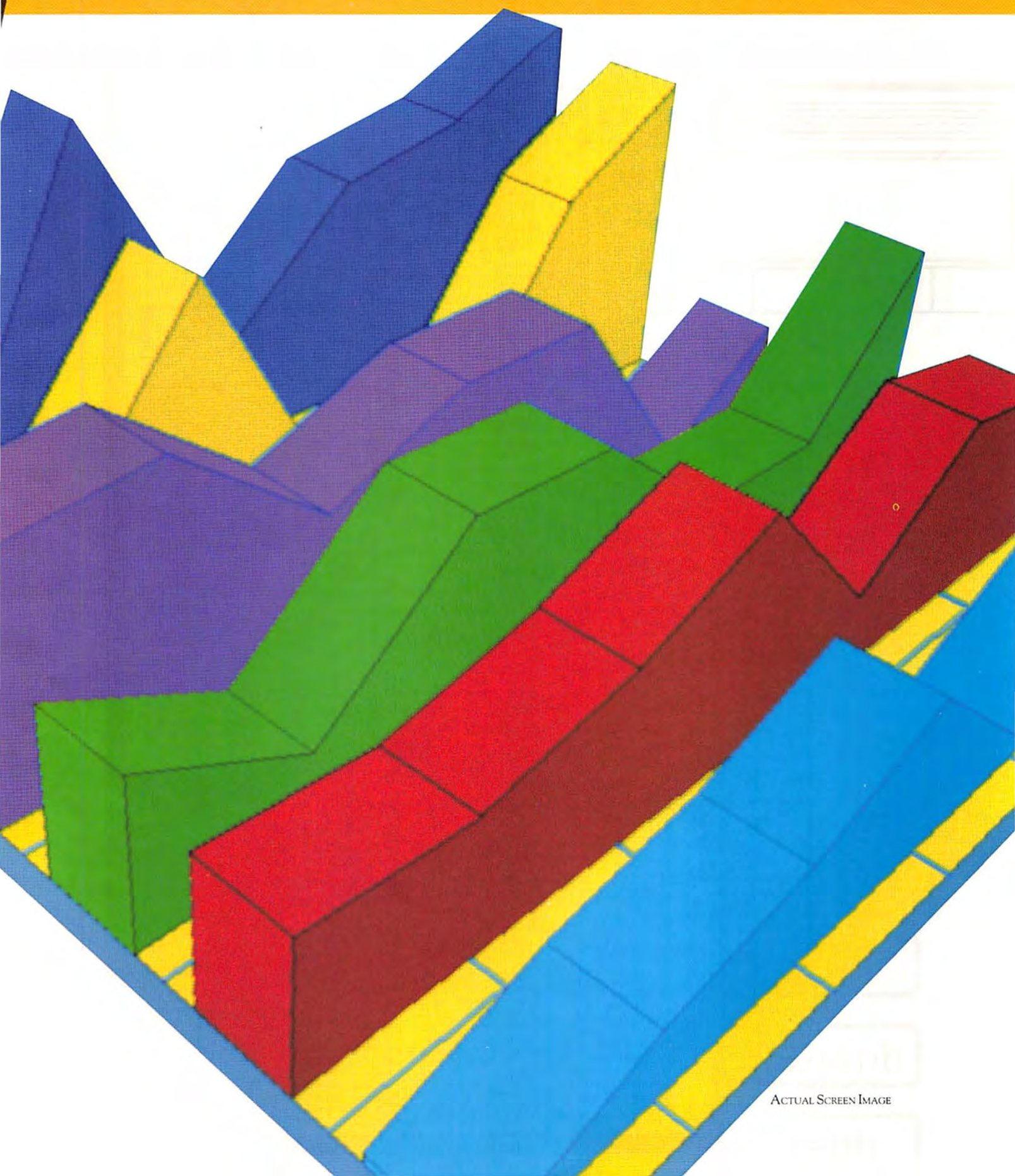
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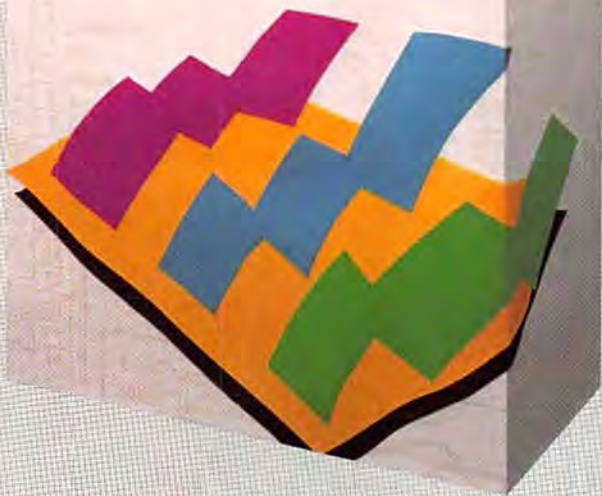
THIS IS WAY TOO EASY. UNSURPASSED NUMBER-CRUNCHING POWER. CHARTS SO GRAPHIC, THEY JUMP OFF THE SCREEN INTO PAGE PERFECT PRESENTATIONS. YOU'RE ACTUALLY LOOKING FORWARD TO YOUR NEXT MEETING. BECAUSE YOU'RE NOT JUST GOING TO SHOW THEM NUMBERS. YOU'RE GOING TO WIN THEM OVER WITH WINGZ.



ACTUAL SCREEN IMAGE

THE ULTIMATE PRESENTATION SPREADSHEET

WINGZ



INSIDE WINGZ

Spreadsheet

- **Worksheet size:** 32,768 rows by 32,768 columns — over a billion cells.
- **Hierarchical menus:** Certain menu items will bring up a submenu; attached to the original menu.
- **Speed:** Average recalculation for Wingz is estimated at least 30% faster than its closest competitor.
- **Sparse matrix memory management:** Wingz allocates memory only for those cells that contain data, allowing for more efficient memory use.
- **Minimal recalculation:** Wingz recognizes which cells are affected by a worksheet change and recalculates only these cells. This reduces calculation time.
- **Calculation options:** Wingz has automatic and manual recalculation, as well as natural row, column, recalculate a range and iterations.
- **Linking:** Through HyperScript users can link together as many Wingz files as their system's memory will allow. Any formula can refer to any cell or any worksheet in memory.
- **Naming Capability:** Identify cells by names rather than cell locations.
- **Fill:** Fill a range with numeric or special text information.
- **Consolidation:** "Paste Special" command copies cells, formulas, values, formats. It also allows you to combine information from two ranges on a single worksheet or from two different worksheets.
- **Insert, Delete, Cut, and Copy:** Applicable for any range of cells. Can paste formulas, formats, values, or any combination.

- **Auditing:** Built-in tools for checking cell relationships and performing other worksheet auditing tasks.
- **Security:** Protect your Wingz worksheets with passwords (read/write and read only) plus data encryption.
- **Annotated Cells:** Add notes to any worksheet. Then hide, view, or print them.
- **Adjustable Rows and Columns:** Rows and columns can both be resized within any Wingz worksheet.
- **Cell Selection:** Wingz allows you to select discontinuous ranges of cells for manipulation.
- **Find:** Search worksheet for specific text, value, formula, or other criteria.



What you see is what you get with Wingz. Presentation graphics, spreadsheet data, and text all on one page.

Built-in functions include:

- **Business functions:** BONPRICE, BONDYTM, CINTEREST, CPRINCIPAL, CTERM, DOB, FV, FV, INTEREST, IRR, NPV, PMT, PRINCIPAL, PV, PVL, RATE, SLN, SYD, TERM.
- **Database functions:** DMAX, DMIN, DSTD, DSTDEV, DSUM, DSUMSQ, DVAR, DVARANCE.
- **Date/Time functions:** ADATE, ADDOAYS,

ADDMONTHS, ADDYEARS, CMONTH, CWEKDAY, DATE, DATE1, DATE2, DATE3, DATEVALUE, DAY, DAYNAME, MONTH, MONTHNAME, NOW, YEAR, ADDHOURS, ADDMINUTES, ADDSECONDS, ATIME, HOURS, MINUTE, SECOND, TIME, TIME2, TIMEVALUE.

Logical functions: ERR, EXACT, FALSE, FILE, ISBLANK, ISCALC, ISNUMBER, ISSTRING, TRUE, ISERR, ISRANGE, ISNA, SIGN.

Numeric functions: ABS, ACOS, ACOSH, ASIN, ASINH, ATAN, ATANH, ATAN2, COS, COSH, DEGREES, E, EXP, EXPONENTIAL, FACTORIAL, GOAL, INT, LN, LOG2, LOG10, MOD, NORMAL, PI, RADIANS, RAND, ROUND, SIN, SINH, SORT, TAN, TANH, UNIFORM.

Spreadsheet: CELL, CELLS, CELLTEXT, CHOOSE, COL, COLS, CTSTRING, CTVALUE, HLOOKUP, INDEX, INDIRECT, MAKEBLOCK, MAKECELL, NFORMAT, ROW, ROWS, VLOOKUP.

Statistical functions: AVG, COUNT, MAX, MIN, STD, STDEV, SUM, SUMSQ, VAR, VARIANCE.

Text functions: CHR, CODE, COLLATE, CURRENCY, FIND, LEFT, LEN, LOWER, MATCH, MID, MIDWORD, PROPER, REPEAT, REPLACE, RIGHT, STR, STRING, TRIM, UPPER, VALUE.

User-defined functions: Create custom functions using HyperScript language.

Hundreds of HyperScript functions: Hundreds of other functions

are available through the HyperScript language. These functions fall into four basic categories: COLOR, ENVIRONMENT CONTROL, and MISCELLANEOUS.

Presentation capabilities

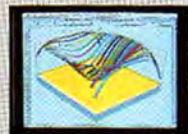
Display Options: Printing graphs, text, numbers, and clip art all on one page. Ability to access as many font types and sizes as the Macintosh system accesses, and use up to 256 colors (Macintosh II hardware limitation, Wingz actually can present over 16 million colors) and/or 38 patterns. Complete control of attributes such as background and foreground colors, fill patterns, object borders, etc. Variable row heights and column widths. Changeable grid color. Turn grids, row and column headers, entry bar, tool box, and worksheet off and on.

Alignment Options: Left, right, center, general.

Number and Date Formats: 14 number and date formats built-in; can create customized formats as well. Negative numbers can appear in red, or any other color you choose.

Text fields: Blocks of text (text fields) can be placed on the worksheet. Editing features include tab, indent, word wrap, search, Change fonts and font attributes down to the individual character. Can reference formulas in a spreadsheet.

Object Orientation: Elements on the worksheet such as charts, free-hand drawings, text fields and controls such as HyperScript buttons are considered objects. Objects can be overlapped, covered, removed, resized, and repositioned in any order. Any number of objects can be attached to a sheet.



No Mac software makes it so easy to create such vivid 3-D graphics.

Graphics

Drawing Tools: Capability to design objects with special drawing tools: Straight line, Arc, Circle, Square or Rectangle, and Polygon or Polyline.

Lines and Arrows: Adjustable line widths, 38 different fill patterns, and any combination of colors. Can be resized or repositioned anywhere on worksheet.

Graphic Elements: Graphic images, clip art, photographs, PICT files, etc. imported on the Wingz clipboard can be used.

Charts and Graphs

Chart types: Twenty basic chart types, both scientific and business oriented: 2-D Bar, Line, Layer, Step, Combination, Horizontal Bar, Pie, HLo: 3-D Bar, 3-D Line, 3-D Layer, 3-D Step, 3-D Combination, 3-D Pie, XY, Scatter, Polar, Wireframe, Contour, Surface. Unlimited number

of graph types can be created through user modification.

Data smoothing: User controllable.

Unlimited graphs per worksheet: Multiple graphs can be created from either the same data or different sets of data within a Wingz worksheet.

3-D Graphs: Three dimensional graph options. Unlimited permutations of 3-D graphs through graph rotation, elevation, and variable perspective (distance) alterations.

Layout Options: Automatic or manual chart layout options.

Legends: Can be automatically created and labeled.

Axis scaling: Manual or automatic. Linear, logarithmic, or percent scales.

Grid display: User modifiable grid and axis.

Data Points: 32,768 data points per series.

Dynamic Linkage

Automatically redraws charts and makes appropriate changes in text fields when spreadsheet data changes.

Database

Use spreadsheet as a database: Allows for quick and easy organizing, filing, sorting, and retrieving of data in any spreadsheet.

Sort: Can sort on as many as 256 keys.

Operations: Four important database functions are: Find, Extract, Delete, and Sort.

Number of records: Up to 32,767 records. Actual size limited only by memory.

Database selection criteria: Extract or link just the information you need.

Application Programming Language

HyperScript: Complete programming language. English-like. Event driven. A series of commands can be executed by a single event such as the click of a button.

Programming features: Classic, powerful programming features include IF THEN ELSE, CASE statements, DO WHILE looping, FOR-NEXT loops, PROCEDUREs, etc.

Customization: User definable menus, advanced controls (buttons, sliders, and number wheels), dialog boxes, and functions.

Buttons: Automate virtually any action by executing a HyperScript program.

Learn Mode: Allows recording of scripts for replay or edit purposes.

Import/Export Capabilities

Read and write file exchange with other Macintosh and DOS spreadsheet programs, such as Excel (SYLK) or Lotus (WKS, WK1), as well as DIF and ASCII file formats.

Printing

Print Preview: Shows entire page, its layout, and page breaks.

Page features: Headers, footers, titles, margins, automatic page numbering, print formulas or values.

Hide/Show features: Hide or show worksheet information, fixed titles, cell notes, text fields, grid lines, buttons and controls, graphics including lines, squares, etc.

Printers: Supports the range of printers supported by the Apple print drivers, including the LaserWriter, LaserWriter Plus, LaserWriter II, Image Writer II, and Image Writer I/O printers. Wingz also supports a range of additional hardware including color printers which support postscript and Apple Quick Draw Commands.

Color Printing Capability

Requires compatible printer or plotter and driver software.



Wingz can create dramatic engineering graphs that lend visual clarity to complex data.

Other Wingz features

Fully supports Macintosh user interface for increased ease of use.

Utilizes up to 8 MB memory on Macintosh II.

Toolbox for selection of pointing, selecting, creation and drawing tools.

Extensive keyboard interface utilizing Apple Extended keyboard function keys.

Comprehensive, context sensitive, on-line help. Help displayed on screen at same time as active worksheet. Multiple help windows may be open at one time.

Network support. File protection/encryption.

Wingz is not copy-protected.

Hardware and Operating System Requirements

Wingz requires a Macintosh Plus, SE, or II with one megabyte of memory, two diskette drives or one hard disk. Two megabytes of memory is suggested when running MultiFinder. A hard disk is recommended.

Wingz supports the Macintosh operating system, and will run under System version 4.1 (Finder 5.5) or higher. Wingz also runs under MultiFinder or Apple A/UX.

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 Around one corner there's a fire-breathing dragon. Around the next, the torturer cracking his whip. Any second you may get an arrow in the back. This must be *Dark Castle*. Your quest is to topple the evil Black Knight in battle. But first you must fight the horde of nasty defenders. Relentless action, stunning graphics and more than 70 digitized sounds explain why *Dark Castle* has won top game awards from both Macworld and MacUser.

 If scary old castles aren't your taste, picture yourself strapped into an attack helicopter with a do-or-die mission behind enemy lines. Now you're ready for *Apache Strike*.™ This arcade-style game pits you against defending tanks and helicopters as you fly your chopper through the urban canyons of enemy cities. You get help from L.I.N.D.A., the sweet-voiced on-board computer who warns you of "enemy behind" or "fuel pod damaged." But the ultimate test in *Apache Strike* is your flying skill—and your nerve.

 So you think the castle is safer after all? Think again. And welcome to *Beyond Dark Castle*, which picks up where *Dark Castle* left off. The Black Knight has returned, but venomous snakes, flying vultures make him even scarier. More sounds, more graphics, more scrolling, more scrolling and a cataclysmic finale combine to make this a worthy sequel to *Dark Castle*.

System Requirements:
Macintosh Plus, SE or
Macintosh II. Suggested
Retail Price: \$49.95 each

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Games Division



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years of the Mac and that has recently been absorbed by HyperCard. I rate this development much more important and recommend that you check it out.

Groupware?

On the flip side of forging a single application from offerings by different companies is *groupware*, programs created for people to use together over networked computers. Collaborative applications by any other name... The July 1988 issue of *Scientific American* carried a column that contained some ominous rumblings about the important role of groupware in the future. As if that editorial alone weren't enough to consign the subject to a dusty shelf in the stores of the Smithsonian, SRI, that venerable research institute in Menlo Park, California, is about to issue a weighty tome on the subject.

We have seen some work in this area on the Mac, including indications that Knowledge Navigator could also be used for cooperative projects once it progresses from concept to product. Rob Harrington, founder of WOS Technologies and now part of Reese Jones's growing Farallon empire in Berkeley, California, has an interesting new product: Timbuktu Remote.

Timbuktu Remote expands on the concept of WOS's earlier product, Timbuktu. (Another WOS/Farallon product is Katmandu. Rob names all his products for places we would like to visit if any of us had time for vacations.) Timbuktu allows one Macintosh to see the desktop of another Mac on the same network. Timbuktu Remote goes another step and allows control over another person's desktop via the phone lines from a remote Mac. Rob installed the software on several of our networked computers one day at Macworld, and we were able to run one Timbuktu-linked Mac from the keyboard and mouse of another. It was both eerie and impressive to witness the cursor moving about as if it had a will of its own. We quickly learned that collaborative computing systems will require more than unspoken rules for network etiquette.

Initially, Timbuktu Remote has an obvious application for long-distance technical support or training. Users with problems (and with Timbuktu Remote installed) could call the support number and actually show a troubleshooter the problem. Anyone who has called a phone support line and tried to explain all of the nuances of where software hangs up will appreciate this. By taking control of the

(continues)

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Commentary/Jerry Borrell

troublesome desktop, the support person could then show the user over the phone how to solve the problem.

Come to think of it, Layered's Front Desk, a multiuser calendar that works nicely over the network, does some of this as well.

E-Mail

Which brings us to E-mail, an ideal target for development of groupware. Again, we have a lot of development going on in the shadows. You may recall that InBox now belongs to Gordon Eubanks at Symantec, and that Bill Gates bought InterMail. InBox 2.0 is out and has many valuable improvements, but the next version of Microsoft Mail (née InterMail) is still under construction. Both Gordon and Bill are thinking of what the next step is for E-mail, and of how applications should be able to communicate with E-mail. Bill Gates's plans naturally derive from how he envisions MS applications (Word, first of all) having E-mail options embedded as pull-down menu functions.

It's not a big leap from today's capability to collaborative computing and the integration of E-mail, but standards are required. And if noises from Berkeley (in the vicinity of Farallon) are any indication, then lots of application developers are putting their heads together to figure out some of these things.

Question: What's the nice thing about standards? Answer: There are lots to choose from.

In Summary

One of the most interesting aspects of these concepts is the number of small companies working to create real-world products out of such highfalutin ideas. Many of these small firms are actually succeeding in making the ideas work on a small scale. More grist for some future book on how computers evolved during the late twentieth century.

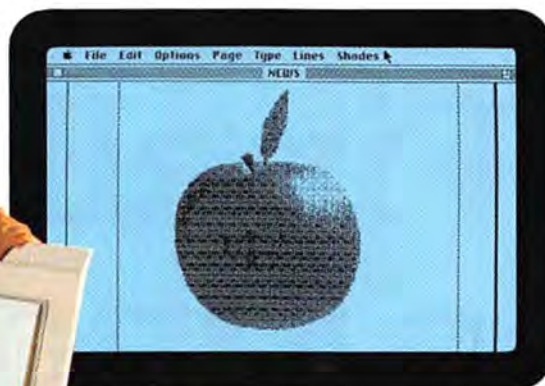
Speaking of that evolution, one developer went so far as to hypothesize that NeXT, Steve Jobs's company, will be incorporating several of these ideas into its computers. In fact, the number of mainstream Mac developers working on applications for the NeXT machine is growing. Voluble hints are being dropped that indeed the machine may move personal computers ahead, even if sales aren't expected to threaten Apple's newfound riches.

Question: What's the name of the next computer magazine? □

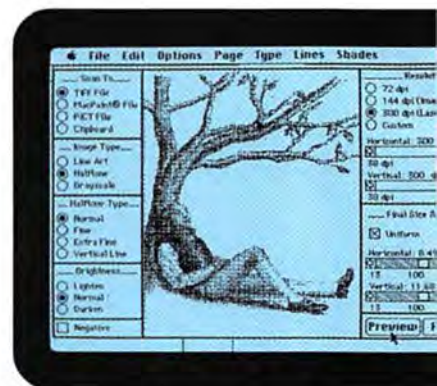
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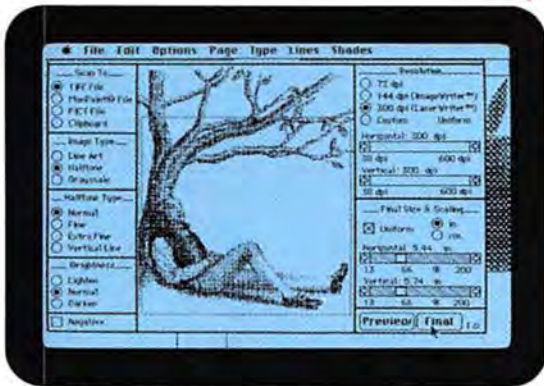
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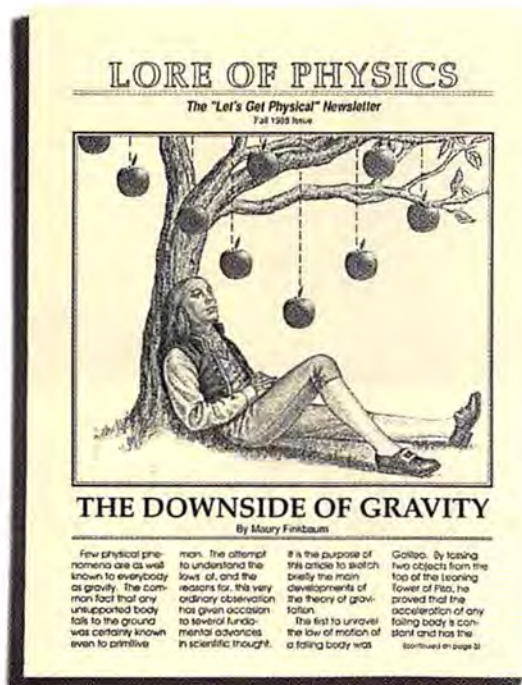
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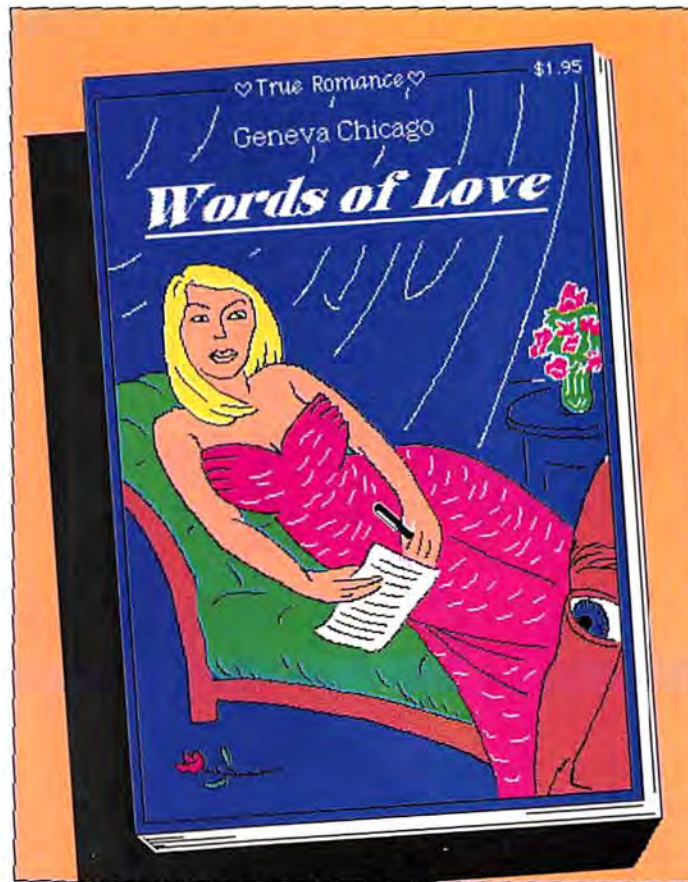


Love and Word Processors

Finding a new writing tool is as tough as seeking a mate—even when prospects are plentiful

The new crop of Macintosh word processors could not have come at a better time for me. I had just finished a book using Microsoft Word 3.01 and was ready to personally throttle anyone associated with that program. My relationship with Word was a love affair gone very bad. I could not stand to look at the program and, judging from its behavior (an inexplicable series of crashes that seemed spiteful in their intensity), the program could not stand to look at me. Who could have predicted that things would deteriorate to such a point? Years ago, when Word and I first hooked up, it was instant infatuation. With its multiple documents and its plethora of features, I felt liberated from my previous alliance—a shotgun marriage with the sleek but limited MacWrite. True, Word 1.0 was somewhat clunkier to learn—a keyboard command set that sounded like submarine code was only one of its quirks—but since the program allowed me the power I wanted to create documents, it was not long before I was singing its praises, a song voiced even louder with the improvement called 3.01. I can even name the tune: "I've grown accustomed to her interface."

The relationship had its problems, notably the scandalous behavior of Word in its 3.0 incarnation, a rocky period still painful to recall. But Word and I had good



times, completing dozens of columns and the aforementioned 500-page book. Still, I found myself wanting more, and Word and I grew apart. Finally, the Big Trouble appeared: every time I recalled a long file, Word would quit on me after three or four changes. I called Microsoft to discuss this recalcitrance, and despite the best efforts of the company's friendly support staff (why not be friendly? I was paying for the calls), the Big Trouble continued. To this day, I don't know why Word, to use the

words on the dialog box it left me, "unexpectedly quit." But I knew that I had to go on, find another word processor.

Fortunately, just as I became available, a flurry of word processors appeared on the market. I had been tracking two in particular: WordPerfect and FullWrite Professional. I also had been giving a lot of

(continues)

Steven Levy is a Macworld columnist and the author of The Unicorn's Secret: Murder in the Age of Aquarius published this fall by Prentice Hall Press.



Novell presents a new network even the pickiest

Macintosh owners have a reputation for being fanatical about their Macs. And rightfully so, when you consider the elegance of the Macintosh user interface.

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product introduction, Apple chairman John Sculley lauded Novell for its AFP support and contrasted Novell's product with serve to

InfoWorld, June 20, 1988

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Steven Levy

thought to a fast contender named Write-Now 2.0, but that application had yet to make it to shrinkwrap by the time of my late springtime search. I didn't want promises, I wanted total involvement. So I tried to see if I could live with WordPerfect or FullWrite. And kissed Word 3.01 good-bye.

Nobody's Perfect

At first, I wasn't sure about WordPerfect. I suspected our politics would collide. After all, Perfect had a shady past. It ran on MS-DOS machines, as well as any other operating system that seemed to promise a good time. As a Macintosh loyalist, I doubted whether the version I used would extend the proper respect to the Mac. I wanted no mixed marriage.

But I needn't have worried. The Mac version of WordPerfect does not reflect the numbing rigidity of the MS-DOS world. Instead, its creators have wisely chosen the course of least resistance, MacWrite-like windows with the usual conventions of selection, cutting, and pasting. The only visible concessions to the lock-step lunacy of MS-DOS are a series of little boxes at the bottom of the window that enable you to change the type style (italic, boldface, and so on) with the mouse. Since these options are also available by menu or keyboard command, those boxes are a total waste of time and should be eliminated.

On the other hand, to the left of those boxes is a line identifying the location of the cursor within the document, page, and line number. This signifies that WordPerfect does not suffer one of the two most annoying lapses of Word, the inability to repaginate on the fly. Word count, another function I've often missed in Word, is handled this way in WordPerfect: select Spell from the Special menu, whereupon a new menu opens to the left. Move the arrow onto the Word Count option on the new menu, and, presto, a dialog box tells you how many words are in the document. After a few tries you get sick of this process and figure out a way to do it on the keyboard: **⌘-E** and then 4. Most anything in WordPerfect can be done on the keyboard if you take the trouble to look it up; how much you memorize depends on how much you hate those little "move-to-the-left" menus.

(continues) •

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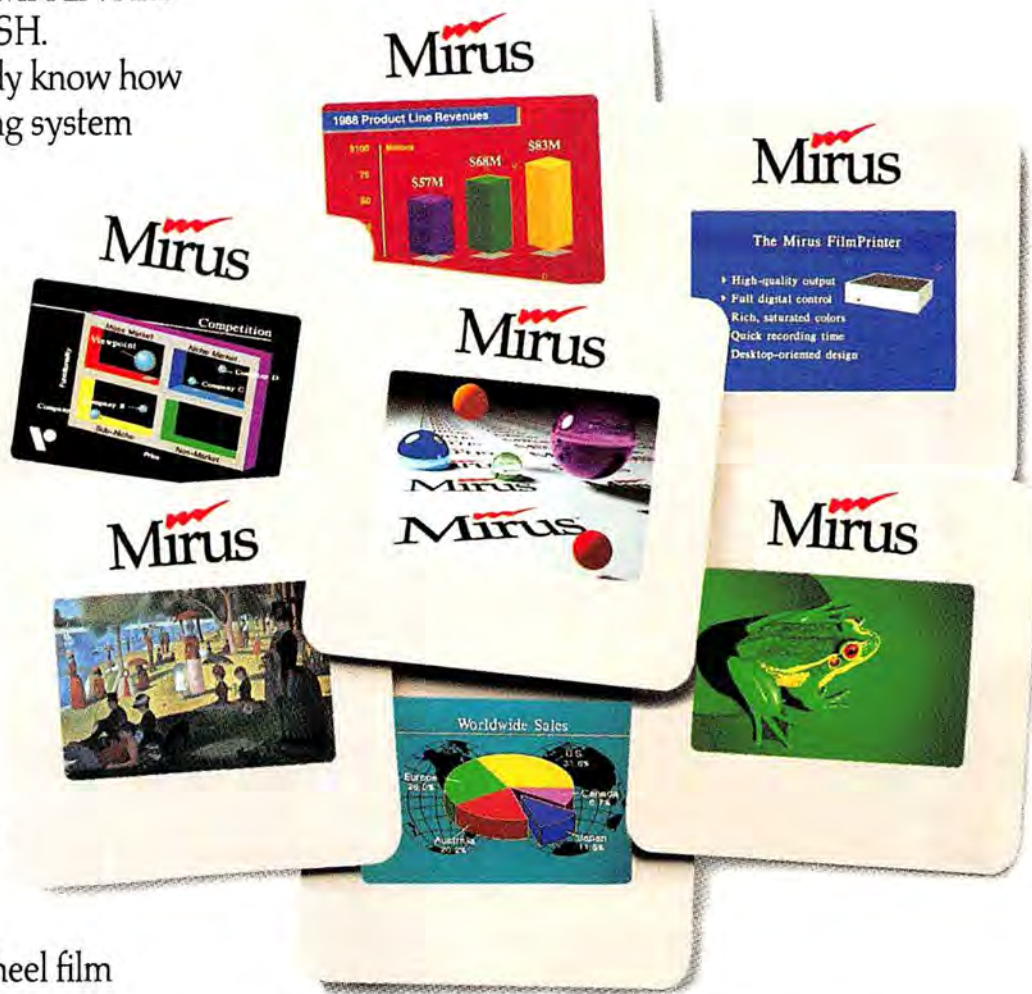
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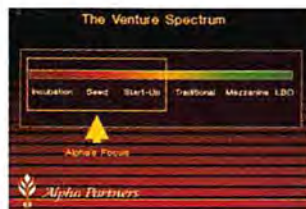
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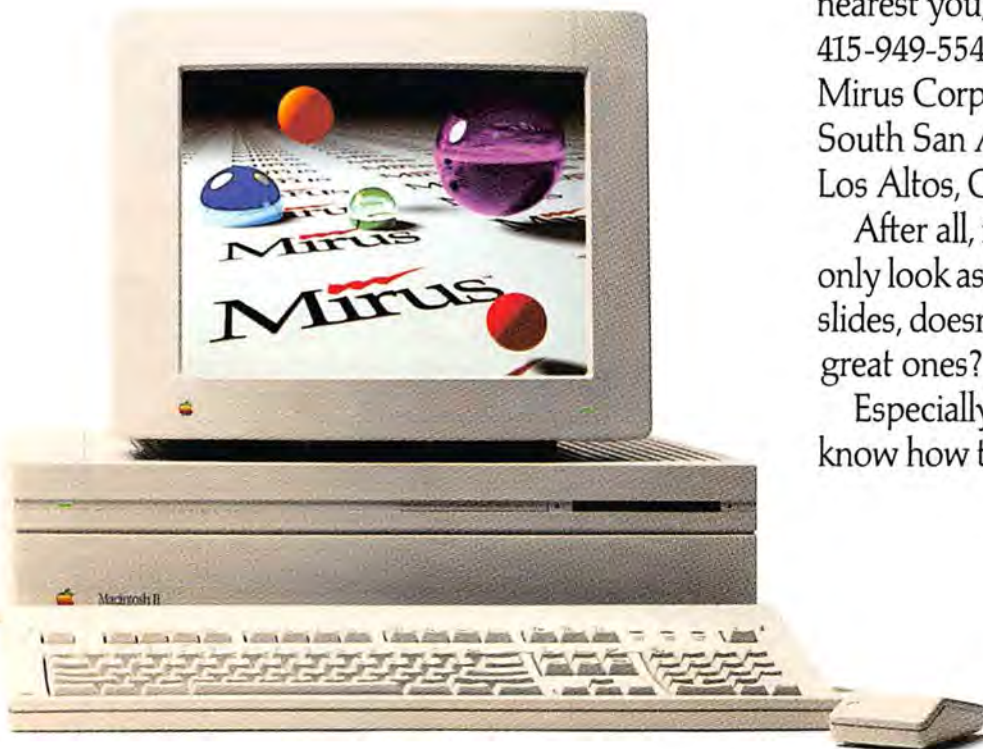
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One of the things I haven't memorized yet, but want to, is the command to double-space my document. When I use menus, this reasonable request becomes a relatively big production number. Other shortcuts make it easy to select text, by paragraph or sentence. In fact, things are generally easy to do on WordPerfect. Macros, for instance, are much more powerful and accessible than they are in Word. Without having to refer to WordPerfect's rather formidable manual, I whipped up a letter format, complete with embedded date, and made a macro out of it. It worked on the first try.

During my trial relationship with WordPerfect, I found it to be a perfectly adequate companion. As I suspected, the longer I stayed with it, the more its considerable talents became apparent. I could have asked for a better thesaurus, but the spelling checker was acceptable. I appreciated that WordPerfect could read and translate other texts from other word processors (though I was frustrated that it refused to read Word documents saved in the Fast Save format, as most of mine were) and doubly grateful that it also *wrote* in other formats.

OK, I admit it, WordPerfect doesn't have much sex appeal. But I wrote a column, a feature story, a couple of reviews with it. With no problems. The program ran briskly on the borrowed Mac II I was using and still responded decently when I returned the machine and resumed work on my 2.5-megabyte Mac Plus. The program was far from perfect; for instance, sometimes I would select a word, cut it, and find that the program failed to get rid of the extra space created by my deletion. But that's niggling. The big question was, could I leave Word for WordPerfect? The answer? Sure.

At Long Last, Love

So by the time I finally got my copy of Ashton-Tate's long-awaited FullWrite Professional, I was not so desperate for a new match. After all, WordPerfect had given me what I needed; how much more could FullWrite deliver?

Would you believe love at first sight?

Well, maybe not first sight. The FullWrite user interface is puzzling at first glance and requires a trip to the manual to understand the various modes represented

(continues)

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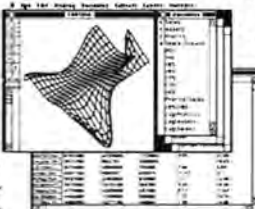
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Ezra Shapiro, Consulting Editor
BYTE Magazine, Feb., '88

ImageWriter IIs. The Grappler LQ drives 24 pin and HP compatible laser printers (and the new 300 dpi DeskJet) as if they were ImageWriter LQs. All you do is set the Grappler's switch for the printer you're using, plug it in and start printing. Your Mac thinks it's still talking to an ImageWriter, so all your software will continue to operate as usual.

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Steven Levy

by boxes at the bottom of the windows. But unlike the gratuitous style boxes in WordPerfect's view of the world, these choices yield exciting options. Besides a what-you-see-is-what-you-get view of the page, you can choose a view that instantly identifies the most recent changes in the document. Or an outline view. Or a view that clearly identifies where you place the various notes or sidebars in the document.

Sidebars? Oh, yes. FullWrite is the first word processor to have real page-layout capabilities.

But I don't want to dwell on that stuff; I'm a writer, not a publisher. What really won my heart about FullWrite was the consistently delightful evidence that its creators had actually *thought* about the best way to implement the countless features it offers. They have dared to improvise, to discard the merely acceptable when a clever alternative could be found. As a result, FullWrite is brimming with charms, and each session spent with it yields more thrilling discoveries.

Like what? Well, any old program selects a word when you double-click on it. FullWrite also can select a paragraph when you triple-click. When you want to change the selected text to another style, simply hold down the ⌘ key and click the cursor on any text in the desired style (that includes uppercase and lowercase "styles," too). And FullWrite provides the most sensible way to handle the conundrum of how to use the keyboard to access the cornucopian range of options buried within its menus: a devilishly simple system called WalkDown menus. I won't explain it because it's one of those things that is more difficult to describe than it is to perform, but take my word that it's an innovation that should, and probably will, find its way into other Macintosh programs.

As I used FullWrite more and more, my incredulity increased—could it be *that* good? Generally, the answer was yes. When I called up the thesaurus, there was my favorite, Word Finder, maximized to run with the word processor. The spell-checking ran smoothly. Columns could be handled easily on screen. Footnotes, headers, notes, and indexing were provided with FullWrite's characteristic combination of simple operation and extended power. It could open files created from other word

(continues)

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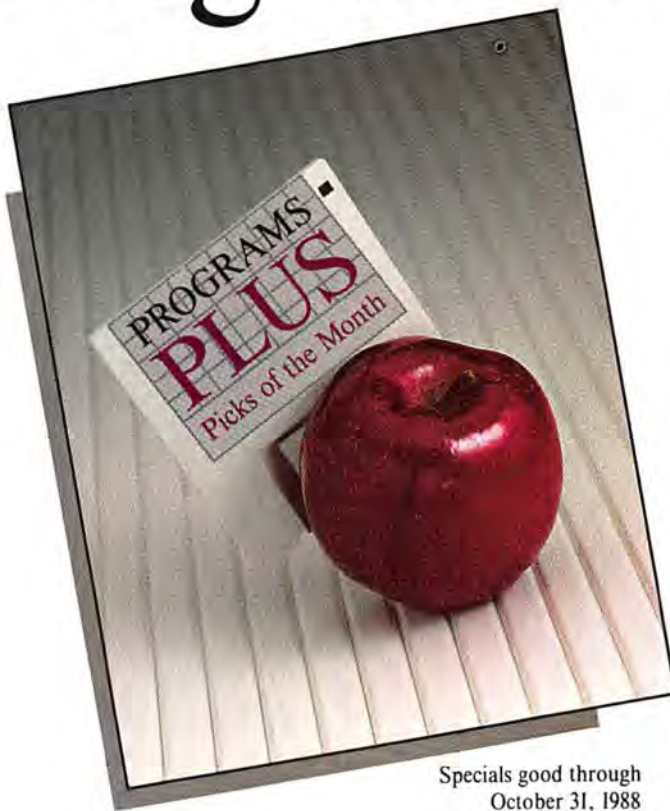
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Canvas 2.0 by Deneba Software



Canvas 2.0, one of the top graphics programs in use today, now includes many new features. Some of the enhancements include: an unlimited number of layers, precision positioning to 1/64,000th of an inch, Bezier curves and polygons with unlimited control points, and 16.7 million colors on the Mac II. Auto-Tracing converts existing bit mapped images into true objects. As you can see, **Canvas 2.0** now rivals dedicated CAD programs. Whether you use it for business graphics, presentations, desktop publishing, engineering or architecture, **Canvas 2.0** will stimulate your creativity.

Canvas 2.0 165.

Desk Accessory Programs

Affinity Microsystems Tempo II	89.	Greene, Inc. QuickDex 1.4A	32.
AlfiniFile	46.	Imagine Software	
Beyond Inc. Menu Fonts 2	32.	Smart Alarms & Appointment Diary	35.
Borland SideKick V2.0	59.	Mainstay Think'n Time	61.
CE Software DiskTop 3.0	28.	Olduvai Software DA-Switcher II	25.
Deneba Software Comment 2.0	54.	Solutions, International Super Glue	52.
Electronic Arts Disk Tools Plus	31.	SmartScrap & The Clipper 2.0	52.
Exodus Software Retriever	59.	Symmetry HyperDA (Req. 512K)	38.

Languages

Borland		Microsoft	
Turbo Pascal	65.	Microsoft Basic Interpreter 3.0	62.
Turbo Pascal Numerical Methods	65.	Microsoft Basic Compiler	125.
Turbo Pascal Tutor	45.	Smethers & Barnes Prototyper	75.
Consular		Symantec Lightspeed C	95.
Macintosh 68000 Development System	59.	Lightspeed Pascal	65.
Insignia Soft PC	489.	T.M.L. T.M.L. Pascal II	
Mainstay V.I.P. 2.5		(Includes MPW)	79.
(Visual Interactive Programming)	109.	T.M.L. Source Code Library II	49.

Turbo Trackball by Asher Engineering



The inherent drawbacks of the mouse are elegantly solved with the new **Turbo Trackball**. The two-button **Turbo Trackball** is sculpted to fit neatly alongside your keyboard and leave the rest of your desk free. The ball mechanism provides smooth and precise control, and a button lock feature allows you to pull down menus and drag items with ease. Everything that the mouse can do can be done quickly and easily with the **Turbo Trackball**.

Turbo Trackball 69.

MacKids Educational Programs by Nordic Software

MacKids is a complete series of twelve quality educational software products for the Mac specifically designed to teach and entertain kids. Whether your children are preschoolers or young adults, there's a **MacKids** package that will give them the learning edge.



Preschool Disk 1 (3-7), Preschool Disk 2 (3-7), CoinWorks (4-12), ClockWorks (4-10), Early Elementary 1 (6-9), Lemonade Stand (6-16), FlashWorks (6-adult), Naval Battle (6-adult), Word Search (6-adult), Alphabetizer (7-adult), EarthWorks (10-adult), or BodyWorks (10-adult).

Each Program 28.

Utility Software

ALSoft Disk Express 1.10	26.	Olduvai Software	
Font/DA Juggler Plus	32.	Icon-It! or MultiClip	39.
Berkeley System Design		Read-It! TS (For Thunderscan)	79.
Stepping Out II	54.	Read-It! O.C.R. (For Image Scanners)	199.
Beyond Inc. Fore Runner	32.	Silicon Beach Software	
CE Software		Silicon Press	41.
QuickKeys (Macro Program)	54.	Software Power	
Central Point Software		Power-op Disk Optimizer	39.
Copy II Mac (Includes MacTools)	20.	SuperMac Software SuperSpool 5.0	54.
Design Software/Electronic Arts		SuperLaserSpool 2.0	82.
DS Backup	49.	Diskfit 1.4	54.
Emerald City Software LaserTalk	187.	Sentinel 1.0	155.
Fifth Generation Systems		Symantec	
FastBack For The Macintosh	54.	MacSQZ!	49.
Suitecase or Power Station	37.	Symantec Utilities for Mac (S.U.M.)	59.
Ideaform Disk Quick V2.10	27.	Williams & Macias Disk Finder	29.
InfoSphere Liaison	129.	myDiskLabeler w/Color	31.
LaserServe (LaserWriter Print Spooler)	62.	myDiskLabeler w/LaserWriter Option	34.
Microlytics, Inc. GOfier	45.	Working Software, Inc.	
Microseeds Redux	65.	Findswell 2.0 (Document Finder)	36.

Communications Software

Compuserve		FreeSoft Red Ryder V10.3	55.
Compuserve Starter Kit	24.	Hayes Smartcom II 3.0	88.
Grolier On Line Encyclopedia	32.	Palantir InTalk V3	119.
Compuserve Navigator	45.	Software Ventures	
DataViz MacLink Plus with Cable	145.	Microphone II (Includes Glue)	225.
Dow Jones Desktop Express	95.	Traveling Software LAP-LINK	85.

to Polish Up Your Mac...

Deluxe Macplus-XKB Case by Targus

Macintosh users value the portability of their machines, and Targus has provided a stylish way to carry your Mac. The **Deluxe Macplus-XKB case** is made for the Macintosh/Plus/SE and the extended keyboard. This unique bag conveniently houses the keyboard in a separate, removable case. The rugged outer-shell is made from treated 840-D nylon. Full 1" foam padding protects your valuable equipment. The case includes a large exterior pocket for miscellaneous items such as manuals. A portfolio section includes disk pockets, mouse and cable pockets, as well as pen and business card holders. Padded handles and shoulder strap allow you to transport your Mac in comfort.



Deluxe Macplus-XKB case 65.

Where in the World is Carmen Sandiego? by Broderbund



Where on Earth will you find the excitement of international travel combined with the intrigue of cloak and dagger sleuthing? In your Macintosh — when you boot up Broderbund's **Where in the World is Carmen Sandiego?** As an Interpol agent you'll use clues, police dossiers, a computer database, and the World Almanac (the folks at Broderbund include this useful reference with the program) to pursue the world's most notorious criminals! This award-winning educational game teaches children (age 12+) geography and culture, and helps adults sharpen their reasoning skills. Lively graphics, animation, and sound maintain excitement. Combinations of 30 cities, 30 criminals, and 1,000+ clues assure new challenges every time you take a new case!

Where in the World is Carmen Sandiego? 25.

CommLink 2400 Modem by MDIdeas

Give your telecommunications a boost with the high-performance **CommLink 2400** external modem. Although it is small in size (same as the Apple 3.5" drive), it has a surplus of features. Operating at 0-300/1200/2400 baud, it supports Hayes "AT" commands and "S" registers, and works with all Hayes compatible communications software. Digital signal processing and VLSI technology ensure reliable and clean data transfer. Save time with auto-dial/ auto-answer modes, and monitor calls on-screen or with the internal adjustable-volume speaker.



CommLink 2400 179.

MacSnap Internal Memory Expansions by Dove Computer Corporation



It's a safe bet that no matter what Macintosh model you have, Dove Computer has a **MacSnap** memory expansion product that matches your needs. That's because Dove has an extensive line of high quality memory and productivity enhancement products available. All Dove products are easy to install and represent a superior value! We've selected some of the most popular models, and are offering them at special prices. All models listed include Dove's RamSnap software, their intelligent ram management software.

MacSnap 2SE	475.
MacSnap 524E	265.
MacSnap 524S	409.
MacSnap 548E	585.
MacSnap 548S	649.
MacSnap Plus 2	475.

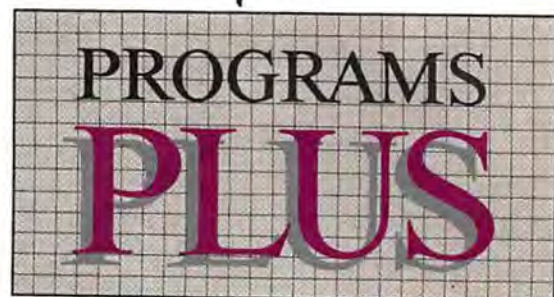
Acknowledge by SuperMac Software

Acknowledge enables you to create telecommunications systems linking virtually every user to any data they need, allowing them almost unlimited access to your most valuable resource, information. With **Acknowledge** Custom Information Systems, users can access mainframes, PCs, other Macintoshes, and communications devices running AppleShare, TOPS, InBox, and Microsoft Mail, plus other LAN products — geography and compatibility are problems of the past! And because it's Multifinder compatible, file transfers and program execution continue while individual users work in their applications, increasing staff and system efficiency. **Acknowledge** includes TAL (Telecommunications Access Language — a new user-friendly programming language), AckEdit for creating custom dialogs, a menu construction tool, and support for creation of custom help files and icons.



Acknowledge 359.

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Mac286 Co-Processor (Mac II)	Call	MacSnap Plus 2 (MacPlus to 2MB Non Expandable)	Special 475.
Central Point		MacSnap 2SE or 1024 Option (1 MB Acc. or MacII Memory Exp.)	Special 475.
Central Point 800K External Drive	185.	SCSI Interface/Port	129.
CMS PRO-II Series 60-II/1	735.	MacSnap Toolkit (torx driver, opener & grounding set)	15.
PRO-II Series 100-II/1	1169.	Everex Emac 20D (20MB Hard Disk)	520.
Compact Series SC30 (Mac+/SE/II)	649.	Emac 20 Deluxe	585.
Compact Series SC45 (Mac+/SE/II)	859.	Personal Computer Peripherals	
SD Series MacStack SD20 (Mac+/SE/II)	569.	Beige or Platinum Color, Optional	
SD Series MacStack SD30 (Mac+/SE/II)	615.	Built-In Modems Available.	
SD Series MacStack SD60 (Mac+/SE/II)	849.	MacBottom HD-21	
PRO-SE Series 30SE/1 or 30SE/R	535.	(20+MB SCSI Hard Disk)	749.
PRO-SE Series 45SE/1 or 45SE/R	735.	MacBottom HD-32	
60MB Tape Backup (Mac+/SE/II)	785.	(32MB SCSI Hard Disk)	879.
Cutting Edge Cutting Edge 800K Drive	175.	MacBottom HD-45	
Cutting Edge Wedge XL 30 w/SCSI HD	629.	(45MB SCSI Hard Disk)	1139.
Cutting Edge Wedge XL 45 w/SCSI HD	829.	MacBottom HD-70 (70MB SCSI Hard Disk) Plat only	1395.
Cutting Edge XL 30 Internal Hard Drive	505.	Rodime Rodime 20 Plus Ext.	629.
Cutting Edge XL 45 Internal Hard Drive	645.	Rodime 45 Plus (Ext. 45MB SCSI)	939.
Dove Computer Corporation		Rodime 450RX (Int. 45MB Mac SE/II)	829.
68020 Accelerator Boards for Mac SE		Rodime 60 Plus (Ext. 60MB SCSI)	1039.
MSE 1 (16 Mhz)	585.	Rodime 100 Plus (Ext. 100MB SCSI)	1169.
MSE 2 (16 Mhz w/IMB)	1059.	Rodime 140 Plus (Ext. 140MB SCSI)	1319.
MSE 3 (16 Mhz w/Math Co-processor)	779.	Rodime 1000 RX (Int. 100MB MacII)	1045.
MSE 4 (16 Mhz w/IMB and Math Co-processor)	1255.	Rodime 1400 RX (Int. 144MB MacII)	1669.
MacSnap 524 (512K to 1MB)	325.		
MacSnap 524E (512E to 1MB)	Special 265.		
MacSnap 524S (512E to 1MB w/SCSI)	Special 409.		

Printers & Digitizers

AST Research TurboLaser P/S	3559.	Seikosha SP1000 (Imagewriter Comp.)	229.
TurboScan (Sheetfeed model)	1199.	Summagraphics Bit Pad Plus	335.
TurboScan (Flatbed model)	1329.	ThunderWare ThunderScan V4.0 with Power Port	199.
Koala Technologies Corp.		Mac II Power Accessory	42.
MacVision 2.0 (Digitizer)	225.	Video Technology	
Kurta IS ADB Tablet	259.	Laser 190 A (Imagewriter Compatible)	249.
Cordless 4 Button Cursor	99.		

Accessories

Abaton ProPoint (ADB TurboMouse for Mac SE & Mac II)	99.	Disk Drive Cleaning Kit	20.
Asher Engineering		Tilt/Swivel	22.
Turbo Trackball (Mac & Mac+ or Mac SE & Mac II)	Special 69.	Apple Security Kit	34.
Bech-Tech		Antiglare Polarizing Filter	33.
Fanny Mac (Beige or Platinum)	65.	Modem/Fax Protector 10	15.
CH Products Mach IV Plus: Quad or ADB	65.	Modem/Fax Protector 20	29.
Mirage: Quad or ADB/Turns Joystick Into Mouse	39.	Power Tree Surge Suppressors (10, 20, or 50)	Call
Curtis Manufacturing		Printer Muffler Stand (80 & 132)	21.
Emerald-Surge Suppressor-SP-2	36.	Printer Muffler 80	43.
Ruby-Surge Suppressor-SPF-2	55.	Printer Muffler 132	58.
Cutting Edge Cutting Edge EADB-105 Keyboard (Mac SE & Mac II)	135.	System Saver Mac (Beige or Platinum)	64.
DataDesk Mac-101 Keyboard/Beige (128k/512k & MacPlus)	139.	Super Base	34.
MAC-101 ADB Keyboard/Platinum (Mac SE & Mac II)	139.	System Saver SE	62.
Ergotron		Masterpiece Mac II	119.
MacTilt or MacTilt SE (Platinum Color)	68.	New Turbo Mouse (Reg. or ADB)	109.
Farallon MacRecorder Sound System (Mac SE or Mac II)	145.	Mouse Systems A+ Mouse (MacPlus)	65.
I/O Design		A+ ADB Mouse (Mac SE/Mac II)	85.
Mac Luggage in Navy or Platinum Gray	64.	Moustrak MousePad 7" x 9" Size	8.
Macinware Plus Carrying Case	76.	MousePad 9" x 11" Size	9.
Macinware SE Carrying Case	49.	Orange Micro Grappler C/Mac/GS	84.
Imageware II Carrying Case		Grappler L/Q	98.
Kalmar Designs		Ribbons	
Teakwood Roll-Top Disk Cases: Micro Cabinet (holds 45 disks)	14.	Available in Black, Blue, Brown, Green, Orange, Purple, Red, Yellow, Silver & Gold	
Double Micro Cabinet (holds 90 disks)	23.	ImageWriter Ribbon	4.
Triple Micro Cabinet (holds 135 disks)	32.	ImageWriter Black 6-pack	20.
Kensington External Disk Drive Cover	8.	ImageWriter Rainbow Pack (6 Colors)	20.
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Macintosh II Stand	20.	Silicon Comforts MacChimney (Very Effective Cardboard Laminate Convection Cooling Device)	16.
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Mousepad (Reg. or ADB)	8.	Mahogany Disk Case (holds 96)	30.
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Mousepad/SE Dust Cover	9.	High Trek Carry Cases - Platinum Gray, Navy	49.
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		Macintosh SE & Extended Kybd Case	49.
		Targus	59.
		Imagewriter II Carry Case Bk.	59.
		Macintosh Plus Carry Case Bk.	59.
		Deluxe MacPlus-XKB Bk.	Special 65.

Blank Media

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Sony 3 1/2" SS/DD Disks (box of 10)	13.	Fuji 3 1/2" DS/DD Disks (box of 10)	19.
Double Sided 3 1/2" Diskettes		Maxell 3 1/2" DS/DD Disks (box of 10)	20.
BASF 3 1/2" DS/DD Disks (box of 5)	9.	Verbatim 3 1/2" DS/DD Disks (box of 10)	19.
Bulk (Sony) 3 1/2" DS/DD (10)	17.	3M 3 1/2" DS/DD Disks (box of 10)	20.

Modems

Anchor Automation		Novation	
MacPac 2400E w/software & cable	179.	Novation Parrot 1200	109.
AST		Practical Peripherals	
AST-2x2400 (MacPlus/SE/II)	625.	Practical Modem 1200SA	109.
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processors, including fast-saved Word 3.01 files. And the system it uses for outlining is the best I have seen embedded in any word-processor—watch out, Symantec, because when a user hooks up with FullWrite, More is less.

Of course, FullWrite had a few problems. It did suffer a crash or two, notably when certain desk accessories were used. It is possible I was pushing its memory demands, which happen to be prodigious. The 2-megabyte Mac II I was using could barely contain FullWrite, and in fact the program will simply not run on any Macintosh currently sold by Apple unless the user makes a costly investment in extra memory. A lesser gripe is the fact that while FullWrite gladly accepts files from the likes of Microsoft Word, it petulantly refuses to write files in that format. One would expect a more generous spirit from this otherwise engaging program.

Just Like Romeo and Juliet

But overall, FullWrite seemed too good to be true. And that's exactly what it was. Because when I moved operations

from the borrowed Mac II over to the Mac Plus, FullWrite gave notice that it would only perform well in luxury surroundings. Oh, the features were intact, and the screen size was no problem (especially since a simple touch of the Option key changes the cursor to a grabbing hand that can move the page around on the screen). The problem was speed, or lack of it. Without a 68020 processor to coddle it, FullWrite moped; I would hammer away at the keyboard, swept up in the rush of creation, and the program would idly post the words in sporadic bursts. When I backspaced to delete a word, FullWrite would take its own sweet time in reflecting my deletion. When I double-clicked to select a word, FullWrite, seemingly absorbed in other ruminations, would postpone highlighting the word. This lack of response gave me vertigo. I was unable to concentrate on the task at hand, the one most important task a writer performs when using a word processor: putting text in the damned file! It was small consolation that, once the text was in, FullWrite could wrap it around an irregular object with no problem. On a Mac Plus, and to a lesser degree on a Mac SE, FullWrite is unusable.

So I stopped using it.

Is it better to have loved and lost than never to have loved at all? Not with word processors. Until I get a Mac II, or go out and spend a thousand dollars or more on an accelerator board, I am haunted by the knowledge that FullWrite and I frequent different worlds, can never come together. As I write this column—with WordPerfect, as fate would have it—I dream of triple-clicks and WalkDown dialog box controls.

What next? Well, I'll take a look at WriteNow 2.0 when it comes out. At least speed won't be a problem there, and a look at a prerelease version shows it has some promise. And now I hear that my old flame Word is making an attempt to win me back. Microsoft says version 4.0 of Word will make me forget about FullWrite. It sounds impossible, but I'll take a look. What do I have to lose?

It was just my luck to fall for the word processor that is the first of a new set of Mac applications, tailored for processors more powerful than the 68000 that controls the original Mac. It will take more than time to heal this wound.

It will take an upgrade. □

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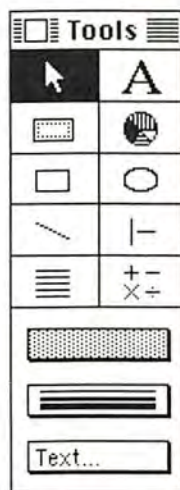
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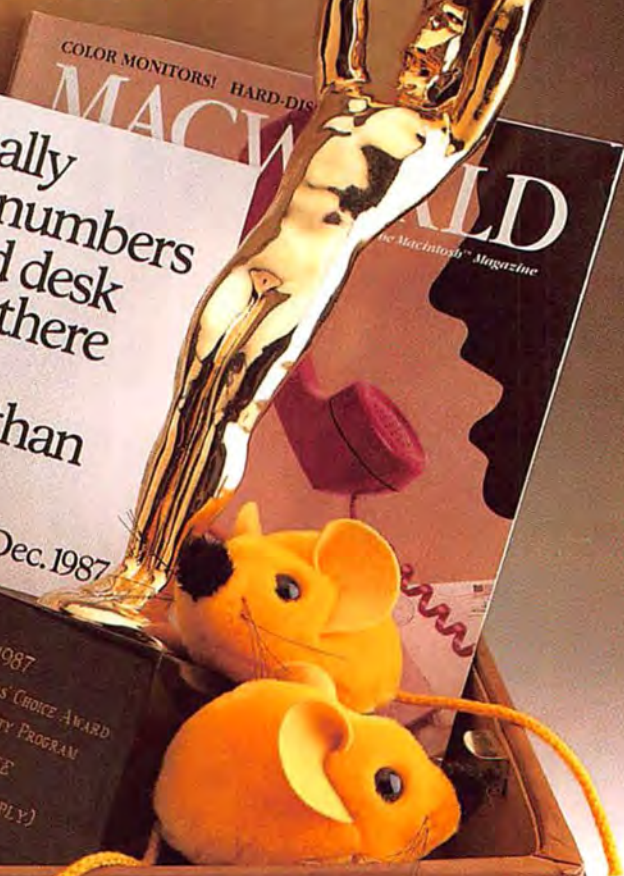


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Verbatim

*An interview with Paul Brainerd,
president of Aldus Corporation*



Paul Brainerd sees himself as a bridge between technology in the lab and in our working lives. He filled that role at the Minneapolis Star and Tribune, where he led the transition from hot type to computer-based photocomposition. He went to the other side of the fence after that, working for Atex, a maker of electronic publishing systems for newspapers. When Kodak bought Atex and closed its office in the Northwest, Brainerd and four others from his group formed Aldus, the Seattle company that originated desktop publishing with the introduction of PageMaker; first on the Mac and later on the IBM PC. This year Aldus has introduced FreeHand, a PostScript illustration program, and Aldus Persuasion, a business presentation package. SnapShot, a program that works with a still video camera to digitize images, was introduced on the PC this year and is on its way to the Mac.

Why did you name your company after a Renaissance printer from Venice?

We wanted a name that emphasized human values, rather than technology. During a road trip we took very soon after we formed the company, we stopped at libraries along the way to research publishing history. I came across a passage on Aldus Manutius that impressed me. He was very important in publishing—inventing italic type and standardizing punctuation. More important, he was really an entrepreneur for his day; he brought the academic pursuit of publishing to a much broader audience. That was an example of what we were going to try to accomplish by using the microcomputer. And his name was pronounceable.

Jonathan Seybold has said that proprietary publishing systems have essentially become dinosaurs, giving way to programs for the Mac and other personal computers. Do you agree?

Five years ago innovative newspapers and magazines were already beginning to need standard hardware platforms for their publishing systems. Their publishers saw no reason for the financial reporter to have both an Atex computer terminal for doing the text entry and an IBM PC for doing Lotus 1-2-3 financial analysis of the corporations in the news. The only application area today that still justifies buying a dedicated system is four-color prepress.

What's the holdup with color?

The high-end color systems made by companies such as Scitex and Crossfield deal with large images of up to 60 or 100 megabytes, and transformations on that much data still require special-purpose hardware, though that's beginning to change. Photographs get into areas of color correc-

tion—matching skin tones, for example—that are more difficult to do on microcomputers. The computer display uses an RGB (red-green-blue) model, and those colors don't accurately match what we get with the CMYB (cyan-magenta-yellow-black) output of the printing process.

Are the tools for handling process-color available on the Mac yet?

Yes, I think they are, but you have to understand the tradeoffs—the Mac allows artists who could never have afforded a color production system to have one for \$10,000. We have to be realistic about the limitations, some of which will be eliminated in another 6 to 18 months. We couldn't have done an application like FreeHand two years ago; we couldn't have done PageMaker four years ago because the laser printing technology didn't exist. We're always pushing the boundaries of the technology with our products.

What are the limitations of Macintosh technology right now? Desktop publishing with newspaper-quality color? Magazine-quality color?

That depends on the publication, and the environment in which it's being produced. We can indeed produce magazine-quality results with particular image types, but I cannot recommend PageMaker for the *Boston Globe* yet.

What improvements does the Mac still need to make it viable as a publishing workstation?

First, the difference between screen display and the printed result, the difference between QuickDraw and PostScript imag-

(continues)

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Even hard-case power users agree...

FileMaker is the one database manager that does everything you really want a database to do.

Automatically index entries for lightning-fast searches. View

and edit multiple records on-screen. Import and export information and graphics from other programs. Calculate, sort and print numbers-heavy forms like invoices, p.o.'s, and expense reports. Produce text-heavy output like lists, mailing labels and form letters. Automate repetitive tasks, like regular statements and sales reports, with easy-to-use scripts.

All in fewer keystrokes, and less time, with no aggravation.

**Powerful and hassle-free
for workgroups, too.**

No setup time. No dedicated

hardware. Easily-shared files and access to laser printers and other peripherals.

Everyone and anyone can use FileMaker to manage data better. And make use of its formidable graphic power to make output look its best.

So your information not only makes more sense, it makes an impression.

For more information and the location of a Claris dealer near you, call 800-334-3535 today.

FileMaker II. It's now ready for your stamp of approval, too.

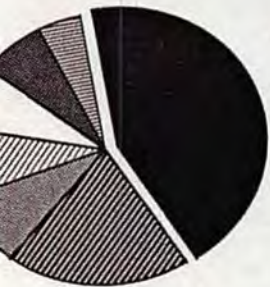
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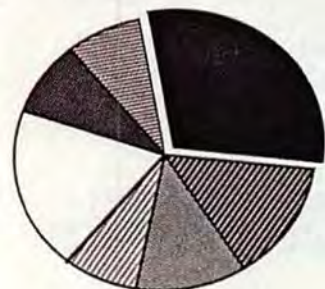
Circle 342 on reader service card

FileMaker Market Share

43.5%
1987



30.0%
1986

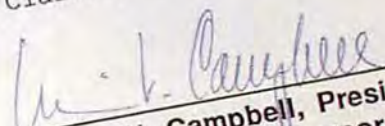


Acquisition Requisition No. 1003

Company Name	Nashoba Systems, Inc.
Address	Foster City, CA
Installed Base	60,000 Users
Products	FileMaker for Macintosh
Reason for Acquisition	1. Leading Market Share 2. Exploit Future Technology 3. Great Product 4. Great People
Purchase Price	To Be Negotiated

Summary

FileMaker is the best selling database manager for individuals or workgroups who want professional-quality reports and forms. FileMaker II is the next complement to the Claris product family.


William V. Campbell, President
Claris Corporation



We can indeed produce magazine-quality results with particular image types.

ing models must be addressed. What you see on the screen closely approximates what you get on paper, but the difference may force you to print several times to correct mismatches in cases where there are very tight fits.

Second, network support and throughput have become more important, and so has access to larger file service systems. Apple is addressing these changes through its strategic alliance with Digital Equipment Corporation. Publishing people are very concerned with system reliability, particularly people working on newspapers who cannot afford to lose hours to equipment failure.

Will you make a version of PageMaker that would work with PostScript as a display language?

Display PostScript is very important because it eliminates the difference between the screen and the printed result. In fact I think all of our customers would want Display PostScript if it were free. But, of course it's not free. If it were to cost \$300 there would be wide acceptance of it as a display model; at \$1500, it would probably interest only 15 percent of the people who use our products.

If a third party were to implement a PostScript display controller board, we could quickly revise our software to take advantage of that.

Do you expect to see PostScript emulators?

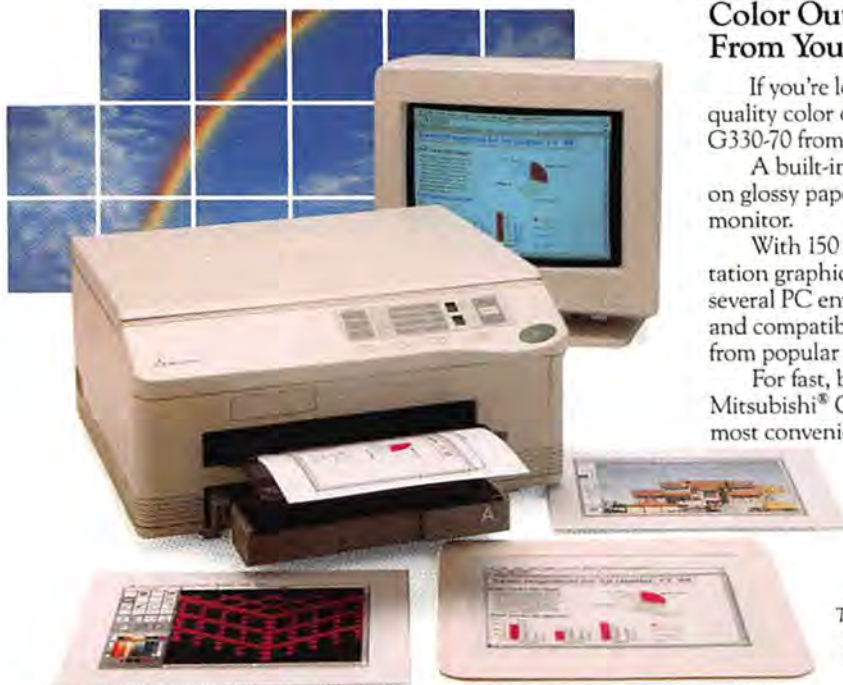
We do expect to see PostScript-compatible interpreters, and we will cooperate in testing them because the last thing the customer needs is to start getting products that are supposedly compatible with PostScript but end up not being compatible in some way. The trade press concentration on this development has probably been premature, but I do think we will be seeing PostScript-compatible devices coming to market this year.

Color thermal printers seem very limited in their ability to create dithered patterns that convincingly reproduce colors from the screen. Is ink-jet printing technology likely to do any better?

There are three technologies, each with a different price. Ink-jet has come a long way in the last ten years. Today, some very reasonable devices are being produced. And Hewlett-Packard (among others, including some Japanese companies) is conducting research projects aimed at producing high-quality, color ink-jet printers at a low cost. Typically, to get the low cost (under \$2000) the ink-jet printer manufacturers have re-

(continues)

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Color Output That Sizzles From Your Apple® Macintosh™ II.

If you're looking for an easy-to-use color printer that delivers fast, high quality color output, with full Apple Macintosh II compatibility, look at the G330-70 from Mitsubishi Electronics.

A built-in video interface enables the G330-70 to create a permanent copy on glossy paper or transparency film of any image viewed on your computer monitor.

With 150 dots per inch resolution, the G330-70 is ideally suited for presentation graphics, paint-type graphic art and PC CAD. It operates smoothly in several PC environments, including the Apple Macintosh II, IBM® PC/XT/AT and compatibles, or IBM PS/2™. The G330-70 can print the screen displays from popular graphics boards, including Mac II, CGA, EGA and VGA.

For fast, bold, brilliant color output directly from your monitor, specify the Mitsubishi® G330-70. At a suggested retail price of \$5900, the G330-70 offers the most convenient method for high quality color output.

For product information or nearest authorized Mitsubishi Electronics sales representatives, please call 1-800-556-1234, ext. 54R. In California, call 1-800-441-2345, ext. 54R. Mitsubishi Electronics America, Inc., Computer Peripherals Division, 991 Knox Street, Torrance, CA 90502, (213) 217-5732.

The G330-70 color thermal transfer printer produces a full-color 8½" x 11" page or transparency in about 80 seconds.

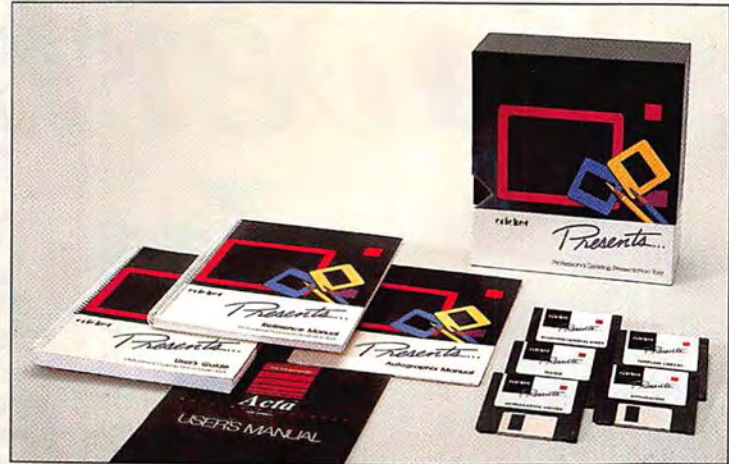
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Instant...*

*Slides
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Another Drop-Dead Deadline How often does it happen? Another presentation due and no time to spare. Color 35mm slides? Sure, slides would be perfect but they take too long to produce *and* are very costly. Overhead transparencies would be fine, but how do you get a complete presentation done quickly and easily?

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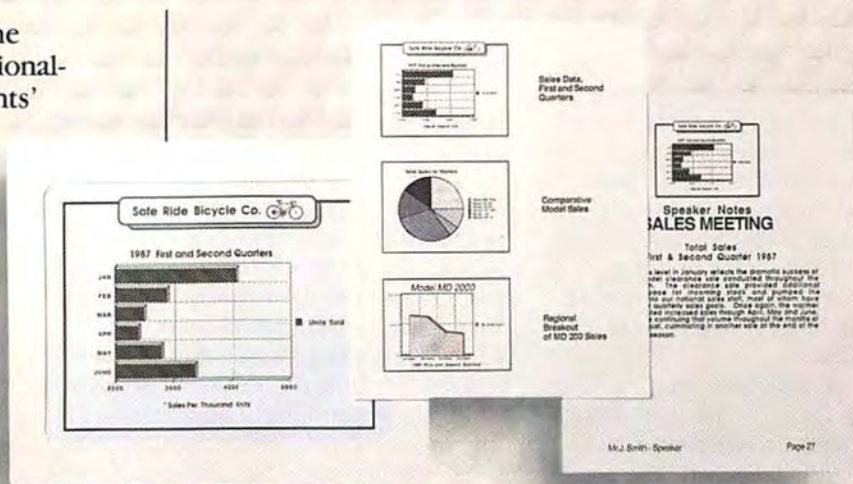
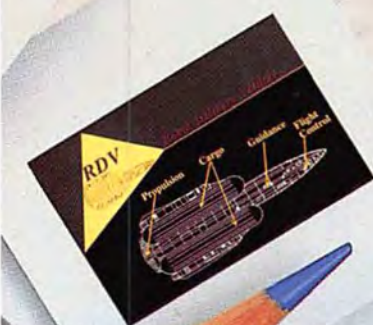
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If a third party were to implement a PostScript display controller board, we could quickly revise our software.

sorted to moving the printing head across the page, which means it takes about a minute to produce each page. There's also a finite resolution problem.

The thermal transfer technologies can handle much higher resolutions, but they're much more costly because they're almost miniature four-color printing presses on the desk. The most expensive technology today is the color laser printer, starting at \$60,000.

Producers of all three technologies are trying to reduce their costs by half in the next 12 to 18 months to achieve broad acceptance in the office. The whole acceptance of color in the office may be dictated more by the ability to *copy* color, and we're seeing some pretty exciting products in that area from Canon, Xerox, and Kodak that will make color copies in the office

much more widely available.

How does the entry of QuickDraw laser printers affect your users?

The issue of QuickDraw versus PostScript printers has largely been one of cost. We've worked with both Apple and General Computer to support their QuickDraw printers. We've tried to eliminate as many differences as possible, for example we put the halftone imaging model inside PageMaker to allow photographs to be printed on either the LaserWriter SC or the GCC Personal Laser Printer. That process involved a lot of work for us.

About 80 percent of our customers use the LaserWriter for output; 15 percent

use the ImageWriter and then take their files to a local printing service for final output if they need higher quality. As a result, supporting QuickDraw is very important for us, and for our customers.

Do you see fonts to be an issue with the QuickDraw printers?

The fonts used in the Apple SC QuickDraw printer are bitmaps that take up a lot of space on the disk, and you have to have a bitmap for each type size. By the time you add it up, the people who couldn't pay for a PostScript printer end up having to spend that money anyway for a hard disk with enough space for the number of fonts they need in the System. There are several tradeoffs, and Apple, the press, and the dealers need to make the users aware of what those tradeoffs are.

You've introduced a new presentation package that looks very flexible and powerful. When do you think we'll start seeing presentations that are more than an outline of bullet items?





It's no longer acceptable to sell a software product unless it's in the local language.

We're not going to change the way people communicate overnight. There are educational things, cultural things, that we have to change. When I was a graduate student, I taught the introductory course in visual communication, required for all journalism students. It was appalling to see college students who entered this course, who had gone through grade school and junior high school and high school without learning even the basics of visual communication—things like line, form, color, texture. Without that basic foundation we're not going to make much progress. As a result, we've done a lot of work to create materials that allow people to learn these skills.

Aldus has made a big investment in the international market recently. Why?

The international market is not only a key business opportunity, but it's absolutely critical to me personally: I'm interested in taking a message to the whole world, not just the United States. That means designing products to meet different language needs—we currently have PageMaker in 10 languages and plan to have it in 13 languages by the end of 1988—from French to Japan's Kanji. The product design issues are very challenging, but even more challenging are the cultural differences from country to country that influence how we present the products, how we provide support and service to our customers and to the local manufacturers of the devices and screens.

Many high-technology companies, and many Americans in general, don't have an appreciation for the rest of the world.

There are 350 million people in Western Europe and their need for our products is as great as the need in the United States.

What are some specific needs of the international markets?

There are some very simple things that we Americans tend not to be very sensitive to. The most common paper size in the world is A4. If you're in the United Kingdom or France or Germany, would you feel very good about a piece of software that forced you to change the default setting for the page size every time you went to print?

It's no longer acceptable to sell a software product unless it's in the local language. That means the manual, the box, all the instructions inside, the help files, everything is translated into Swedish, into French, into German. You can't expect international customers to call the United States for support; they need local support. The time and date formats differ. The financial programs must represent numbers and currency and accounting principles according to the national customs.

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HIGH PERFORMANCE TO THE MACS.

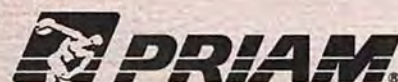
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The Ultimate Color Somewhere Between

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8-Bit Color Standard

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System Should Be in 8-Bits & \$250,000.



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And up till now, you could only get that kind of image from a system costing \$250,000 or more. The kind you see in print or broadcast production facilities.

But now, we're delivering the first 24-bit color for the Mac II. The RasterOps ColorBoard™ 104 and 19" Trinitron monitor.*

Of course, this system runs all software written to the Mac 8-bit QuickDraw™ standard. But with our ColorDraw extensions, these programs run on your screen in full 24-bit color.

As a result, you can look for a whole new level of image quality. In programs like QuarkXPress™ for desktop publishing. LaserPaint Color II® for image processing. Dimensions™ for 3D modeling. Along with presentation graphics. Desktop video. And anywhere else you can imagine.

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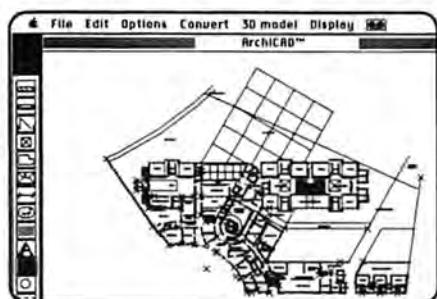
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ARCHITECTURE



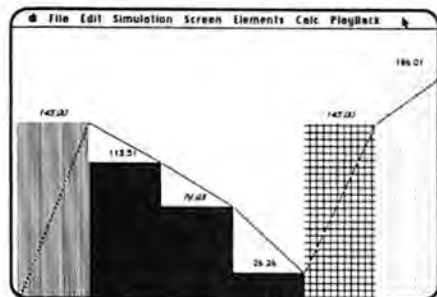
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Verbatim



We compiled a list of over 350 enhancements our customers wanted when we were planning PageMaker version 3.0.

Is desktop publishing a different animal abroad?

In many places, PageMaker is used just as it is here. But there are some parts of the world where all kinds of publishing are much more limited. In Latin America, you'll see many small newspapers produced on electric typewriters. The publishers can't afford silver-based materials for photocomposition, so photocomposition has never been used; it's been strike-on typewriters or hot-metal line casting. With desktop publishing, we can help the society communicate and get a lot more information out in a very socially advantageous way, information about better health care methods, how to grow crops, and other things we don't necessarily think of when we consider desktop publishing here.

It's been said many times that freedom of the press belongs to the person who owns it. Unfortunately, in an industrialized context it costs a lot to own the press; now we've reversed that process. Practically anyone with reasonable means can now afford to publish their ideas at a low cost, which is a very positive thing for society.

PageMaker seems to have been designed for people who are familiar with pasting up pages with traditional tools. What about people who've never done layout?

Clearly the early adopters of PageMaker were professionals in the field who understood the benefits for them and who immediately went out and bought it. They in turn have exposed PageMaker to a much larger audience of business professionals who would like to use these tools in the office but may be intimidated because they sense that these products are very complex.

We're trying to deal with these things by evolving the product, and by surrounding the product with training and templates

that let people with little design experience create professional-looking publications quickly. We're working to integrate the templates more with the program so that using them is more automatic. Most business users want to transform their content automatically into finished product. We haven't produced the ability to just snap our fingers and it's there, but our new presentation program goes further in that direction than anything else we've done.

Of course, our present customers want more and more features—we compiled a list of over 350 enhancements our customers wanted when we were planning PageMaker version 3.0. At the same time our new customers say, "I want less complexity." We're trying to add layers to the user interface so that users can have as much complexity as they want, but at some point we may have to divide the product for the graphic arts professional and the office user.

Aldus has also actively promoted training and customer support.

It's an attitude I formed while growing up. My family had a small business, and I learned that the success of a business like that depends upon repeat business. I've tried to take a leadership position in the Mac market, and at Aldus, to advocate that our job isn't finished when we sell a product. We really have to have a *satisfied* customer.

Do you think customers choose a program based on a company's reputation for customer support?

Yes, over 50 percent of our customers tell us they bought our products as a result of recommendations from current users, and I know that when I buy a product, I consider not only the quality of the product, but also the company behind the product. □

Interviewed by Nancy E. Dunn

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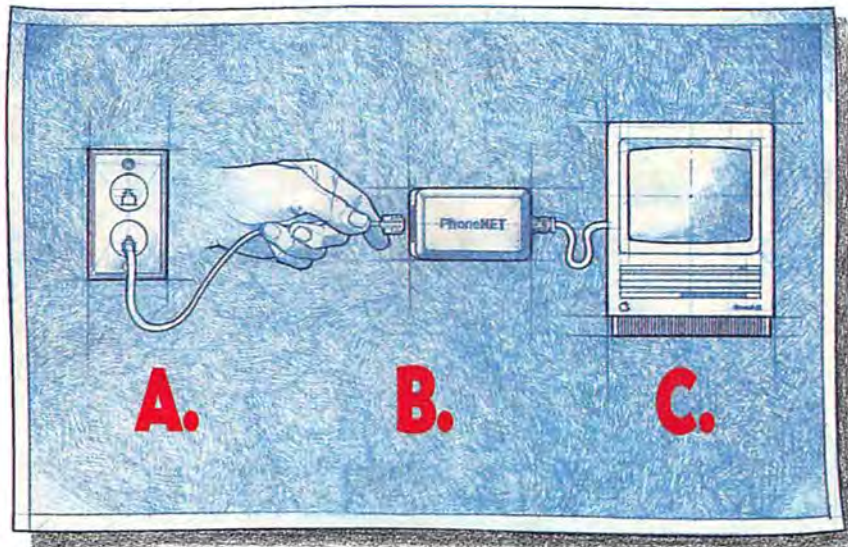
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Macworld News

by Gil Davis

Four Color Monitors from E-Machines



E-Machines is offering a new 16-inch color monitor, the T16, that gives nearly 70 percent more screen area than Apple's standard 13-inch color monitor. The increased size makes it possible to view an entire page of text on a landscape format using the Mac's standard 72-dots-per-inch screen resolution. The combined cost of the T16 monitor and E-Machines' video board is \$3295, compared with Apple's system price of \$1647 (with a 13-inch monitor).

Other monitors use more dots per inch to get more of the page on screen, but this results in smaller images and text, making it more difficult to see what's displayed. Still, E-Machines thinks some customers might want to get two pages of information on a 16-inch display, so it couples a higher-resolution video card with the Sony Trinitron monitor (almost identical to the T16) for a \$4495 list price. Instead of the T16's 832 by 624 pixels at 72 dpi, the TX offers 1024 by 808 pixels at 85 dpi.

E-Machines is also offering a special 19-inch Trinitron monitor that uses the same video card as the TX and outputs the same 1024 by 808 pixels. But because its screen is much



The 16- and 19-inch color monitors shown here by E-Machines president Steve Vollum offer much more screen area than Apple's standard monitor.

ROBERT HOLMGREN

larger, the T19 combination can display larger images using 75 dpi. Substitute a 20-inch Hitachi monitor and you have a C20 system at a lower price (\$5195) than the T19 combination, which sells for \$5995. All monitors except the T16 use a 72-Hz refresh rate to reduce screen flicker.

Competing with the E-Machines monitors is Intecolor's \$1995 MegaTrend/2 monitor. It offers 640-by-480 resolution using Apple's standard color video board, which costs \$748. When combined as a system, the total list price comes to \$2743.

For more information, call E-Machines in Beaverton, Oregon, at 503/646-6699, and Intecolor in Norcross, Georgia, at 404/449-5961.

French Building Blocks



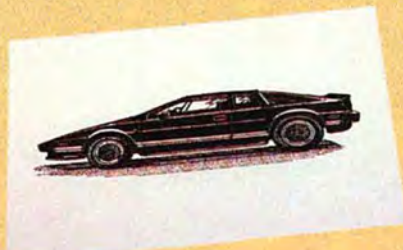
As kids, we used to build houses with blocks. Every once in a while, we'd build one with cards—just to see it tumble down. This is roughly analogous to the situation that exists in the architectural CAD world—a situation that has strong implications for architects in terms of ease of use and quality of output.

Currently, most three-dimensional programs used for architecture are based on the house-of-cards concept: walls, roofs, and other major elements are drawn as two-dimensional plates. Walls in the real world

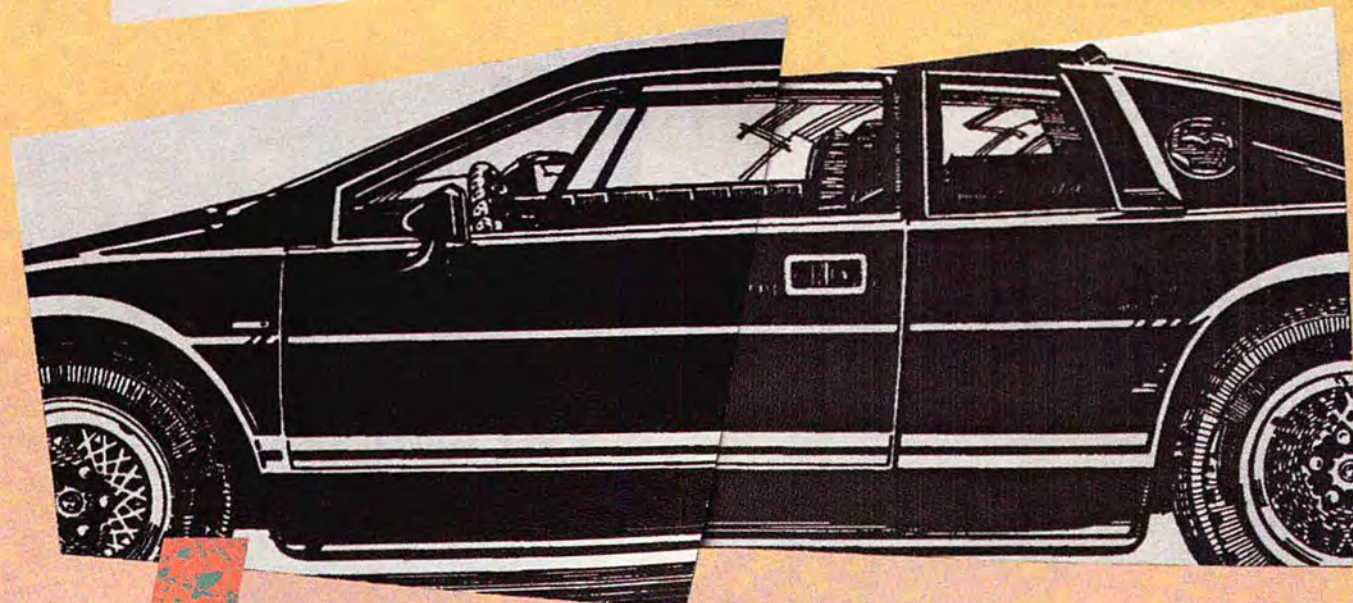
are three-dimensional, so it becomes difficult and time-consuming to picture how the building's interior will really look, or to calculate volumes, amount of insulation required, or anything else that is spatial.

A newly imported, French architectural program, Mac Architrion, attempts to overcome these limitations by beginning with the block as the basic unit. A floor plan of a house, for instance, might begin with a block that's 40 feet wide, 60 feet long, and 12 inches thick. On top of that, walls are created with single or multiple blocks of standard thicknesses, like 6 inches. While such a procedure may seem tedious, it's actually very fast because any block can be

(continues)



These unretouched print samples show the superior print quality of QMS-PS 810 over printers using first-generation print engines.



Introducing the PostScript laser printer that blacks out at high speeds.

The new QMS-PS[®] 810 can compose and print the most complex pages in record times, with richer, more saturated blacks than ever before. All with the desktop publishing power of Adobe PostScript[®], and the superior print know-how of QMS, an industry leader.

Under the hood QMS ASAP[™] (Advanced System Architecture for PostScript) is proprietary technology that helps eliminate the hardware bottlenecks that hinder other PostScript printers. As a result, QMS-PS 810 boasts processing speeds remarkably faster than other PostScript printers in its class. And faster output means greater productivity. In addition, the QMS-PS 810 laser

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Along with PostScript, the HP LaserJet[™], Diablo[®] 630 and HP-GL[™] printer emulations are added for your non-PostScript software.

The QMS-PS 810 laser printer is easy to use, maintain, and comes with a one-year warranty. It's available from Laser Connection dealers. Laser Connection is a sales and marketing subsidiary of QMS. For the dealer nearest you call **1-800-523-2696**.

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Circle 104 on reader service card

easily replicated and automatically joined with its likenesses. Any block can be modified to create a door, window, or other opening that can be instantly filled with a frame taken from the program's 3-D library, or with a custom frame.

The four-year-old program's approach enables designers to conceive of, create, and view plans in the same 3-D units seen in the real world. As a result, they can "walk" through a building's interior and get a sense of what impact a stairwell or partial wall might have on a room's psychological space. And since each block becomes part of a database, it's very easy to calculate quantity factors such as net floor space, total wall insulation, and interior volume.

In addition, any 3-D building plan can be used to almost instantly obtain 2-D working plans, sections, elevations, perspectives, and sun studies. All these features make Mac Architrion an integrated program resembling Microsoft Works' capability for switching between modules. Output can be sent to dot matrix and laser printers, and to plotters. Online help is available using interactive emulations; reference and training

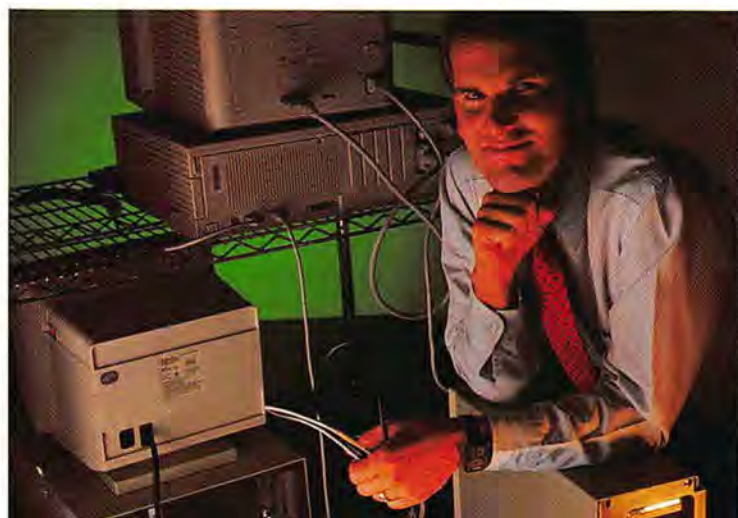
manuals are in HyperCard format. A demonstration disk that shows you how to create and modify plans for a house is available from Gimeor, in Washington, D.C., at 202/223-4373.

Calling All PCs



It can be difficult if you're one of the few Mac users in your company and you're surrounded by hundreds of MS-DOS computers. To break that isolation, some Mac enthusiasts connect themselves to MS-DOS-based networks so they can use electronic mail, file servers, and printers. But that often means going without the Mac's Hierarchical File System and the AppleTalk Filing Protocols that make Apple's network so quick and easy to use.

A new networking product from Novell offers seamless integration between Macintosh, MS-DOS, and OS/2 computers by maintaining each computer's native environment. Novell's NetWare gives complete access to all common resources such as files, printers, network management, security, E-mail,

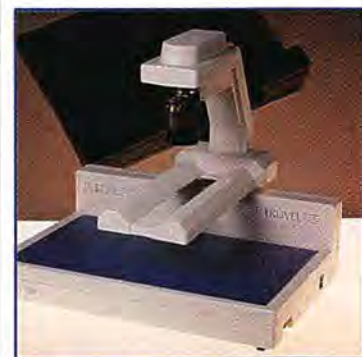


Novell's product manager Bruce Nelson is proud of NetWare's seamless integration of Macintosh, MS-DOS, and OS/2 computers.

archiving, and Btrieve and SQL data management.

For users, NetWare means that work groups and communications links can be established without the limitations normally imposed by dissimilar computers. For developers, NetWare brings the ability to publish software that can invisibly transfer files between different computers. The result for everyone is more solutions, more power, and better communications, connectivity, and productivity. For further information, call Novell at 800/453-1267.

Now Truvel is shipping two color scanners. One scans only color (\$7495), while the other scans color and black and white (\$8495). Both require an additional SCSI interface (\$1595).

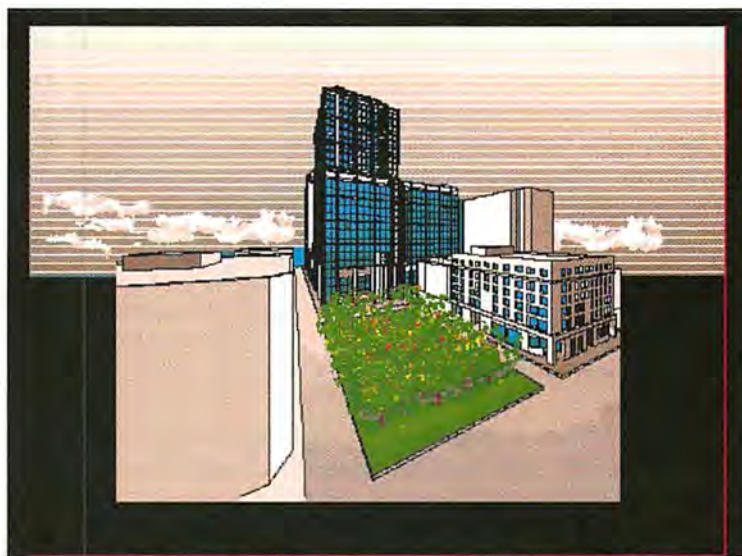


This Truvel scanner reproduces high-quality images in both color and black and white.

(Truvel's \$5495 black-and-white scanner uses an \$1195 SCSI interface.)

A major advantage of Truvel's design is its moving, overhead tower containing the camera, lens, and two lights. This traveling mechanism scans an area of up to 12 inches by 17 inches in one pass, allowing you to input two sheets of letter-size paper or a B-size drawing. Documents and objects up to 2 inches thick can be accommodated.

(continues)



With Mac Architrion, architects can create and view building plans with real-world dimensions.

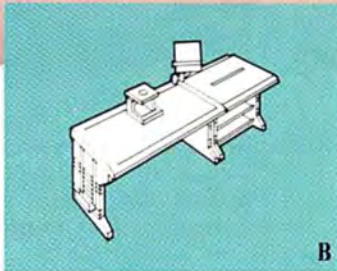
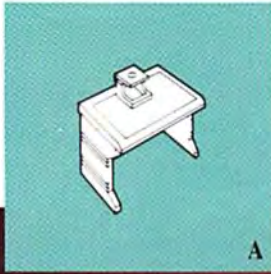
Scans 16.8 Million Colors



Select from its 16.8 million colors and the Mac II's screen gives you breathtaking photorealism. High-quality input, however, is a problem, with few color scanners seeing the light of day.

Getting color images into a Macintosh can be especially important when people want to capture photographic images to include in books, newsletters, and magazines.

Right, it's efficient.
Right, it's great looking.
Costs an arm and a leg, right?



Wrong.

If you think you can't afford computer workstation furniture as up-to-date as your Macintosh, think again.

Breakthrough prices. The basic workstation (drawing A) costs less than \$275. For under \$580, you can set up the intermediate workstation (drawing B). And the full featured workstation (drawing C and photo) is less than \$1195. Since the WorkManager™ System is modular, you can start small and add on as your needs—and resources—grow.

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Circle 276 on reader service card

MicroComputer
Accessories, Inc.

You can modify resolution by adjusting the camera's zoom lens so it "sees" a scan width varying from 12 inches (300 dpi) to 4 inches (900 dpi). Software also controls various functions such as "threshold," which is useful if a document is old or the ink is faded. In that case, Truvel's scanner can be told to record only black-and-white information above a certain background level. Software also sets the contrast levels for each color. For further information, call Truvel in Chatsworth, California, at 818/407-1031.

Simulating Real-World Events



It's obviously impractical to demolish a city to see how it would survive an earthquake. True, a fire marshal could calculate that San Francisco's downtown streets would lie useless beneath six feet of rubble, but no simple formula could predict which buildings would fall or determine what could be done to strengthen them. The answer lies in knowing how to predict the interactions between earthquakes, buildings,



and geology using a science called simulation.

Up to now, simulation programs have been largely limited to narrow areas of interest. They often ran on mainframes under the direction of simulation consultants who might charge many thousands of dollars to solve a specialized problem.

Now there's a general-use simulation program for the Macintosh called Extend that can model such diverse activities as electronic systems, cash flow, factory production, stock market behavior, computer networks, pollutant propagation, neural response, and almost anything else that can be quantified using mathematical formulas.

Extend, in its simplest format, is a series of on-screen building blocks that you can manipulate to look like anything you want to draw. A home

heating system might begin with a simple drawing of an oil-fired water heater. But behind the heater's appearance is a whole set of descriptors that define how the heater works. By just drawing lines, you can connect this heater to radiators, electricity, and an oil tank. How would turning off several radiators affect oil consumption? Just click a button for computations in either spreadsheet or graph form.

Broadway Discovers the Mac



It's no secret that the Mac has become the favorite computer of thousands of high-tech synthesizer artists. Lately, however, veteran Broadway songwriters are sitting down to computers for the first time.



Broadway songwriter John Kander uses a Mac to capture his songs by playing one MIDI keyboard with each hand.

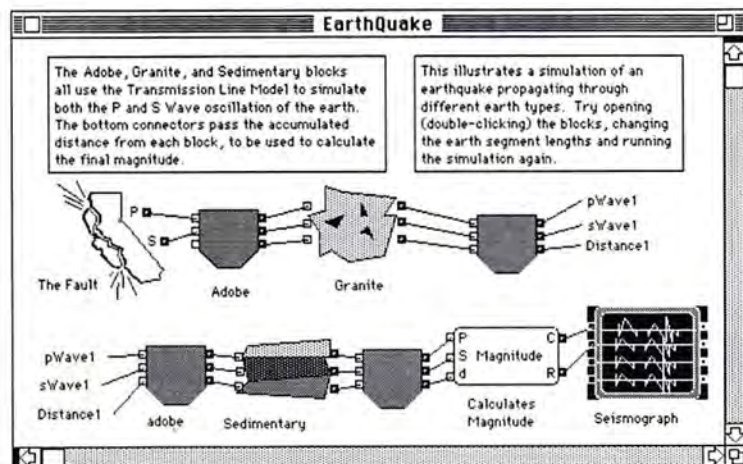
Creating the building blocks requires detailed knowledge of how something works, and the ability to program using Extend's C-like scripting language. But once a building block is created, even generalists can use it, thus bringing the power of simulation to almost anyone's desktop.

Extend, which lists for \$495, comes with 64 different blocks (including their scripts and on-line help) and more than 60 built-in functions for plotting, queuing, math, statistics, and diagnostics. For further information, call Imagine That in San Jose, California, at 408/365-0305.

Jerry Bock, composer of *Fiddler on the Roof* and *Fiorello!*, uses his new Mac with Performer to transform simple piano pieces into fully developed works. "When the Mac plays back my piano part, I start to hear all kinds of possibilities. I'm encouraged to add details and layers of orchestration," he says. "A suite of waltzes I wrote for the piano blossomed into a chamber piece; now I'm even envisioning them as a ballet."

Cy Coleman, too, has recently become a Mac musician. The composer of *Sweet Charity* and

(continues)



Extend, a general-use simulation program, models almost anything that can be quantified with mathematical formulas.

INCREDIBLE

You are looking at the leading edge in desk top publishing design. The distinctive documents featured here were created using ordinary page layout software programs such as PageMaker, ReadySetGo and X-Press. What makes them extraordinary is the innovative use of PostScript clip art and fonts on floppy disks by Image Club. *That's really good.*

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I M A G E C L U B

Barnum and standards like "Hey, Look Me Over" and "If They Could See Me Now" is writing the scores for six upcoming musicals. Coleman uses the Mac to produce sheet music in a flash. For example, during the recent Broadway tryout of Coleman's *Let 'Em Rot*, the Mac was kept at the theater; changes to the score were printed out on the spot, with huge savings in time and copyist fees.

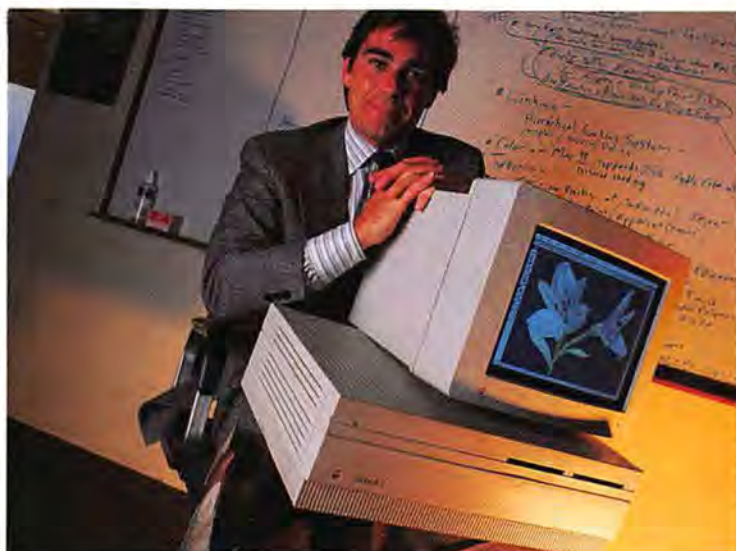
John Kander's new Mac is perched right next to the old Steinway grand piano on which he composed such hit shows as *Cabaret*, *Chicago*, and *Zorba!* and songs like "New York, New York." Using Performer, he records his songs by playing one MIDI keyboard with each hand. "This way," he explains, "it's OK if my hands cross; when I convert what I've played into notation, the right- and left-hand parts will show up on the proper staves." After adding a vocal line, Kander converts the sequence into HB Engraver file format and prints out his creation—without ever having set pencil to paper. Kander plans to produce the entire score for his new show electronically.

That America's classic songwriters have discovered the Mac should come as good news. And if the Mac helps them write more music more easily, there will be that many more great songs to sing on Broadway. —David Pogue

Moves 3-D Objects



Swivel 3D from Paracomp is unique among Macintosh 3-D drawing and modeling software because it creates animations of 3-D objects. For example, you can create the image of a bicycle that steers right and left while the wheels, pedals, and cranks go around.



Paracomp president William Woodward displays an image created with Swivel 3D drawing and modeling software.

It's all done by creating various 3-D images, such as wheels and a bicycle frame, and then defining how those objects are linked. Many types of linkages are supported by a tool called Free-links, which joins objects together using editable constraints and parent-child relationships. For instance, the child object is free to be manipulated separately, but when the parent is moved, the child moves with it. Other tools lock multiple objects together and mimic the movement of ball joints.

For animations, a *tweening* tool moves an image between starting and ending points on the screen—you specify the number of in-between images. All linkage movements are appropriately tweened as well.

In addition, Swivel 3D can produce either color or monochrome images of nearly any shape in the following formats: wire-frame, hidden-line wire-frame, outline-shaded, or contoured and shaded. It has extensive facilities for exporting images to other programs such as MacDraw, MacDraft, Mac-



Swivel 3D creates this image of a bicycle. The handlebars move to the right and left while the wheels, pedals, and cranks go around.

Paint, FullPaint, SuperPaint, PixelPaint, Image Studio, and VideoWorks II.

Swivel 3D, which lists for \$395, is intended for use in such diverse applications as design visualization and animation. It could become popular because it couples a highly intuitive user interface with the ability to manipulate complex objects and then create animations. Paracomp's previous offerings include ModelShop, MacVLSI, and Milo. For further information, call Paracomp in San Francisco, California, at 415/543-3848. —David L. Peltz

Mac Animation Hits the Big Time



The Mac II—having made its mark in fields such as CAD, publishing, and music—further its image as a Renaissance machine by introducing a professional-quality animation workstation.

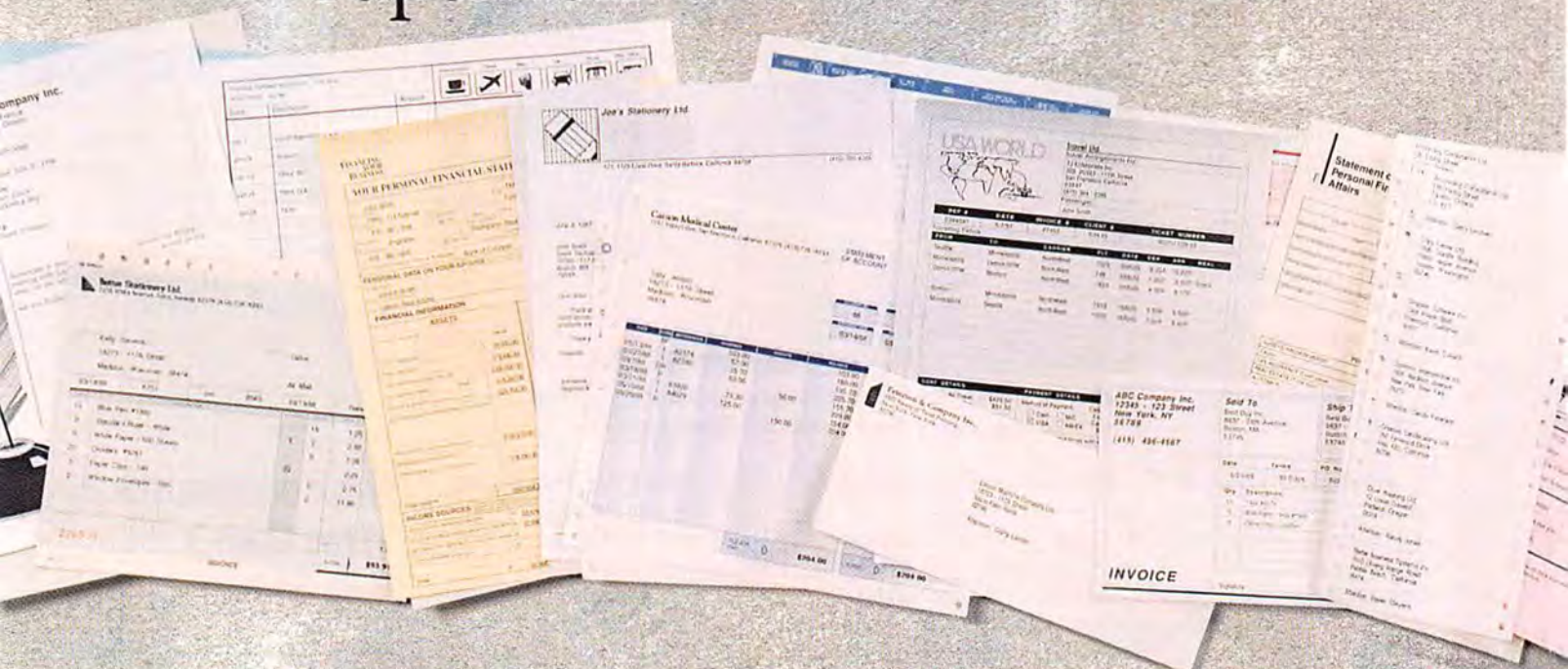
Apple made a 3-minute animation, which was shown at this year's SIGGRAPH, a computer graphics conference sponsored by the Association for Computing Machinery. The movie, called *Pencil Test*, chronicles the adventures of a pencil icon after it falls off a Mac's screen onto a desk full of 3-dimensional items that are unfamiliar to our 2-dimensional hero.

According to Galyn Susman, one of the team who worked on *Pencil Test*, the project was intended not only to show that the Mac II could create production-quality animation, but also to study the tools needed to do so and to help define Apple's future role in supporting animation.

(continues)

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Features such as gray screens, hairlines, variable type sizes, text editing, customizable grids, and printing and

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For offices with more than one Macintosh, additional desk accessories can be purchased separately.

And yes, for those of you who want some help getting started, Fast Forms still comes with a **free template disk** filled with forms ready to use.

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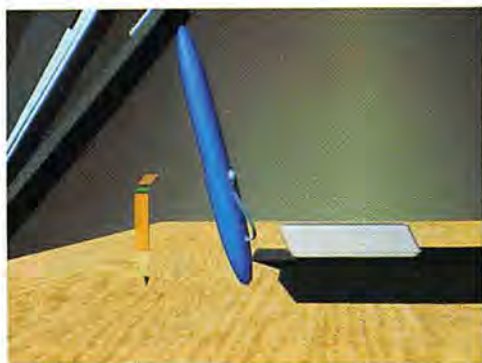
(403) 463 - 3330



drawing a form



Pencil Test, a 3-minute animation starring a pencil icon, was shown at SIGGRAPH 88 to prove that the Mac II can create production-quality animation.



Although *Pencil Test* has but a single star, the crew's credits go on and on. Silicon Beach's Super 3D produced the initial wireframe shapes. A custom program called Twixt then animated the drawings in 3-D space. Next, a custom rendering program took individual movie frames and performed sophisticated functions on them, antialiasing (smoothing rough edges), shading, and texture-mapping them. As frames were collected, short segments of the animation were reviewed and transferred to videotape, the film's final medium. A soundtrack was then recorded and added to the tape with DigiDesign's software.

Pencil Test was just that—a test. Its acceptance by SIGGRAPH shows that the Mac II can indeed produce high-quality animation. On the other hand, more than 20 people, 20

Macs, and numerous custom programs were required to make the animation a reality. Susman estimates that the Mac won't be a viable high-end animation computer for another three years or so. This early experiment shows that the Mac has potential as an animation workstation; it's up to Apple and other developers to keep the ball rolling. —Erfert Fenton

Three for Presentations



Move over, Microsoft PowerPoint (now available in version 2.0) and Cricket Presents. Make way for three new presentation graphics programs: a new version of More from Symantec, ReadySetShow from Letraset,

and a product from Aldus called Aldus Persuasion. All three programs let you design black-and-white or color presentation materials, including slides, transparencies, speaker's notes, and handouts. Each program also lets you present a slide show on the Mac's screen.

Symantec's More II focuses on organizing and managing information and then turning it into a presentation. The program integrates its presentation features around a powerful outliner with augmented word processing capabilities. Changes in the outline are automatically reflected in slides. More II, for \$395, includes a full set of drawing tools, but can't create most standard business charts. The program, however, does have a more flexible tree-charting capability than previous versions and produces standard text slides called bullet charts.

ReadySetShow, a close cousin to Letraset's ReadySetGo page layout program, emphasizes text handling. It integrates features such as kerning and style sheets with charting and drawing capabilities. Users can create pie, scatter, line, bar, and column charts. A slide-sorting feature lets users organize presentation visuals. ReadySetShow is available now for a suggested retail price of \$395.

Persuasion users organize ideas with an outliner. Using a feature called AutoTemplates, you can transfer outline text and charts into predesigned layouts automatically. You can

add graphics with built-in drawing tools or create charts by typing data into the program or transferring spreadsheet data from other programs. Persuasion supports up to 16 million colors and imports a wide variety of file formats. The program will be available by the end of the year for a suggested retail price of \$495. For further information, call Aldus at 206/622-5500, Symantec at 408/253-9600, and Letraset USA at 201/845-6100. —Adrian Mello

Zoo-Ink's Designs

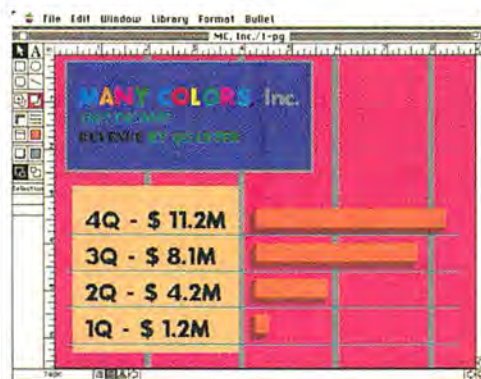


Alan Grinberg, founder and owner of a San Francisco textile design and printing company called Zoo-Ink, is famous for hand-printed fabrics that look like original art—made with the help of a Macintosh.

Grinberg's fabrics grace Saks Fifth Avenue and the Hilton Hotels. Even the Queen of England ordered bedspreads made from material screened at Zoo-Ink. Grinberg applies other artists' designs to fabric as well, as he did for film star Howard the Duck, who wore pajamas made from Zoo-Ink-printed material in the movie *Howard the Duck*.

All this success is due to Grinberg's creativity in com-

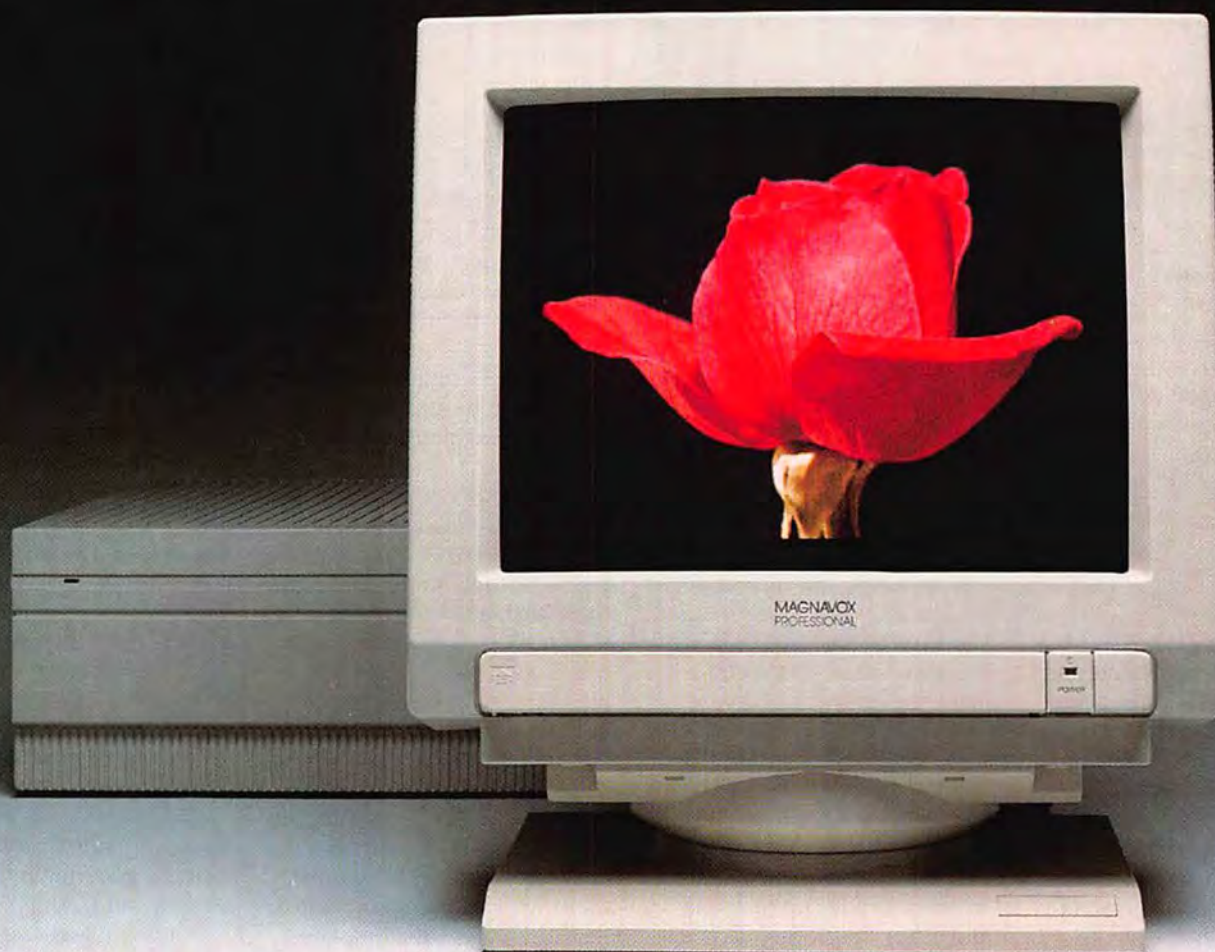
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More II is one of three programs that enable you to design presentation graphics and give slide shows on screen.

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CRT for superb resolution, and a glossy CRT face for crystal clear images. Graphics and text on the MAC display shine at their best. The integrated tilt-base provides the ultimate in user comfort.

Additionally we offer a solid, two-year warranty instead of the usual 90 days. And the \$699 retail makes this a great value.

Designing a superior display for the Macintosh II system was smart. Offering it for \$300 less, that's very smart.

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Alan Grinberg can design a fabric pattern in five minutes on a Mac that would take several hours if designed traditionally.

ination with a Mac II and several applications like Pattern Breeder from Australia, MacPaint, a desk accessory called MacTracks, and a small program written by Grinberg himself, which allows him to design a motif and then repeat it until it becomes a pattern—all in record time. In fact, what Grinberg designs in under five minutes with the Macintosh could easily take another artist several hours to create with traditional design methods.

After the design is photographed and enlarged, it's transferred by hand onto fabric through a large silkscreen stretched tightly over a wooden frame. Panel by panel, the design is transferred using a large squeegee and paint mixed at Zoo-Ink.

The design on each panel of completed fabric looks much more random and hand-done than might be expected from computer-generated output. That's the result of Grinberg's own computer program's ability to make computer printouts look artistic. —Jeanette Borzo

HYPERCARD

Childhood Delights



HyperCard has made children's games a cinch to create, but few of these games go to the artistic lengths of *The Manhole*. Robyn Miller, who wrote this five-disk set, has created a fantastic adventure world, replete with sound and animation.

The Manhole stands out for the sheer volume of its elaborate drawings, from a manhole cover and a fire hydrant, to beanstalks and castles. Each disk contains between 100 and 150 cards, which the user navigates by clicking on objects. Great-looking buildings, creatures, ornaments, and landscapes provide hours of entertainment.

The Manhole is carefully designed for a child's comprehension. The stacks use a small amount of spoken text and restrained sound effects. The passageways from venue to venue are smooth and logical. Though the stack is password protected, HyperCard snoopers will be tantalized to seek out *The Manhole's* motion and dissolve techniques.

To be honest, I have yet to explore the entire Manhole system. I know there's an interactive keyboard that lets you play notes hidden in the drawer of a dresser somewhere, but I haven't found it. There are probably many other mysteries and interactions awaiting, as well.

When I first saw the stack at a HyperCard exposition, a little girl, maybe three or four years old, was navigating it successfully. No wonder—the child was Laura Atkinson,

daughter of HyperCard's creator, Bill Atkinson.

For further information, call Prolog Software in Henderson, Texas, at 214/657-7394. —Scott Kronick

French TV Spawns Color Paint Program



A year ago, Serge Rostan of Paris's

Adone Company answered graphic designers' pleas for a color painting program more powerful than SuperMac's PixelPaint by supplying color video hardware to French television stations. Realizing that such an offering would probably also be well received elsewhere, Rostan began working on what would become GraphistPaint II—a U.S. version being sold by Aba Software.

GraphistPaint II contains many of PixelPaint's painting tools, but its real forte is manipulating color images using sophisticated capabilities that can save time and increase impact.

Let's say a designer wants to picture a person dreaming of a vacation on a beach. After drawing the beach and sky, and a single image of the person's face, the designer can use the program to multiply the face 50 times and then put those 50 faces in the sky, so it appears that many faces are looking down on the beach. Such an image would take a long time to construct, even using a computer. But GraphistPaint II makes the transformation in seconds. And GraphistPaint II also has the ability to wrap a flat image around a sphere, and to create moving color. For example, the sky above the beach

(continues)



Replete with sound and animation, *The Manhole* takes HyperCard-designed children's games to new artistic heights.

Drive Safely.

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That's the basic rule of thumb with disk drives because you can't risk crashing. And that's precisely why you should buy a Jasmine DirectDrive™. Ranging in storage from 20MB up to 140 MB, all DirectDrives have to first pass the Jasmine torture test: 10 million read/write commands with stop/starts at low voltages.

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Robert Vehling,
president of New
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thinks *Graphist-
Paint II* will fill a
key niche in the TV
marketplace.



could be selected and then told to change colors slowly, but continually. What results is a sky that's constantly changing color—the only constants are the clouds and beach.

GraphistPaint II imports and exports PICT and TIFF files and video images captured with Data Translation's new Quick-Capture card. For further information, call Aba Software in Malvern, Pennsylvania, at 213/644-3580.

Laptop for the Rest of Us

 Heavyweight computing in an ultralight-weight portable design has finally arrived in a package from the U.K. Cambridge Computer's 2-pound Z88 goes about its business quietly, thanks to a rubber keyboard. Its size can be compared to two stacked issues of *Macworld*.

Complete with integrated software called PipeDream, the Z88 enables you to word process documents, create spreadsheets or databases, manage your calendar, or attach a modem and connect to an online service.

The Z88 operates up to 20 hours on four AA batteries, and has an auto-shutoff feature that turns the machine off after several minutes of nonuse. When you turn it back on, you're returned to your document, ex-

actly where you left it. Context switching, similar to the Mac's MultiFinder, allows you to work in several applications at the same time. But be forewarned, the Z88 isn't nearly as easy to use as a Macintosh.


The number of applications you can load depends on how many optional snap-in RAM modules you install. The Z88 comes standard with 32K of built-in RAM and can be expanded to 1.5 megabytes using three 512K cartridges. Cambridge says a maximum expansion of 4MB will be possible in the future as denser RAMs become available.

Cambridge offers two optional communications programs that allow the Z88 to communicate directly with your desktop Macintosh or MS-DOS computer. The serial cable to connect them comes in two versions, MS-DOS and Macintosh, and converts the data being transferred so the Z88's

data can be read by popular applications like MacWrite or Excel.

Suggested retail price of the Z88 is \$549, and additional 128K RAM cartridges cost \$110 each. For further information, call the United States distributor, SSI, in Portland, Maine, at 207/761-3700.—Joe Hutsko

Viruses Infect Few but Wreak Havoc

 Dozens of articles about the many dangers of computer viruses have appeared in recent months, but how many users have actually had their computers infected? In May, at the height of the virus scare, we sent questionnaires to 1000 randomly selected readers. We received 519 responses and some surprising feedback.

Of the 42 users whose computers had been infected, many found removing the virus to be a real problem. Even after spending an average of two hours at the task, they reported a success rate of only 65 percent. A few said they hadn't fully eliminated the virus even

after 10 to 20 hours of work. Perhaps of some consolation during this removal effort was the feeling that they weren't alone—nearly three-quarters said they knew at least one other person whose computer had also experienced a virus.

Finally, we asked, "What actions, if any, do you think should be taken against people who promulgate viruses?" Responses ranged from advocating criminal prosecution to such comments as:

"May the fleas of a thousand camels infest their armpits."

"Take their Macs away and force them to use IBMs."

"Chain them in front of an MS-DOS system with no manual."

But the problem remains. Even if no new viruses are introduced, one-third of the 42 people who reported an infection are still battling a computer virus that can infect other Macs.—Allan Lundell □



With the Z88, Cambridge Computer offers heavyweight computing in a laptop the size of the Macintosh keyboard.

Have you had personal experience with a Macintosh virus?

Yes 8.2% No 91.8%

Based on 519 respondents.

If Yes, did you lose files as a result of a virus invading your Macintosh?

Yes 56.1% No 43.9%

Based on 41 respondents.

If Yes, what type of files?

System 30.2% Document 30.2% Application 39.5%

Based on 23 respondents.

Over 90 percent of the Macworld readers who responded to our survey are still virus-free.

It's a steal!

The four-digit number next to each product is the product's ITEM NUMBER. Please refer to this number when ordering. Thank you.

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CP denotes copy-protected.
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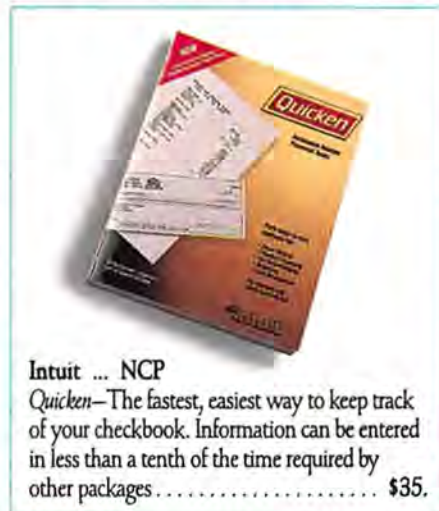
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1195	Fontographer 2.3	239.
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2419	DiskQuick 2.10	27.
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2422	Smart Alarms 2.5	35.
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MacroPac International ... NCP		
2943	101 Macros for Excel	44.
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4068	Aztec C	75.
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4075	Aztec SDB	115.
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Miles Computing ... NCP		
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2769	Peoples, Places & Things Vol. 5	27.
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2748	The Perfect Score: SAT 1.0 (CP)	46.
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2780	Dollars & Sense 4.0	81.
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3129	KaleidaGraph 1.10	125.
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3504	Silicon Press 1.1	41.
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2809	A+ Mouse ADB	85.
Nutmeg Systems ... 90 days		
2992	15" Monitor for Mac Plus	1295.
2994	15" Monitor for Mac SE	1295.
2993	15" Monitor for Mac II	1395.
4002	19" Monitor for Mac Plus	1395.
4003	19" Monitor for Mac SE	1395.
4004	19" Monitor for Mac II	1495.
Nuvotech ... 1 year		
2999	TurboNet/AppleTalk connector cable	6.
3000	TurboNet ST (DIN-8)	30.
Orange Micro ... 1 year		
3036	Grappler	79.
4005	Grappler LQ	92.
Personal Computer Peripherals ... 2 years		
3177	HD-WSI (Apple HD-20 to SCSI)	269.
3181	MacBottom HD 21 SCSI	749.
3180	MacBottom HD 21 w/Modem	915.
3185	MacBottom HD 32 SCSI	899.
3184	MacBottom HD 32 w/Modem	1045.
3189	MacBottom HD 45 SCSI	1149.
3188	MacBottom HD 45 w/Modem	1295.
3190	MacBottom HD 70 SCSI	1395.
3176	MacBottom IHD-144 Meg (1 yr.)	2189.
Practical Peripherals ... 5 years		
3100	1200 Baud External Modem	109.
3102	2400 Baud External Modem	189.
3089	Mac Communications Pack	249.
Sharp ... 90 days		
3453	JX-450 Color Scanner	call
Shiva		
3444	NetSerial X232	309.
3442	NetModem V1200	359.
3443	NetModem V2400	479.
Summagraphics ... 90 days		
3371	MacTablet 12" x 12"	379.
Thunderware ... 90 days		
3648	ThunderScan 4.0 with PowerPort	199.



Targus
Mac SE & Extended Keyboard Carry Case—Made of a special material that's as strong as Cordura but much smoother so it won't catch on sharp corners. Closed-cell foam protects against jolts. \$69.

DISKS

3297	Sony 3 1/2" DS/DD Disks	\$18.
2214	Fuji 3 1/2" DS/DD Disks	19.
3772	Verbatim 3 1/2" DS/DD Disks	19.
2792	MAXELL 3 1/2" DS/DD Disks	20.

INFORMATION SERVICES

CompuServe		
1676	CompuServe Information Service	24.
1671	Grolier's Online Encyclopedia	32.
1673	CompuServe Navigator 2.02	45.
Dow Jones		
1789	Dow Jones Membership Kit	24.
1785	Desktop Express	95.

ACCESSORIES

Bantam Books		
1403	Complete HyperCard Handbook	24.
Computer Coverup		
1723	ImageWriter II Cover	8.



MECA ... NCP
Managing Your Money—Use it for taking care of budgets & bank accounts, calculate net worth, and track investments. It may even be tax deductible. \$129.

1722	ImageWriter LQ Cover	8.
1724	Mac SE Cover Set	10.
1725	Mac SE Ext. Keyboard Cover Set	10.
Goldstein & Blair		
2267	The Macintosh Bible	16.
I/O Design		
2378	MacLuggage HDware	54.
2376	MacLuggage Macinware Plus	69.
2379	MacLuggage Imageware II	49.
2381	MacLuggage Macinware SE	79.
Kalmar Designs		
2531	Teakwood Roll-top Case (90 disks)	20.
2533	Teakwood Roll-top Case (135 disks)	27.
Moustrak		
<i>Available in a variety of colors.</i>		
2694	Moustrak Pad (standard 7"x9")	8.
2692	Moustrak Pad (large 9"x11")	9.
2693	Moustrak Pad L/J (9"x11")	10.
	Moustrak Designer Series	each 12.
Ribbons		
3255	ImageWriter II Black Ribbon	4.
3261	ImageWriter II 4-color Ribbon	9.
3270	ImageWriter II Rainbow Six Pack	20.
<i>Available in black, blue, brown, green, orange, purple, red, yellow and silver.</i>		



BrainPower ... NCP
ArchiText—Combines boolean searching and HyperText abilities to create a very practical HyperText application. \$195.

3260	ImageWriter LQ Black Ribbon	17.
4011	ImageWriter LQ 4-color Ribbon	20.
Sopris Software		
4017	ImageWriter II Cover	11.
4016	Mac Plus Cover	15.
4019	Mac SE & Ext. Keyboard Cover	15.
4018	LaserWriter II Cover	17.
4012	High Trek ImageWriter II carry case	49.
4013	High Trek Mac Plus carry case	59.
4014	High Trek Mac SE & ext. kybd. case	69.
Targus		
3618	ImageWriter II Carry Case	49.
3617	Mac Plus/SE Carry Case	59.
4015	Mac SE & Ext. Kybd. Carry Case	69.

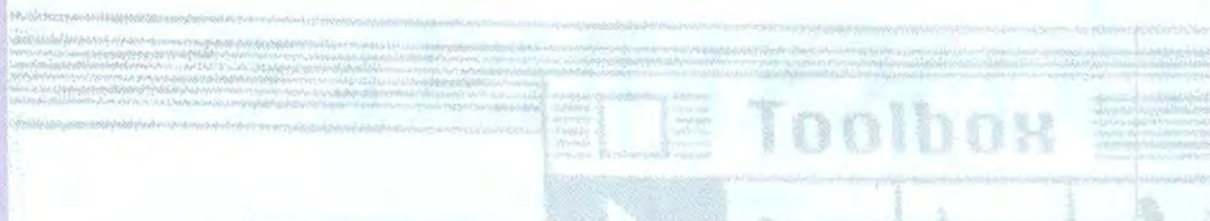
OUR POLICY

- We accept VISA and MASTERCARD.
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order.
- No sales tax.
- All U.S. shipments insured; no additional charge.
- APO/FPO orders shipped 1st Class Mail, charged by weight.
- Allow 1 week for personal and company checks to clear.
- COD max. \$1000. Cash or certified check.
- 120 day limited warranty on all products.*
- To order, call us anytime Monday through Friday 9:00 to 9:00 EST, or Saturday 9:00 to 5:30 EST. You can call our business offices at 603/446-7711 Monday through Friday 9:00 to 5:30 EST.

SHIPPING

Continental US: Barring massive computer failures and other natural or unnatural catastrophes, all non-C.O.D. orders phoned into MacConnection by 8 PM EST will ship Airborne the same night for next day delivery, except for those within UPS Ground Zone 1 (which is also an overnight service). The total freight charge on any order placed with MacConnection is now \$3. Backorders will also ship Airborne overnight at no additional charge. Some areas require an additional day delivery.

Hawaii, Alaska and Outside Continental US: Call 603/446-7711 for information.



Is Desktop Publishing Worth It?

How to tell when you've reached the edge of the desktop and are about to fall off

by J. E. Arcellana

Don't believe everything you read. Hardware vendors, software developers, industry analysts, even reader-friendly computer magazines (like this one) say it: You got your Mac, you got your laser printer, you got your desktop publishing software, you got your First Amendment, you got your French phrase book, and—voilà!—in 15 minutes, you're a publisher. You have the power of the press. You command attention in a room full of people. You're Citizen Kane.

It doesn't happen quite that way. Reality comes along. Desktop publishing can do a lot for you, but it can't do everything. A desktop publishing system is a useful set of tools, it can save you time and money, but you have to spend before you can save.

You could spend \$10,000 on industrial-strength software to perform color correction and photographic retouching, and \$20,000 on a high-powered Mac, a large-screen color monitor with 16 zillion colors, a laser printer with 36 or so built-in fonts and memory enough for half a dozen more, a scanner, software for text processing, page makeup, object-oriented drawing and bitmapped painting, and image manipulation in several gray levels. And then you could take hundreds of hours learning the basics of all your system's components—all before you ever begin, maybe, to recoup your investment.

How Much Is It Worth to You?

So do yourself a favor. Ask yourself: How much is it worth to put all that publishing on your desktop? How much production should you attempt on your desktop before you turn to other, more traditional techniques because desktop publishing is—

horrors!—no longer cost-justifiable? In other words, when is desktop publishing appropriate technology, and when should you just say no?

To find out, you need to analyze two areas: your publication and your resources. To break down the first area, look at the frequency of your publication, its size and design, its typographic demands, and its use of photos, graphics, and color. To assess your resources, consider the people and the money you have available, as well as your existing base of software and hardware.

Be aware that your analysis is unavoidably colored by subjective considerations such as your sense of aesthetics, your willingness and ability to acquire new skills, how much you think your time is worth, and how badly you want to control the production process.

To give you some idea of the expenses associated with desktop publishing, we've provided cost breakdowns of several representative jobs, including an advertising brochure, a catalog, a booklet, and an events calendar (see the accompanying sidebars). A graphic designer familiar with both desktop and traditional publishing systems prepared the cost estimates based on the finished publication. They include only production (*prepress*) expenses, not the cost of required hardware and software, training costs if necessary, or printing costs. Labor rates are usual and customary; no artist fees for original art are included.

Is It Worth It?



Maybe, if you know how to use Illustrator 88 to create graduated screens, you aren't too particular about the subtleties of color; and you don't mind the almost-imperceptible banding that the discerning eye can pick up in the desktop rendition on top, which cost \$32.50 to prepare. The bottom graduated screen cost \$75, including \$25 for a color proof.

How Often Do You Do It?

If yours is a one-time-only publication, don't bother learning how to use desktop publishing tools. You have to actually produce a publication at least once on a desktop system before you can start using the system efficiently. Your first time out is when you discover incompatibilities, limitations, the most readily apparent bugs. The more you use the system, the fewer problems you have to solve and the smoother the process becomes.

"Desktop publishing is good stuff, but it's not perfect," Craig Danuloff says. Danuloff is president of Publishing Resources, a desktop publishing service bureau in Boulder, Colorado. "It's new technology and complex technology. The trouble is that if you read enough magazines and talk to enough sales people, you'll buy the rhetoric. You'll throw a job at a computer on the last day. Forget it! Start-up time is real. Don't underestimate it."

Without disagreeing, Sanjay Sakhuja speaks more gently about the technology that he used to take Krishna Copy from a chain of self-service copy centers based in the San Francisco Bay Area to a nationally prominent group of desktop publishing service bureaus. "For a one-time job," he says, "it may be true that desktop publishing's not worth it, but with a weekly or monthly publication or anything repetitive, it's worth it. The first time is more painful than the second time. So it's not really a fair judgment of the system."

Users—the people who buy the services that Krishna, Publishing Resources, and other bureaus sell—share that view. Tom Ahern, visual communications supervisor at GTech Corporation in Providence, Rhode Island, says, "If you have to do it twice, then the time savings are tremendous. You eat a lot of setup time, but after that, it's easier." As Danuloff puts it, "It's the recurring value that's best."

The consensus is summarized by Jonathan Seybold, publisher of two industry newsletters about computer-based publishing, one of which is devoted to desktop systems. (Based in Malibu, California, Seybold also organizes annual seminars on publishing systems.) Seybold says, "If you're doing something one time only, the learning curve is not worth it. Have a professional do it, rather than do it yourself. It's a skills question. If you're reapplying those skills, if you'll get the chance to improve them, then, yes, it's worth it. But if you'll never use those skills again, it's not a good investment to take the time to acquire them."

Of course, don't decide to put out a daily publication with a desktop system without considering other requirements that result from your decision, especially staffing and something called *throughput*—the rate at which you can produce pages using desktop publishing tools. (You'll probably find that you'd do better with relatively fewer people performing more-traditional roles than with lots of people desktop publishing all of, say, a newspaper such as *USA Today*.)

Given the state of the technology, desktop publishing seems to have found a comfortable niche in occasional brochures, monthly newsletters, journals, and other midsize volumes that commonly have quarterly production cycles. But, all other considerations aside, the more often you put out your publication, the more worthwhile it is to use desktop publishing tools.

Are You the Demanding Type?

Perhaps because the frustrations caused by the original LaserWriter Gang of Four (Times, Helvetica, Courier, and—like Ringo, the odd one in the group—Symbol) are still fresh in their minds, many knowledgeable people seem grateful for, certainly relieved about, the choices in typefaces now available on the desktop. According to graphic designers, service bureau operators, and production professionals, there are no practical limits to the typefaces you can use in your publication. In the words of Margery Cantor, a book designer based in the San Francisco Bay Area, “Unless you’re doing a treatise on the history of typography or something like that,” you can almost always find a typeface (though maybe not *the* typeface) that’s suitable for your purposes.

Frank Lee, who owns and operates the service bureau MacTypeNet in the Detroit suburb of Livonia, says of desktop type, “We’re in pretty good shape. I can’t think of too many jobs when I couldn’t find a typeface that would work for the client.” The gap between typeface selections on the desktop (under a thousand) and

the choices available from traditional systems (in the tens of thousands) may be wide, but it’s surely closing as typeface vendors like Adobe, Linotype, Letraset, and URW scramble to issue desktop renditions of their faces.

Seybold points out that “with every transition in type technology, from hot metal to photo to cathode ray to raster, it has taken a while to transfer the font libraries from one technology to the next. The current limitations have nothing to do with desktop publishing technology itself.” He estimates that at the current rate of “technology transfer,” existing type collections will be adapted in their entirety for desktop publishing systems in two years.

In the meantime, Seybold offers some cautionary advice: “You’re at the mercy of the priorities of the type vendors, who of course will release the more popular faces first.” He goes on to describe what he calls an anomaly, an example of just how arbitrary type selection can be: “Palatino, for example, had fallen out of favor before desktop publishing brought it back. It’s a face that Liz Bond (at Adobe Systems) and I like, and I was able to convince Apple to put it in the ROM of the Laserwriter Plus. Now people are designing for it. Because Palatino was favored by relatively few people, it’s come back.”

Whether or not there are enough typefaces to satisfy you, don’t try to match existing type produced on traditional typesetting systems (such as photo or hot metal) by using a desktop publishing system. Even if the names of the faces are the same, they won’t match easily, if at all.

Lee, Danuloff, and others who run service bureaus (which effectively serve as desktop type shops) cite cases of attempting, in vain, to match a typeface that’s been part of a business’s corporate identity for years. Sakhuja goes so far as to warn against trying to combine, on the same layout, type produced with different page makeup applications (for example, a column of text produced in PageMaker pasted up mechanically with another column produced in Quark XPress). “There are inconsistencies even between programs,” Sakhuja says, “and matching is difficult. Stick with one system or technology. If you start with PageMaker, stick with it. It’s hard if not impossible to match

Is It Worth It?



No way. If you’re into muddy impressionism, four-color separations on the desktop might be acceptable; otherwise, spend the extra money to do your color traditionally. You won’t regret it. The picture at left is a Cibachrome print made from a 35mm slide and scanned by a color scanner at 72 dpi and 8 bits per pixel. Color separations were prepared in LaserPaint and produced on a Linotronic L300. Total cost: \$120, including the cost of color keys for proofing. The image would look better if it had been scanned at 24 bits per pixel, but it still wouldn’t look as good as the picture at right, prepared traditionally for \$195, including \$50 for a matchprint proof (the standard in the magazine industry).

Cost Breakdown



Advertising Brochure

Renaissance Designs advertising brochure. 8 pages, 8½ by 11 inches, 5 duotones per page average, 2 spot colors.

Traditional

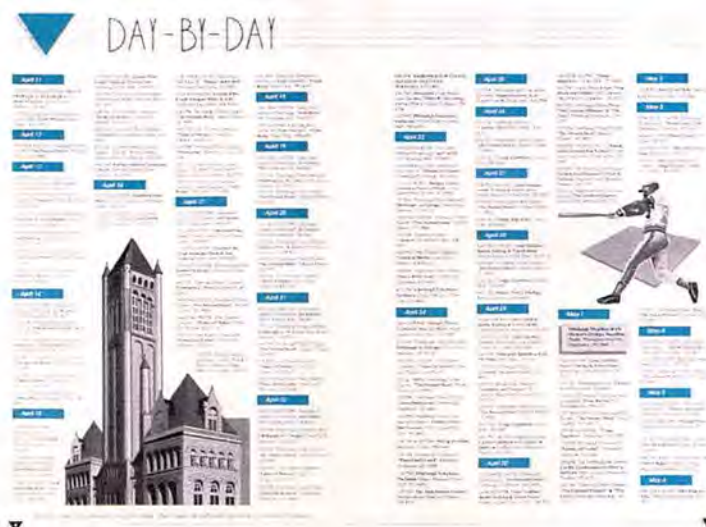
Design 4 hrs @ \$35/hr	\$140
Typesetting	\$140
Pasteup and production 12 hrs @ \$22/hr	\$264
Duotones	\$400
Line art	\$8
Total	\$952

Desktop

Design 4 hrs @ \$35/hr	\$140
Typesetting	\$105
Pasteup and production 12 hrs @ \$22/hr	\$264
Duotones	\$400
Line art	\$8
Total	\$917

Usually, desktop publishing saves you the most money in typesetting fees, and this case is no exception. The savings (\$35) are greater if the spot color is done traditionally (by marking a tissue overlay with your spot color specifications for the printer). On the desktop, spot color separations involve retypesetting the pages that have the second color, almost doubling typesetting costs if you have spot color on every page.

J. Nils Lindstrom, the graphic designer in Monrovia, California, who produced the brochure for Renaissance Designs, took the practical route, thereby saving much more than \$35: "All spot color was specced for the printer, and the black-to-gray wash on the cover was done traditionally—we took a halftone of a Pantone gradation. The photos are duotone screens at 150 lines per inch."



Events Calendar

Pittsburgh To Go events calendar. 28 pages, 11 by 17 inches, 1 halftone per page average, 1 spot color.

Traditional

Design 6 hrs @ \$35/hr	\$210
Typesetting	\$2500
Pasteup and production 45 hrs @ \$22/hr	\$990
Halftones	\$130
Line art	\$24
Total	\$3854

Desktop

Design 6 hrs @ \$35/hr	\$210
Typesetting text	\$500
Typesetting display type	\$528
Pasteup and production 25 hrs @ \$22/hr	\$550
Halftones	\$2530
Line art	\$704
Total	\$5022

Chris Rasmussen, president of Novus Graphic Communication in Pittsburgh, Pennsylvania, says that Novus "went as far as you can take it on the desktop" in Pittsburgh To Go, "except for some spot color speccing." Even if you're a Mac enthusiast (as Rasmussen is), this may be further than you want to go if you don't have an "Illustrator wiz" working for you (as Rasmussen has).

Had the halftones and the line art been done traditionally and combined with desktop techniques in production and typesetting, the desktop estimate would have been almost \$2000 less than the traditional estimate. Producing the halftones and line art, as well as the display type, in a desktop illustration program such as Illustrator added around \$3000 to the estimate. An Illustrator wiz would work faster, but you'd have to pay more per hour. Fees for original art, whether scanned in as Illustrator templates or screened as traditional halftones, are additional.

an existing document created with traditional methods or with a different desktop publishing program.”

Two other possible stumbling blocks are display type, especially in advertising layouts with unusual (and sometimes unreadable) treatments of text, and logo type, which helps identify an enterprise or publication. For such specialized uses, you’re better off creating the type in an illustration program (like Illustrator or FreeHand) or paying a designer to create it, rather than doing it yourself in a page makeup program.

What’s Your Design?

If there’s one lesson to learn about using desktop publishing, it’s this: Don’t be fanatical, be practical. You have to know when and how to mix and match tools and techniques. Nowhere are the rewards of this attitude more apparent than in the design of primarily desktop-published documents.

Almost any publication design can be realized using, at least in part, desktop publishing technology. You don’t have to lock yourself into letter-size, 16-page, 3-column formats, with Times text and Helvetica display type. Gone are the days when using the technology meant practically screaming Desktop Published! Can You Tell? on the first page, because you were handicapped by vaguely imprecise positioning, predictable graphics, and other giveaways.

Is It Worth It?

A raven’s call filled the clearing. The boy watched the bird launch itself into the air from its perch on a branch overhanging the cabin. It slowly circled the clearing, gradually gaining altitude until it broke into open sky.

The cabin lay close to the trees on one side of the clearing. Fresh snow blanketed the sheetmetal roof, a small mound hiding the chimney. The boy looked at the single window on the cabin’s south wall and felt uneasy, as if someone were watching from within.

He shifted his gaze to the entrance. Snow had drifted over the woodpile and the

A raven’s call filled the clearing. The boy watched the bird launch itself into the air from its perch on a branch overhanging the cabin. It slowly circled the clearing, gradually gaining altitude until it broke into the open sky.

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He shifted his gaze to the entrance. Snow had drifted

You bet. A full page of body type (actually, a full page of anything) costs only \$12.50 on the desktop (left), while the cost of traditional typesetting (right) for the same amount of text can easily reach two or three times as much. But then, on the desktop, you’re doing the actual typesetting when you format and lay out text on the Mac.



Thanks to a fresh generation of computer-savvy, or at least not computerphobic, graphic designers—most trained on the Macintosh and all willing to combine the latest technology with traditional tools—and the improvements constantly being made to desktop publishing applications (PageMaker, XPress, and ReadySetGo tirelessly sing their own version of “Anything You Can Do, I Can Do Better”), a desktop-published document doesn’t have to look like the old stereotype.

With some imagination and resourcefulness, you can work your way around (or, by being realistic, come to terms with) desktop publishing’s remaining inadequacies and make real your publication design. Just be ready to compromise—not necessarily on the result, but on the process. As Tom Ahern points out, “There are real limitations that can affect your design if you are committed to doing everything, 100 percent, on the computer.”

Those limitations include design elements like drop caps, rotated type, and graduated screens that go from dark to light—elements that are difficult to accomplish satisfactorily on a desktop publishing system but are easily, though manually, pasted onto a layout otherwise done on a computer. Ahern cites rotated type as an example: “It’s a simple matter to print out type and then rotate it on the mechanical.

“In a complicated design, desktop publishing offers no great savings in time,” Ahern explains. “Compared with traditional methods, it usually takes as long, if not longer, to do a complicated design electronically. It’s easy to be fooled into thinking that desktop publishing is the solution to everything. It’s just another tool.”

Seybold affirms this no-nonsense, whatever-fits approach: “It’s a big mistake to assume that you have to do every bit of a job on desktop publishing. You need to know where to break off and use conventional means. People spend a lot of time and effort pushing the technology and pushing their own skills—and they end up wasting their time.”

Jim Morton, who prepares publications for printing out of his Pop Void enterprise in San Francisco, likes desktop publishing but doesn’t like to waste his time. He has a list of trouble spots on the desktop: “Drop caps are a pain in the neck. Graduated screens

Cost Breakdown

Introduction

THE REHAB MANUAL

PLANNING AND MANAGING A HOUSING REHABILITATION PROJECT

This manual is intended primarily for construction specialists, rehabilitation coordinators, project managers, and others who may have limited experience in housing rehabilitation or development projects. It focuses on the sensitive rehabilitation of deteriorated residential structures of modest scale, although many of the concepts presented will have broader applications.

Successfully completing a rehabilitation job can be a truly satisfying accomplishment. Ideally, housing rehabilitation should use existing dilapidated housing stock to create safe, attractive and affordable housing. Moreover, it should maintain the character of a neighborhood by restoring, as much as possible, the original architectural components while increasing the comfort and safety of the dwelling.

The scope of this manual was purposely kept relatively narrow. It will not deal with developing a market analysis for a project nor with securing the necessary financing nor with formulating a long term management plan. These topics are, nonetheless, critically important to the success of any development project. Resources listed in the back of this manual can provide further information on these subjects.

Throughout this manual there will be examples of various planning and construction stages of an actual renovation project. The property chosen for this case study is 406 West Green Street in Ithaca, New York. Additional background on this project is included on the back inside cover.

This manual distills the experience of the staff of a nonprofit housing corporation that has rehabilitated over 700 housing units in the past ten years. It outlines a process of planning and managing a housing rehabilitation job that will minimize some common pitfalls. You may need to tailor this advice to your project, but the basic process should be the same.

Booklet

The Rehab Manual booklet. 20 pages plus covers, 8½ by 11 inches, no halftones, 1 spot color.

Traditional

Design	5 hrs @ \$35/hr	\$175
Typesetting		\$1100
Pasteup and production		
35 hrs @ \$22/hr		\$770
Line art		\$85
Total		\$2130

Desktop

Design	5 hrs @ \$35/hr	\$175
Typesetting		\$338
Pasteup and production		
25 hrs @ \$22/hr		\$550
Line art		\$85
Total		\$1148

Because it has a relatively simple design, no photos, and lots of text, producing this booklet on the desktop cut the traditional budget almost in half and still met reader expectations of production value. (After all, how slick does a home rehabilitation guide have to be?) Susan and Kenn Marsh in Ithaca, New York, designed and produced the publication for Ithaca Neighborhood Housing Services. Susan says, "The color wash on the cover was done traditionally. It was something we had designed on the Mac, but the output wasn't smooth enough and we had no time to airbrush."

The Marshes specced the spot color for the printer and pasted in the line art mechanically, even though it was scanned in. "We scanned them in for complete flexibility in sizing," Susan explains. "It could have gotten expensive if we'd worked with photostats instead of laser printer output."

HISTORY & SOCIAL STUDIES

England at Bay
DVD, 1995
\$24.95
This DVD features the story of the English fleet's victory over the Spanish Armada in 1588. It includes a commentary by the author, a map of the English Channel, and a list of the ships involved.

An Island Called Thule
DVD, 1995
\$24.95
This DVD features the story of the discovery of the North Pole by Robert Peary in 1909. It includes a commentary by the author, a map of the Arctic region, and a list of the ships involved.

The Empire of the Northern Shores
DVD, 1995
\$24.95
This DVD features the story of the development of the Northern Shores of Lake Michigan. It includes a commentary by the author, a map of the region, and a list of the ships involved.

Here King Harold Is
DVD, 1995
\$24.95
This DVD features the story of the Battle of Hastings in 1066. It includes a commentary by the author, a map of the battle site, and a list of the ships involved.

The Ultimate Outpost
DVD, 1995
\$24.95
This DVD features the story of the development of the Antarctic continent. It includes a commentary by the author, a map of the continent, and a list of the ships involved.

President and Politics with Richard Nixon
DVD, 1995
\$24.95
This DVD features the story of the presidency of Richard Nixon. It includes a commentary by the author, a map of the United States, and a list of the ships involved.

The Second American Revolution, Part I
DVD, 1995
\$24.95
This DVD features the story of the Second American Revolution. It includes a commentary by the author, a map of the United States, and a list of the ships involved.

The Second American Revolution, Part II
DVD, 1995
\$24.95
This DVD features the story of the Second American Revolution. It includes a commentary by the author, a map of the United States, and a list of the ships involved.

Catalog

PBS Video catalog supplement. 72 pages plus covers, 8½ by 11 inches, 4 halftones per page average, 1 spot color.

Traditional

Design	4 hrs @ \$35/hr	\$140
Typesetting		\$2160
Pasteup and production		
80 hrs @ \$22/hr		\$1760
Halftones		\$400
Line art		\$40
Total		\$4500

Desktop

Design	4 hrs @ \$35/hr	\$140
Typesetting		\$938
Pasteup and production		
50 hrs @ \$22/hr		\$1100
Halftones		\$400
Line art		\$40
Total		\$2618

Even with the 53 pages typeset twice for color separations and tints, using a desktop publishing system resulted in significant savings in the production of this text-heavy catalog of public television program listings—an example of how type comes much cheaper on the desktop.

Washington, D.C. graphic designer Eugenia Kim produced the catalog for the Public Broadcasting System. She points out some desktop limitations she encountered: "I used scanned photos for position only. All the photos were dropped in traditionally because I wanted more gray levels and varying dot sizes than were available on the scanned images. I wasn't satisfied with the quality. I specced the spot color and the screens for the printer. And I took the trouble to kern the display type manually till it looked right."

are difficult to do on the desktop. Dropout halftones are impossible to do, as well as any pencil shading or any ink wash effects—anything that's done with india ink."

You are often better off indicating the specifications for screens, in black or another color, graduated or not, for the printer to do photographically, rather than creating them in a desktop publishing program. On the desktop, graduated screens show bands that mark the boundaries between density levels; most people notice the bands even on output from a Lino-tronic 300. Leaving the desktop to create screens saves you time and money, and gives you better results.

Morton isn't the only one with drop caps on top of the list of design limitations. Craig Danuloff also says, "Drop caps are hard to get exactly right," but according to him "most customers don't demand that kind of quality." If you are that demanding, he suggests that you create the drop cap in Illustrator and paste it in mechanically. He ventures that page makeup programs are "a version away from being able to do it right automatically. Aldus, for example, could sit some engineers down to write it into PageMaker; it'll probably take them two days." He then offers a vision of the next desktop publishing cliché: "But then a glut of drop caps—drop cap abuse—would probably result."

How Colorful Is It?

Trying to produce color publications entirely on the desktop results more in colorful language than in colorful pages. While it's true that page makeup pro-



grams such as PageMaker and XPress allow you to specify colors on screen and produce color separations of your layouts (one for each color, including black), you are often better off "spec'ing"—writing out the specifications for—color on the layout and letting the printer take care of it. As with screens, traditional techniques save time and money compared with desktop technology, and they yield better results.

The use of color in a publication can range over a spectrum, from spot color (when a graphic element or a headline is in a color other than black), through flat color (when an illustration or other element in a layout is in one or more colors of uniform density and touches or is superimposed over different-color elements), to full photographic color.

Desktop publishing applications excel in preparing separations for spot color, but unless an element in the second color touches an element in the first color (black), separations are unnecessary. You could (and should) mark the spots you want in the second color on a tissue overlay. As Craig Danuloff says, "A printer can do it, and it will be less expensive. Some people want to use the technology just because it's there, not because they need it."

When the elements you want in flat color touch elements (such as type) in another color, you could make a separation for each additional color on a desktop system, but even in this case you could just as easily spec your layout on a tissue overlay and have your printer prepare the separations. Seybold recommends preparing flat color on the desktop "if you have experience with it. If you're doing it one time through, just have it done by the printer. It would probably take you at least once to understand how to get the tints that you want from the specs that you lay down for the printer. Have any special effects done conventionally."

Preparing photographic color—indeed, all photographic images, whether black and white or color—is even more difficult and impractical on a desktop system. Aside from the prohibitive demands on memory and processing power made by photographic color images, the difficulties arise from the differences in technologies. The vagaries of color inks, and of the finish, rag content, and weight of paper stock, make predicting how color will look on a printed page hard enough with traditional photographic proofing methods. Color proofing on color monitors and color laser

Is It Worth It?



Too close to call. Spot-color specifications and separations for the top fish were made in Desktop Express; the costs of the separations and a color key (for proofing) totaled \$70. For \$60, you could have a printer (the person) prepare the separations as was done for the bottom example (the cost of the color key is included). If you already know the software and like the control, the \$10 difference may be well spent.

Last Respects Last Respects

Absolutely, if your desktop software gives you control at least above letter and word spacing and if you're satisfied with the relatively limited (but growing) selection of display typefaces available on the desktop. Setting display type on the desktop (as in top example) will save you money compared to traditional methods (bottom), but if you have only one or two lines of type on a single page of typeset output (which you'll paste up mechanically), your savings will not be significant.

printers, which are electronic and use digital information, takes on the dimensions of an act of faith: you believe the colors to be so—or you don't.

Not only do you not see what you might get, but preparing color on the desktop is expensive, too, even in terms of \$10,000 Mac-and-LaserWriter systems. Sakhuja, whose Krishna Copy claims to be the first to offer self-service color correction and separation facilities to its customers, says that a desktop color system, including a color scanner, a high-resolution color monitor, and software, costs up to \$30,000. Add to that the cost of training yourself (assuming you have the aptitude) to use the system.

Computer systems designed for color scanning, correction, and separation (such as the Scitex system) are operated by specially trained technicians. Even at Krishna, where using a self-service desktop color system costs \$24 per hour, you are strongly encouraged, at least for the first few times, to "rent" a technician with the system—for \$48 per hour. Sakhuja explains, "You need training just to get started. You need to spend some time with a technician."

Clearly, the more powerful desktop publishing systems become, the more specialized training is required to use them, the more expensive they become, and the less sense it makes for you to try to produce all of your publication on the desktop just because it's possible. Again, the operating principle is to be

practical, not fanatical. Practicality dictates that photographic color be prepared traditionally—on dedicated computer systems—and then "dropped" into a layout produced on the desktop.

Get the Picture?

Perhaps the oldest trick in desktop publishing, when X-acto first met mouse, is drawing solid black rectangles in the layout as "windows" in which to drop conventionally screened photographs—halftone images. That trick is still the best and most common example of how to combine technologies appropriately. If the shoe doesn't fit, don't wear it. Since photos scanned on the desktop too often look like they're stills from headache-inducing "art" films, don't use them in your electronic layout.

As Seybold points out, "It does not pay to use desktop publishing for photos, whether color or black and white. It's cheaper and easier, and you get higher quality with conventional means. We've always been extremely skeptical of including photos in the desktop publishing process. If you use it only once, it would be hard to imagine anyone being able to cost-justify using desktop publishing technology to prepare photographs for printing."

Except perhaps for scanner and printer vendors, everyone else who knows desktop publishing agrees that scanned images are appropriate only in certain situations (for a perspective on what those situations are, see "A Halftone Handbook"). Danuloff, for example, says that his service bureau has "taken a half-step out of the scanning business. We found that with the problems in quality, alignment, and resolution, we couldn't do it profitably. It's not a great thing to do."

At the Imagesetter service bureau in Swampscott, Massachusetts, vice president José Estrela confides, "I have a scanner and I use it for position only. I can get a 133-line screen in under an hour for about \$10. You could spend three hours getting your contrast, and so on, right with a desktop publishing system—and you need thousands of dollars in hardware, lots of memory—and the quality still wouldn't be as good."

While you should always take the traditional route with photos (unless you're after special effects), don't underestimate the benefits of using scanned images "for position only." Being able to size, crop, position, and otherwise manipulate the images before you finally order the conventional halftone could save you much time and trouble if you use photographs extensively in your publication (about one photo every page or page and a half).

What Have You Got?

After you analyze your publication's frequency, type requirements, design, use of color, and photographs, evaluate your resources. Take a long hard look at your staffing, equipment, and finances to determine how they can best meet the requirements of your publication. How can you most efficiently produce your

publication with the people (assuming you're not alone), the tools, and the money you have? How much of the editorial and production processes should you try to do yourself and how much should you hire someone to do?

Keeping your publication's attributes in mind, consider your hardware and software base. The more you use your Mac system for desktop publishing, the more worthwhile investments in the system become. Basically, if you use your system to produce a publication (or publications) more often and with more pages than a monthly 16-page newsletter or a quarterly 200-page journal, you should have a hard disk (at least 20 megabytes, 40 is preferable), additional memory (2MB would be put to good use), a large screen, a PostScript laser printer, and some downloadable fonts. If you have some more money burning a hole in your pocket and your publication includes numerous photographs, get a scanner, but use the scanned images for position only. That's it.

Sure, the ads and the industry visionaries will tell you that the advent of CD-ROM storage, cheaper memory, faster processors, and higher-resolution screens and color printers will enable you to manipulate full-color photographic images on your Macintosh without a \$100,000 grant from your rich eccentric uncle. Maybe. But if you have work to do today, you don't want—and don't need—to do color correction and separation or photographic image manipulation on a desktop system.

As a desktop publisher, your most valuable resource is yourself. It's also the most difficult resource to evaluate objectively, much more so than hardware, software, or finances. Do it anyway. How much time do you have? How much is your time worth? What skills



do you have, and how much are they worth? What tasks could you do better using traditional technology? What tasks are you better off giving to someone else?

All too often, people who use desktop publishing systems get caught up in the technology and forget how much time they're spending on a task that could be accomplished more efficiently using traditional techniques. As Frank Lee says, in all seriousness, "People pay less for their own labor. Some desktop publishers would earn more money mowing lawns."

Don't sell yourself short. Figure out how much your time is worth and bill the publication accordingly, even if it is your publication. The increased price tag should give you ideas on how to spend your time better. At the same time, it should become clear that you cannot, and should not, do it all yourself. Identify which tasks you can do well and which you can't, and then find people who can do those tasks better and in less time. If you can't draw, hire an artist to do it. If you're color blind, don't spec color. If you're clumsy with language, don't write headlines. Appropriate technology, appropriate skills.

Seybold points out that skills are a more important question than technology: "You have to know how far to push the technology and your skills. Know your limitations. It's naive to think that everyone can be really good at communicating visually. Not everyone can communicate well verbally. It's unreasonable to expect everyone to communicate well visually."

"The technology is in place for anyone to master the mechanics of publishing, but as always," Frank Lee advises, "the secret to success is knowing when to quit—when to have someone else do it because you're basically wasting your time doing something you simply cannot do well."

In the final analysis, when you know your own worth, desktop publishing can be worth it. □

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The Rush to Publish

Desktop publishing doesn't mean you can rush it. Craig Danuloff, president of Publishing Resources in Boulder, Colorado, says, "Give yourself some time."

A Halftone Handbook

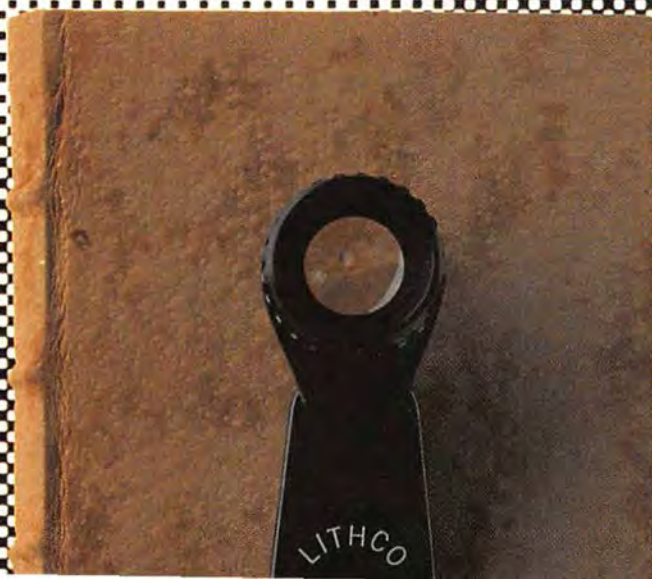
Mac halftoning can be a publisher's dream or a digital debacle. Learn how to avoid the gray-scale blues.

by Joe Matazzoni

OK, I admit it. Sometimes we get a little overenthusiastic around here. Gray-scale scanning is a case in point. The first time I saw a Mac II displaying ImageStudio files, I, like a lot of people, was ready to proclaim the advent of the all-digital publication. Photolithography was dead, long live Mac halftoning! I was possessed by the vision of desktop publishers able to output their pages from a Linotronic with the photographs already in place. No more stripping charges, no delays, complete control.

Unfortunately (for everyone but the lithographers and strippers) the all-digital dream didn't play so well in the real world. Replacing conventional halftones with gray-scale scans turned out to involve a few problems: nothing important, it just took longer, cost more, and looked worse.

File size is the most obvious hitch; a high-quality 8-bit scan can easily run to a megabyte or more. If you have a 32-page newsletter with a picture on each page, you can end up paying hundreds of dollars in Linotronic overtime, not to mention the hassle of getting a 20MB publication to the service bureau. Another hidden drawback is that if you print to negative film, you'll need to pull a positive proof just to check the image quality. There goes the money you might have saved by not having your printer strip in the pictures. And as for saving time by doing everything in one pass, when



you're sitting there examining the hardware and re-reading the ImageStudio manual to find out why things didn't work out like you'd planned, you might find yourself longing for the days when you used to drop off photographs at a prepress shop and pick up halftones the next day, ready to go.

Do these problems mean that the all-digital dream is dead? Not exactly. Many of the scanner-bashing articles published in the computer press lately are, in my opinion, symptomatic of a negative recoil from the gushing prognostications we were all prone to when gray-scale scanners first hit the scene.

It's true that if you put out a standard desktop newsletter and all you want to do is reproduce normal, high-quality photographs, conventional halftones are probably the way to go. But just because scanners won't replace graphic arts cameras in the foreseeable future doesn't mean there aren't situations where scanning can save time and money. By talking to scanner owners around the country and by making a pile of scans myself, I found out what some of those situations are. And in the process, I learned some tips for making life with scanners more simple and for getting better results.

Gray-Scale Scenarios

Marinell and Robert Harriman are publishers in the medium-quality range who are making a scanner work for them. Their *House Rabbit Journal* goes to veterinarians and bunny fanciers. Although you can detect the lack of a full range of grays if you look closely, the journal's 4-bit halftones appear remarkably professional—perhaps because of the glossy stock the Harrimans favor.

"We use quite a few photographs, about one on each page, so we wanted to go with the scanner to cut costs," says Marinell Harriman. "Even though we had to buy the equipment, it's working out. That's partly because Krishna Copy [their output bureau] doesn't charge by the minute."



Robert, Lillian (with black ears), and Marinell Harriman in the *House Rabbit Journal* office. "Bunny of the Month" centerfolds tacked to the wall show off the abilities of the Harrimans' 4-bit Abaton scanner.

The Harrimans print to positive film at 120 lines per inch (lpi), which costs them \$12.50 per sheet. Before they had the scanner, they used to pay that much for type only and then another \$10 or so for halftones and again as much for stripping. In other words, the scanner has cut their production costs by two-thirds. Because the journal is printed to positive, no proofing images are necessary.

Digital halftoning can be even more cost-effective if you're in the low-end, LaserWriter-output set. But it can have other advantages as well. Steve Rensel, who produces catalogs and ads for Pec's, a remote-control model shop in Mountain View, California, cites the Mac's abilities to clean up less-than-perfect images as one reason he's sold on his 6-bit scanner. "I take images from a variety of sources—off boxes, out of magazines, wherever. Some are color, others black and white; we're mainly after product recognition. With ImageStudio, I can put images from different sources on one page and have them look like they came from the same source, with the same contrast and brightness."

Doesn't he get moiré patterns from halftoning halftones? "It's happened," he says, "but not as much as you might think." Rensel offers a piece of advice: if you're starting with color or very dark pictures, try scanning in negative mode and reversing the image back to positive in software.

In high-end operations digital halftones might not make sense for production, but as David Dunkelberger of the design firm Weisz, Yang, and Dunkelberger of Westport, Connecticut, points out, "they do make beautiful comps." When I spoke to him, Dunkelberger had recently produced color mock-ups by combining 6-bit halftones with color Adobe Illustrator files and type in PageMaker and then printing the results on the firm's QMS color printer. "Because it's a thermal printer," he enthused, "the halftones come out like glossy photos. I can take one of these very accurate comprehensives to my printer, and he knows just what I want."

By far the most popular application for scanned images seems to be advertising. Ad designers routinely alter photographs by airbrushing them, cutting out subjects from backgrounds, printing the photographs as percentage screens to be used as backgrounds, and other techniques. Consequently, ad agencies are interested in the creative effects that programs like ImageStudio and Digital Darkroom (which should be released by the time you read this) can provide. And since most ads run to a maximum of one page, memory and storage aren't as big an issue as they are for most other desktop publishers.

Scott Leyes, a graphic designer in Garden Grove, California, uses a 4-bit scanner in his work. "I do a lot of photo retouching. I used to have to paint right on the original—you're scared to death; one slip and it's another \$50 print. Then when you show it to the client, they always want some change, and you have to start over. Now I can show the client five different LaserWriter versions and go to final only when we know what we want."

Gray-Scale Glossary

Halftone A means by which printing presses, using black ink only, can represent images made up of various grays. Photolithographers make conventional halftones by photographing artwork through a screen that breaks the continuous-tone image into a pattern of dots that vary in size. Larger dots combine to form darker areas of the image; small dots represent light tones.

Screen ruling (frequency)

The dots in a halftone vary in size, but their frequency, known as their screen ruling, or linescreen, is constant. The frequency of a halftone is measured in *lines per inch* (lpi). Newspapers use a screen ruling of about 85 lpi; high-quality publications typically use halftones of from 133 to 150 lpi.

Angle The rows of dots in a halftone are usually set at an angle to create a more pleasing visual effect than the grid that would result from placement at 0 degrees. All of the halftone examples in this article are printed at 45 degrees, the least obtrusive and most commonly used angle.

Halftone cell (dither matrix)

Computer halftone dots are themselves composed of smaller dots, the smallest dot that a given printer can produce. When you use a PostScript printer to make a halftone, the printer interpreter divides the number of dots per inch the printer can print (300 on a

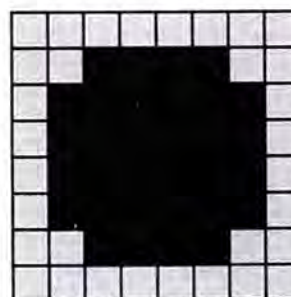
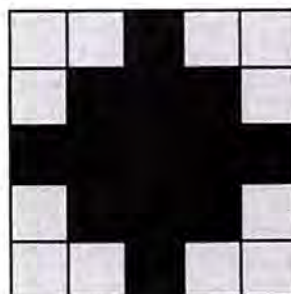
LaserWriter) by the number of lines per inch in the halftone; the resulting number defines the size of the halftone cell (see "How Many Dots in a Dot?"). When all the printer dots in a cell are on, the cell represents pure black; if they're all off, the cell is empty, or white. The number of printer dots in a halftone cell determines the number of gray shades that can be represented by a halftone. On a given printer, when you increase the resolution of the halftone, you decrease the number of dots in the halftone cells. The result is more detail but fewer grays in the image.

Bi-level scan A bi-level scan is one that's saved as a simple bitmap, like a MacPaint image. Scaling a bi-level scan can result in unattractive patterning. And you can't adjust the brightness and contrast of a bi-level halftone, as you can with gray-scale images. In addition, if you send a 300-dpi bi-level scan to a Linotronic, it may actually look worse than if it were printed on a LaserWriter.

Gray-scale scan In bi-level scans, samples are either on or off, black or white. Gray-scale scanners can register more information about the actual values in an image. Unlike bi-level scans, gray-scale scans are device independent; if you send them to a higher quality printing device, they benefit from the extra resolution. They also cause no problems when sized.

Bits per pixel A measure of gray scale: the more bits per pixel, the more gray levels a scanner can save. An 8-bit scanner saves 256 levels; 6 bits gives you 64 levels, 4 bits yields 16. A bi-level scan is actually a 1-bit scan.

For more scanner basics, see "Shades of Gray" (*Macworld*, January 1988) and "Getting Started with Scanners" in next month's issue.



How Many Dots in a Dot?

The halftone cell on the top can contain as many as 25 printer dots and is therefore capable of reproducing 26 tones (including white). The halftone dot it currently contains would make a 52 percent gray. On the bottom, an 8x8 matrix contains a 50 percent dot.

Another ad designer, Richard Michalski of Applied Design in Laguna Beach, California, stresses the control issue when asked why he uses scanned images. "I do very elaborate photocompositing. I use it [a ThunderScanner] because I had nothing but trouble getting things done to my approval: type wasn't straight, screens came out too light or too dark. And when the printer makes mistakes, you have to pay. Now I'm happy, my clients are happy, and I'm making a profit." Because his ads involve complex arrangements of type and imagery, Michalski saves money on stripping by placing everything in XPress. He recently did a piece with six TIFF photos and five Illustrator files that he says would have been "impossible to do conventionally." The piece printed out in 20 minutes and cost him \$25.

Michalski offers one caveat: he makes his own photographs, tailoring the prints specifically for scanning. He believes it's his background as a photographer that enables him to get good results from relatively low-end equipment.

Many of the ad designers I spoke with pointed out that the Mac makes it simple to print different versions of an ad at different line screens. Since clients often place the same ad in different publications, this capability can cut costs.

I challenged the scanner makers, gray-scale software developers, and Linotronic bureaus to refer me to a high-end publisher using gray-scale halftone technology. Aside from people in the computer industry (who'd use it no matter what) or people who've tried it just as an experiment, I couldn't find one.

File Facts

If you're using gray-scale images, it may be helpful to know a few things about file size and file management. The first thing you should be aware of is that file size can vary considerably, depending on the sampling rate with which you make a scan, the number of bits you save, the format you save the file in, and even the program that's doing the saving. Some guidelines to keep in mind: every time you double the sampling rate, you quadruple the file size. However, file size is directly proportional to the number of bits saved—8-bit files are twice as large as 4-bit files. And EPS files range from being approximately the same size as TIFF files (if the program doing the saving doesn't create a high-quality screen representation), to being twice or even four times as large.

If you use layout software that accepts ImageStudio RIFF files, you may be able to cut a file size by about 30 or 40 percent over TIFF (or you may gain nothing, depending on your program's implementation of RIFF. If RIFF isn't an option or doesn't help, the shareware program Stuffit achieves about the same compression).

If compression isn't enough to get a file down to 800K for traveling on a floppy, one solution might be to use a backup program like Redux or DiskFit, which

enables you to save one file over two or more disks. (You'll have to provide the program to your Lino service so they can restore the file to their hard disk for printing.)

Currently, no matter how you save your gray-scale files, the image quality will always be about the same. This may change within the next few years, however, when developers start introducing what Mark Zimmer of Fractal Software calls "loss" or "lossy" data formats. These formats achieve high rates of compression by throwing away "unnecessary" data. While they may make scanner users' lives more manageable, these formats will probably also bring up new complications and questions, since it's likely that image quality from different standards will vary.



A Kiss Is Just a Kiss?

Three 120-lpi Linotronic halftones plus a conventional 150-lpi version (image D). Images A and B show the difference scanning at double the output frequency makes; image A was scanned at 240 dpi, B at 120. (This portrait lacks the diagonal lines that emphasize aliasing, but Gable's collar shows noticeable jaggies.) Both A and B are 8-bit files. Image C, a 4-bit file, looks pretty good due to the flatness of the original image. For maximum quality, all three Lino halftones were output directly to film as negatives.

Available Gray Levels

Printer resolution	Halftone Frequency				
	53 lpi	71 lpi	100 lpi	120 lpi	150 lpi
2540 dpi	+	+	+	+	+
1270 dpi	+	+	+	113	73
600 dpi	129	72	37	26	17
300 dpi	33	19	10	7	5

As these representative figures show, when you increase halftone frequency on a given printer, the number of possible gray levels goes down. Plus signs indicate values well beyond most people's capability to distinguish.

Do Yourself a Favor

The single most important thing you can do to improve your chances of getting good halftones when outputting to a Linotronic that's not your own is to find a service bureau staffed by people who know what they're doing. Making halftones requires skill, and a Linotronic is a delicate machine that has to be kept in perfect adjustment. If you just go to the corner copy shop cum Mac outputting service, it's unlikely you'll get usable results without expensive reruns—if you get them at all.

Interview prospective outputting services before picking one. Look for someone on staff with a graphic arts background—a lithographer, stripper, dot etcher, or typographer. Many people in these jobs have seen that computers are the future of their trade, and finding them in service bureaus isn't impossible. These people know from experience whether or not a halftone will look right when it's printed. Discover whether the shop has much experience doing Mac halftones—and how successful they've been in the past.

Your next questions should be about the shop's pricing policies. The biggest cost consideration for anyone outputting gray-scale files is whether the service charges by the minute. If you end up going with a shop that does, be sure it has Linotype's newer RIPZ equipment, which cuts output time by about 400 percent. Service bureaus also vary on how much premium they charge for printing to film, so that's worth asking about as well.

Finally, make sure the service has the necessary equipment to give you consistent results. While an L100 can be carefully adjusted to approach the quality of an L300, in general the 100s don't provide the same degree of precision and are prone to producing output with streaks and other defects. The type of processor a service uses to develop film and photographic paper can affect image quality as well. *Batch processors* replenish chemicals automatically and continuously. Manual processing units require that an operator replenish depleted chemicals. As a result, output from such units may vary in darkness.

Decent Exposure

Getting good results with a scanner requires you to balance a number of factors, including scan rate (samples per inch), output resolution (halftone lines per inch), printer resolution (dots per inch), and the number of bits saved (possible gray levels). Besides that, you have to make sure the brightness and contrast will produce an image that's acceptable for the printing techniques by which your publication will ultimately be produced.

A lot of information is available on the intricacies of calculating the optimum line screen for given types of files and printing devices (see "Shades of Gray," *Macworld*, January 1988). In general, your goal will be to print at the finest screen that's consistent with preserving the maximum number of gray levels available to you, given the resolution of your output device and the number of bits your scanner saves (see "Available Gray Levels"). The formula for calculating gray levels is (printer resolution ÷ line screen)² + 1 = gray levels.

But maximizing gray levels alone won't ensure that a picture will look good in the final publication; you need the right exposure. An exposure that looks good on screen—or even when it's output—won't necessarily look good in the final copy. In fact it probably won't. You have to take into account the effect the printing process has on a halftone.

In general, the exposure to aim for is one that leaves room for the halftone to gain in darkness and contrast with every generation it goes through after you print it out. Lithographers talk about a *ten-ninety* halftone as being about right, though your printer's actual recommendation will vary depending on your situation. Ten-ninety means that (aside from the very brightest highlights) the lightest areas are filled with halftone dots that yield at least a 10 percent gray, while the areas of shadow are no darker than 90 percent.

You'll get the best results from scanning if you start with a low-contrast photograph. Although this seems like something you should be able to control



Laser Renditions

The low contrast of this photograph makes it easy to render on a LaserWriter even at a fairly fine line screen. Image A was printed at 53 lpi and 45°, B at 71 lpi and 45°, C at 83 lpi and 34° (see "Pick a Number" for insight into C's odd angle). All three images were output as positives on coated paper.



easily in software, you're much better off starting with a flat print. Both ImageStudio and Digital Darkroom have features that let you limit the tonal range of the output by reassigning gray values (see "Cut the Lights"). As I write this article, however, these features are just being introduced, and most people actually making halftones just turn the brightness and contrast down. Digital Darkroom tells you the exact gray value of any point in an image when you Option-click on it with the paintbrush. This can be a handy feature.

The best advice anyone can give you about getting the right exposure is to get together with your printer and output bureau before you do your first digital is sue; together, you should come up with a formula that balances such factors as line screen, printing method, and paper. Then run some samples with test patterns or exemplary images, and once you've standardized on a routine that works, stick to it. Insist that your output service always use the same Linotronic and exposure setting for your jobs.

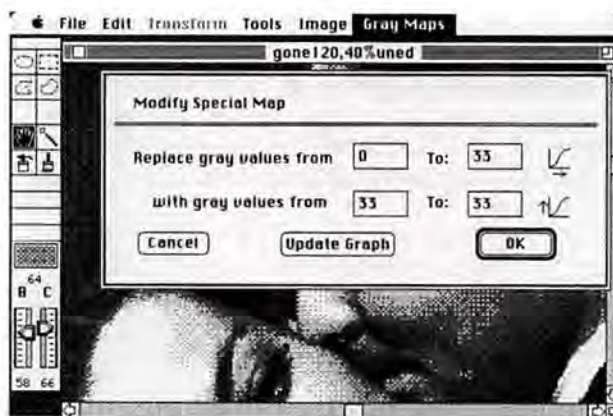
Misinformation Patrol

Given that gray-scale scanning is a new and complicated activity, naturally it's surrounded by a good deal of confusion. In researching this article, I discovered that a number of axioms about scanning that one always hears batted about aren't true at all. In most cases the right information has been available, it's just been forgotten or overlooked. Herewith, I'd like to correct a few common misconceptions (I just hope I don't engender any new ones).

■ *You should always scan at the same resolution as your intended line screen, otherwise you're just wasting time and disk space with extra information.* Wrong. Actually, someone named Nyquist figured out some time ago that you get sharper images (less *aliasing* in tech talk) if you sample at a higher rate than you output (see "A Kiss Is Just a Kiss?"). Nyquist's Sampling Theorem gives two to one as the point of diminishing returns. The sharpening effect is particularly noticeable in images with many diagonal lines. For faces and other soft images, you'll probably find you'll be OK scanning at one to one.

It's important to know that when you scale an image you change the effective sampling rate. Thus, if you print at a 50 percent reduction, you effectively double the scanning rate; if you enlarge an image, you cut the effective rate. Be aware that some programs offer multiple scaling options, some of which actually throw away useful information when you scale down. If you're in doubt about how your program works, you'll always be safe if scaling during printing.

■ *The LaserWriter's default line screen is 60 lines per inch (lpi) at 45 degrees.* You can read this any number of places, including the ImageStudio manual. While this combination is the "nominal default," in fact the LaserWriter is incapable of printing it. This brings up a little-known fact about PostScript halftones. At a given resolution, only certain combinations of line screen and angle are mathematically possible. On



Cut the Lights

ImageStudio and Digital Darkroom both include features that enable you to create exposure thresholds and ceilings by substituting gray values. Here Digital Darkroom is being used to eliminate fall-off in this image's highlights.

typesetting machines the range is relatively large, and you're likely to get what you specify. On the LaserWriter, however, in the realistic zone of 50 to 95 lpi, only 13—that's right, 13—combinations of angle and frequency are actually possible (see "Pick a Number"). When you specify an invalid combination in your spiffy software that lets you enter any line screen and angle you want, what you get back is PostScript's best approximation. The actual LaserWriter default is 53 lpi at 45 degrees.

■ *A 6-bit scanner is plenty for most publishers because 64 gray levels make for a convincingly realistic picture.* Yes and no. This was the strategy of the original, 6-bit version of ImageStudio, and it is true that while the literature on the subject suggests that about 120 gray levels is ideal, 64 levels give a pretty good representation. The problem with a 6-bit image is that it gives you no gray-level overhead, as it were. Every time you take a 6-bit scan and adjust the brightness and contrast in image processing software, you throw away information and gray levels. So you may end up with considerably less than 64 levels.

Of course a 4-bit scan is good enough for many people, so 6 bits might suit you fine. But if you're looking for quality and you've got the cash, you're better off with 8 bits.

This points up the importance of buying a scanner with software that offers control over scanning contrast and brightness. This is especially true for scanners that save only 4 or 6 bits. With contrast and brightness controls, you can rescan until an image looks about right and take advantage of your machine's maximum number of gray levels.

Dot, Dot, Dot...

So, I'd say give it about two years and gray-scale halftoning *may* become a technology, if not for the rest of us, at least for more of us. We'll need to see data formats that bring file sizes down, even faster Linotronics,



Advanced Technology

Digital Darkroom's unique halftone method, Advanced Halftoning, makes the most of laser printers' 300 dpi. By providing more clarity in the lighter tones, Advanced Halftoning produces images with greater impact. Some eyes, however, may find the randomized pattern distracting.

Pick a Number

Frequency (in lpi)	Angle	# of Gray Levels
49	9°	38
50	0°	37
51	31°	35
53	45°	33
56	22°	30
59	11°	27
60	0°	26
60	37°	26
67	27°	21
71	45°	19
73	14°	18
75	0°	17
83	34°	14
95	18°	11

Pick a Number

This list shows the possible angle and frequency combinations between 49 and 95 lpi for most LaserWriters. No matter what combinations you enter in your application software, most LaserWriters return one of these. Use this list and save yourself effort next time you're striving for just the right laser halftone. Courtesy of Patrick Wood of the PostScript Language Journal.

software that's smarter about tailoring exposure for different printing situations, cheaper and better hardware, and more service bureaus that know how to deal with halftoning. Call me an optimist, but I still advise anyone buying a scanner, even if it's only for line art at present, to get a machine with gray-scale capabilities—as an investment in the future.

On the other hand, if you've seen yourself in any of the profiles presented above, and would like to try gray-scale halftoning now, you may be able to without buying a \$2000-plus piece of equipment. Some Mac service bureaus now rent scanner time. One nice thing about this is that a bureau is liable to have an industrial-strength machine that gives optimal results. Another option to consider is Thunderscan. Personally, I don't have the patience, but if you can stand this inexpensive machine's slow scan speed, you can get reasonable results.

If you do decide to go with Mac halftoning, keep in mind a piece of advice someone gave me, the value of which I proved by almost not getting this article into this issue: don't do it the first time on deadline. □

See *Where to Buy* for contact information.

The Clip Art Collector



Add artwork to your documents the easy way—prefab pictures for all purposes

by Erfert Fenton

If you publish anything with the Mac—a newspaper, newsletter, or simply your annual holiday greetings letter—you'll no doubt have occasion to insert some artwork. Those of you who don't have an artist on hand can cull your illustrations from one or more Macintosh clip art collections. More than 30 companies now offer prefab artwork in almost every conceivable subject area, from old standbys like travel and holidays to more varied fare such as art nouveau borders, Japanese demons, and Mayan ruins. The volume of Mac clip art is expanding so rapidly that a few companies already offer their collections on CD ROM; more are sure to follow.

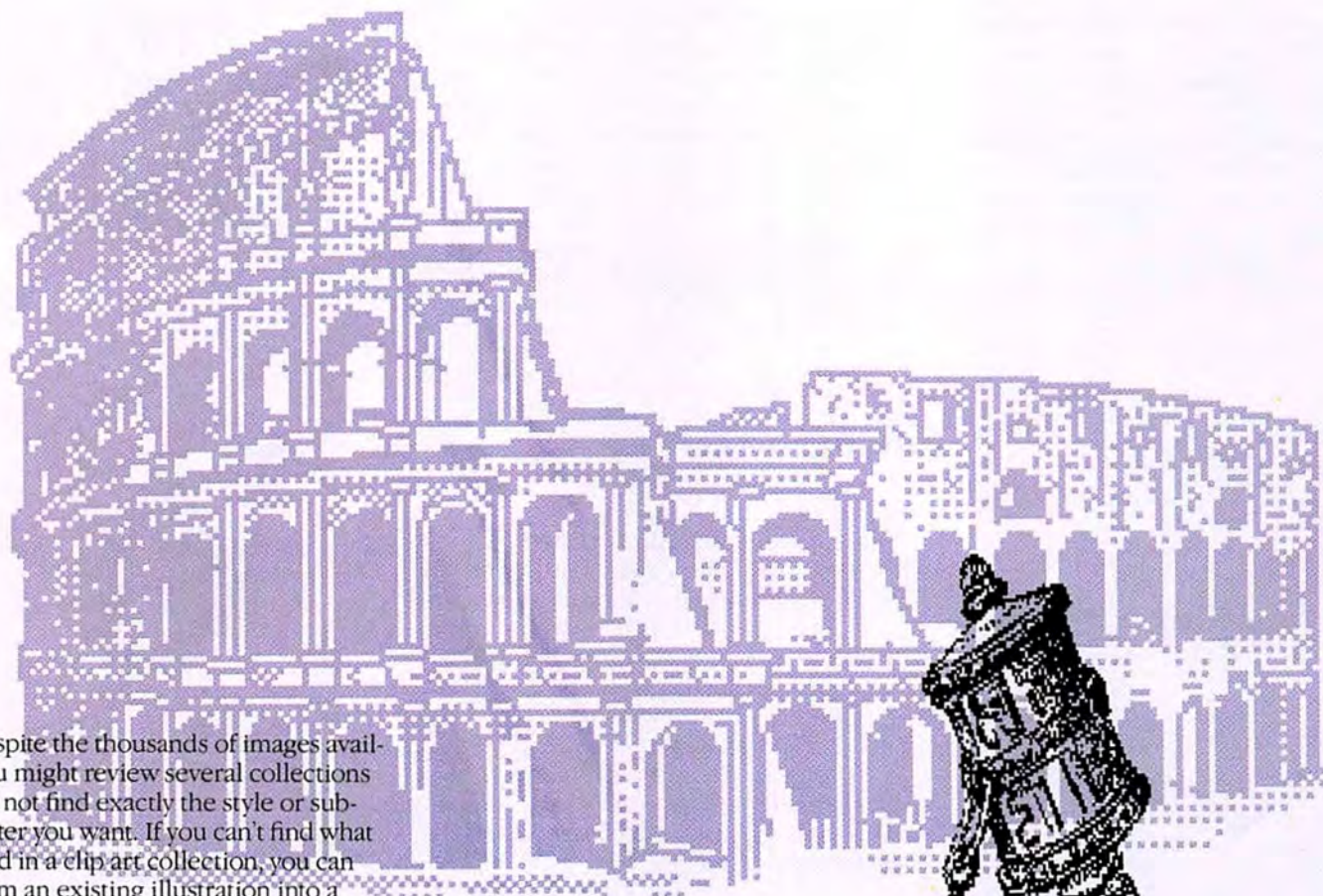
Given the rapid proliferation of clip art, how do you make informed decisions about which disks to buy? The samples and summaries on the next few pages should help you decide which collections meet your needs. Although only a single image is shown for each company listed, you should at least be able to weed out the collections that don't interest you and contact the distributors of those you like for further information (see "Where to Buy" for vendors' addresses and phone numbers).

Contributing editor Erfert Fenton regularly applies her fine arts background to the coverage of Macintosh graphics.

These days Mac clip art is available in three basic formats: bitmapped, PICT, and PostScript. The bitmapped collections are generally MacPaint files, which can be opened with programs such as MacPaint, FullPaint, and SuperPaint. If you need to resize a bitmap, scale it in an object-oriented program such as MacDraw or in SuperPaint's draw layer; resizing a bitmapped image in a paint program will distort it. PICT clip art collections are generally created in MacDraw; the images can be opened with MacDraw or other object-oriented programs and edited if necessary, or pasted into a layout program or word processor document.

The most recent entry into the Mac clip art world is PostScript graphics; most of these images are created in Adobe Illustrator and saved in Illustrator format or as encapsulated PostScript (EPS) files. These images can be edited with Illustrator or FreeHand or pasted directly into a page-layout program.

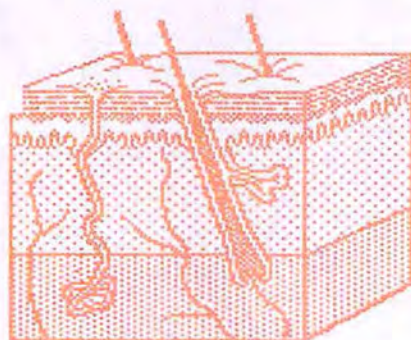
If you use a good deal of clip art, you may find your collection growing harder and harder to organize. Big-time image collectors should consider buying an art organization and retrieval program like Symmetry's PictureBase or Solutions International's The Curator. Or you might opt for a desk accessory such as MacroMind's Art Grabber+ or Dubl-Click Software's Art Roundup; these DAs enable you to scan a clip art collection and grab an image without leaving the currently active application.



Despite the thousands of images available, you might review several collections and still not find exactly the style or subject matter you want. If you can't find what you need in a clip art collection, you can transform an existing illustration into a piece of Mac art. A company called Wordscapes will convert logos and other artwork to EPS format, allowing you to print them at any size. I sent Wordscapes an intricate logo and was very impressed by the results; the company skillfully reproduced a custom typeface as well as the pictorial portion of the logo.



The following mini-reviews examine artwork offered by 32 companies. The ratings, on a scale of one to five stars, reflect my own opinions of the overall quality and usefulness of each publisher's offerings. Since tastes differ, I've included a sample image with each description. I've tried to show images that represent the overall flavor of a collection, but many collections comprise the collaborative effort of several artists. Your best strategy is to contact vendors of collections you think might appeal to you and ask for a catalog. If you're a serious clip art consumer, I'd suggest *The Elec-*



tronic Clip Art Digest, an ambitious catalog published by The Electronic Clip Art Company. The \$129 catalog shows every image on every disk offered by most of the Mac clip art distributors. The first release features around 600 pages of illustrations from 28 companies; additional companies and new disks from listed companies will appear in biannual updates (\$50 a year).

New clip art developers and new offerings from existing companies continue

to appear with great frequency. While I tried to be comprehensive about this sampler, I've no doubt missed a few. Keep your eye on magazine ads and Mac product guides for information on additional companies. Unless otherwise noted, all disks listed here are 800K. Many clip art companies offer their collections on 400K disks as well as 800K disks; contact the manufacturer for information if you have a 400K drive.



Paint Format

Bede Tech

Coloring Book and Clip Art ★★★

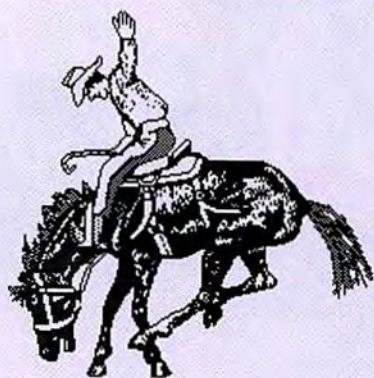
The four 400K Coloring Book disks feature full-page illustrations of animals, birds, plants, and dinosaurs. Other disks offer Christmas, Easter, and business themes; the Business disk contains primarily dingbats and cartoons of office workers. Competently executed overall, but some variation in quality and style. A good buy if you print out multiple coloring books. List price: Coloring Book disks \$12.95 each; others \$14.95 each.



CompuCraft

Mac Art Library ★★★

A 12-disk set encompassing the following categories: animals, buildings, farming, holidays, kitchen items, maps, plants, professions, sports, symbols, tools, and transportation. Some images are digitized, some are hand-drawn, others are a combination; some of the digitized images are outlined by hand, which looks awkward. Image quality varies but is generally acceptable. List price: \$39.95 per disk, Variety Pack \$49.95, 12-disk set \$250 (all disks 400K).



Davka Corporation

DavkaGraphics I and II ★★★★★

Two 400K disks of Judaic images plus a Hebrew font. Categories include Biblical figures, blessings, borders, holidays, Israel, people, religious objects, and symbols. Some images are digitized but most are hand-drawn. The drawing style is simple but charming. A good collection. List price: \$34.95 each plus \$3 s/h.



Dubl-Click Software

WetPaint Series: Classic Clip Art, For Publishing, Animal Kingdom ★★★★★

This series covers myriad subjects: American West, animals, borders, dinosaurs, flags, food, games, holidays, mortises, office items, plants, sports, tools, transportation, travel, U.S. map, and more. Hand-drawn as well as digitized. Each three-disk volume holds from 1000 to 2000 graphics: a good choice for a potpourri of images. List price: \$79.95 each.

Dubl-Click Software

WetPaint Series: Special Occasions, Printer's Helper, Industrial Revolution, Old Earth Almanac ★★★★★

Dubl-Click now distributes the MacMemories collection by Image World. Each three-disk collection features digitized prints and drawings from the turn of the century. Categories include animals, art nouveau, business, borders, children, Christmas, food, head and tail pieces, holidays, illuminated letters, music, Old West, plants, professions, publishing, religion, tools, and travel. This collection is one of my favorites. List price: \$79.95 per three-disk set.

D.V. Franks

ArtDisks 1-3 ★★★★★

Three disks, mostly digitized versions of antique graphics. Subjects include animals, birds, buildings, caricatures, columns and capitals, landscapes, and statues. Generally less interesting than similar collections. List price: \$19.95 each (400K).

Dynamic Graphics

DeskTop Art ★★★★★

Several collections spanning subjects such as animals, borders and mortises, business, education, famous people, seasons, sports, and symbols. Most images are small, making them suitable for decorative touches. Drawing styles vary, but the images are generally crisp and clean. Each two-disk set offers more than 200 images in a specific subject area, so a single collection should satisfy a range of tastes. Images are numbered rather than named, making cataloging a chore. List price: \$74.95 per volume (two 400K disks).

Dream Maker Software

MacGallery ★★★

This disk is in HyperCard format and uses keywords to help locate images. Subjects include animals, astrological symbols, borders, dinosaurs, holidays, mortises, religion, and sports. A good collection in general, but many of the drawings are on the

cute side, and the quality of the artwork varies. The collection might appeal to children. List price: \$49.95.

Enzan-Hoshigumi Software

(Imported and distributed by Qualitas Trading Company)

Japanese Clip Art ★★★★★

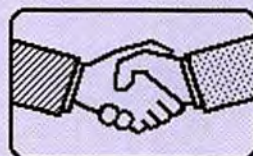
Three collections: Heaven, Earth, and Borders. These exotic images span a range of Japanese subjects—gods and mythical creatures, samurai, calligraphy, decorative borders and mortises, flowers, landscapes, and numerous decorative motifs. These graphics are among my favorites for decorations or space fillers. Elegant, but a bit expensive at \$79.95 per volume.



Kensington Microware

MacAccessories Graphic Accents ★★

One of the earliest Mac clip art collections on the scene, this 400K disk has not stood the test of time. Compared to the current competition, many of the graphics look simple and blocky. Subject areas include arrows, borders, dingbats, entertainment, government, holidays, office items, sports, tools, and transportation. List price: \$49.95.



Magnum Software

McPic ★★★

Another early clip art collection, Magnum's two volumes cover astrological symbols, animals, entertainment, flags, food, holidays, office items, professions, sports, symbols, and transportation. The drawing style varies but is generally simple and unassuming. A fair collection. List price: \$49.95 per 400K disk.



Medina Software

Religious Art Portfolio 1 ★★

A 400K disk of Christian images including hand-drawn symbols, ornaments, borders, and greeting card elements, as well as digitized renditions of religious scenes. Some of the digitized images could stand to have some stray pixels cleaned up. A unique collection but generally of only fair quality. List price: \$24.95.



Miles Computing

Mac the Knife, Volumes 3 and 5

★★★★★

Each contains two 400K disks. These whimsical collections cover subjects such as ancient Egypt, animals, borders, bicyclists, circus scenes, decorative letters, famous buildings, famous people, holidays,



and music. The images are all by the same artist, lending the collection a unified style. It's an offbeat collection as Mac clip art goes, but if you need a bicycling nun or some ancient Egyptian office workers, you're in luck. List price: \$49.95 per volume.

Queue

Q-Art ★

Queue specializes in educational applications, but I doubt that the childlike quality of these drawings will appeal even to most children. Not one of the better collections. Categories include animals, buildings, food, plants, transportation, sports, and tools. List price: \$34.95 (400K).

ScanMaster

Drawings by Leonardo ★★★

How can I have the gall to give Leonardo da Vinci only three stars, you ask? Calm down; the rating applies to the quality of the scanned images, not to the Master's skill. Many of the pictures in this collection are from Leonardo's intricate sketches, which don't lend themselves well to digital reproduction; the images are rife with ragged edges and extraneous pixels. List price: \$29.95 plus \$2 s/h (400K).

Springboard Software

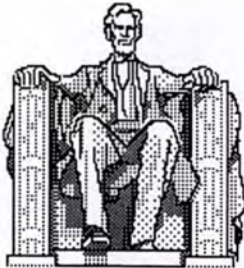
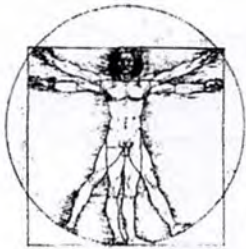
Works of Art ★★★

This collection comes in both MacPaint and HyperCard formats and spans a variety of subjects, including American history, animals, dinosaurs, education, farming, food, holidays, maps, office items, plants, professions, sports, tools, travel, and more. Three disks are currently available: Holidays, Education, and Assortment. The prevailing drawing style is pleasant but often too simple for my taste. List price: \$49.95 per disk.

SunShine Graphics

SunShine Graphics Library ★★★★★

Ever find yourself hunting for a picture of a leaf-nosed bat? Or a Biblical scene by Gustave Doré? If so, SunShine's eclectic and eccentric collection might appeal to you. The images are digitized versions of antique prints, drawings, and paper cut-outs: animals, art nouveau borders, the Civil War, floral patterns, knights, Mayan ruins, twenties fashions, to name a few of the more than 30 categories. The images have been carefully cleaned up and make up one of the more enjoyable collections in my book. List price: \$20 per disk (400K).



T/Maker

ClickArt ★★★(★)

The ClickArt series consists of five disks: Business Images, Christian Images (400K), Holidays (400K), Personal Graphics (400K), and Publications. The collections include hundreds of dingbats and other small images to add decorative touches to newsletters and other publications. A good collection for the most part, but image quality varies from disk to disk. I found the Business Images and Christian Images the best of the lot; they rate four stars. List price: \$49.95 per disk (Christian Images \$59.95).

Visatex

U.S. Presidents, 1988 Presidential Candidates ★★★★★

Two collections of portraits. The U.S. Presidents disk contains a digitized picture of each president from Washington to Reagan. The candidates disk features digitized images and wonderful caricatures of the major 1988 candidates. The candidates disk is, of course, a little dated (Gary who?), but still worth it for anyone who regularly needs pictures of Bush, Dukakis, and Jackson. List price: \$25 per disk (400K each).

PICT/MacDraw Format

AD-Techs

PICTures ★★★★★

A 400K disk containing 130 images in PICT format. Cleanly drawn illustrations in categories such as arrows, borders, computers, food, holidays, office items, sports, tools, travel, and a U.S. map. A good general-purpose collection, although the drawing style is sometimes on the primitive side. List price: \$34.95.

Compuset

Clip Art Disk #1 ★★

An uninspired collection that encompasses a fairly narrow range of subjects. Most of the 73 PICT images are drawn in a simple, geometric style. Categories include borders, food, recording media (tapes, records, etc.), and transportation. List price: \$39.95 (400K).

Freemeyers Design

Ad/Art/Plus ★

Three 400K disks of amateurish drawings. Cartoon Designer provides facial features and body parts for constructing characters; LaserArt/Borders offers decorative borders and starbursts; and the Architectural Graphics disk contains doors, windows, architectural elements, bathroom and kitchen fixtures, plants, and the like. Not recommended. List price: Architectural Graphics \$75, Cartoon Designer \$75, LaserArt/Borders \$49.95.

Image Club Graphics

Digit-Art, Volumes 1 and 2 ★★★★★

Two three-disk sets in MacDraw format. Categories include borders, dingbats, entertainment, letters, mortises, office items, sports, and travel. A good general-purpose collection, although I wasn't impressed by most of the alphabets and borders. List price: \$99 per volume; both volumes \$168.

MicroMaps Software

MacAtlas Professional Version ★★★★★

Seventy-five map templates in PICT format. The collection includes continents divided into countries, with major cities shown (the cities can be selected as a unit or separately and can be deleted if desired); the United States divided into states, with major cities shown; and 50 individual states divided into counties. A high-quality collection. (Also available in paint and HyperCard formats; an EPS version is forthcoming.) List price: \$199; Paint Version \$79; HyperAtlas \$99.

PostScript Format

Adobe Systems

Adobe Collector's Edition ★★★★★

An excellent collection of dingbats and decorative elements, drawn with precision. The two-disk collection includes over 300 dingbats—pointing hands, arrows, stars, and so on—as well as 100 borders and a modifiable alphabet. A good choice for ads, newsletters, and other publications. List price: \$125.

Artware Systems

Artware ★★★

Borders, Christmas images, horses, outdoor scenes, and U.S. states make up Artware's collection so far. The images are



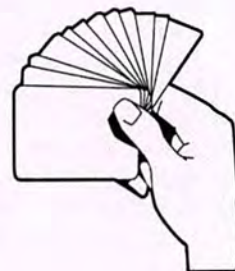


generally well-drawn, but lack the polish of some of the other PostScript collections. You can select images from several disks and order a custom collection if you wish. Also, Artware encourages customers to suggest categories for future disks. List price: \$69.95 Assortment (one disk), \$129.95 Borders (four disks), \$89.95 Christmas (three disks), \$89.95 Equestrian (two disks), \$69.95 QuickPrint Graphics (one disk).

DiskArt

EPS Clip Art, Flags ★★★★★

DiskArt sells several five-disk sets: Flags of the United States, Flags of the World, International Symbols, and EPS Clip Art. The flags series, in Illustrator format, offers some of the first color clip art (they're available in black and white as well). The flags are rendered in impressive detail and look good when printed: an excellent collection. The EPS Clip Art series covers typical clip art subjects such as travel, enter-



Pasting PostScript

With its subtle shading and crisp lines, PostScript is rapidly becoming the clip art format of choice. Illustrator EPS files can be opened and edited with Illustrator or FreeHand, or pasted directly into a page-layout program. But some Mac publishers use a word processor rather than a page-layout application; are they to be denied the joys of PostScript? Fortunately, a little-known Illustrator feature allows you to paste EPS artwork into applications that accept PICT but not EPS files.

First, open a PostScript clip art drawing with Illustrator.

Choose Select All from the Edit menu, then hold down the Option key while you select Copy. This technique transfers PostScript as well as PICT information to the Clipboard. You can then paste the drawing into a word processing document and print it as you would from a page-layout program.

This trick can also be used to place PostScript art into PictureBase, Symmetry's PICT or bitmapped art-organization program. You can then catalog Illustrator drawings as you would any other drawings in PictureBase.



tainment, and so on. List price: \$125 per set (both Flags sets plus International Symbols \$350).

Electronic Pen

The Visual Arts, Set One ★★★★★

Four disks of high-quality artwork in EPS format. The 150 images were drawn by a single artist and hence have a consistent style. Categories include borders, clocks, decorative letters, home and office items, Macintoshes, sports, and transportation (only one human figure is included, however). Recommended. List price: four-disk set \$89.

Hired Hand Design

Moonlight Artworks Disks 1 and 2 ★★★★★

The disks contain more than 20 male and female hands in various poses and holding a variety of objects, credit card logos, "rubber stamp" impressions (PAID, etc.), floppy disks, symbols, and miscellaneous illustrations. A fair collection, but lacking variety in its subject matter. A good choice for people who can't draw hands (that is, almost everyone), however. List price: \$49 per disk.

Image Club Graphics

Digit-Art Volumes 3-8 ★★★★★

Hundreds of images in dozens of categories, including animals, borders, computers, dingbats, farming, food, holidays, maps, office items and workers, people, professions, sports, tools, and transportation. Style and quality varies, which is not surprising in such a large collection. I don't care for the cartoon style in which many of the people and animals are drawn, but others may enjoy it. Also available on CD ROM with periodic updates. List price: Vol. 3 \$149; Vols. 4-8 \$99 each.

Multi-Ad Services

Kwikee Inhouse Graphic System

★★★★★

Multi-Ad furnishes advertising art for retailers and newspapers, focusing on brand-name and generic consumer products, newspaper want-ad headings, and the like. However, a "generic" disk of 300 miscellaneous images (Kwikee Inhouse Pal) is available. Categories include animals, education, farming, fashion, food, holidays, maps, professions, religion, seasons, sports, tools, and transportation. The drawing style is occasionally cute, but the illustrations are crisp and professional. List price: Kwikee Inhouse Graphic System \$195 per month including newsletter and

E-mail box (available on floppy disk or CD ROM), Kwikee Inhouse Pal \$149 (available on CD only). Subscribers can lease a CD ROM player for \$65 a month.

Olduvai Software

Post-Art ★★

Six disks featuring portraits, landscapes, animals, vehicles, and miscellaneous drawings by a single artist. The artwork didn't appeal to me, but perhaps it's not fair to include this collection in a clip art review since it's billed as fine art. Clip art buyers beware—this collection is not suitable for adding decorative touches to documents. List price: Post-Art (two disks) \$69.95, Post-Art II (four disks) \$99.

Studio Advertising Art

Click & Clip 500 ★★★★★

A 15-disk set of 500 PostScript illustrations. I looked at the Winter 1987 collection. A quarterly subscription is also available. Miscellaneous subjects include food, holidays, office items, sports, and transportation. The drawing quality is sporadic; some images are detailed and deftly rendered, while others are simple outlines. Good, but not highly recommended. List price: \$395 for the 15-disk set; \$39.95 for a 2-disk set; \$124.50 a year for quarterly subscription.

3G Graphics

Images with Impact—Graphics

Symbols 1 ★★★★★

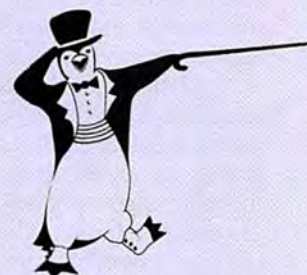
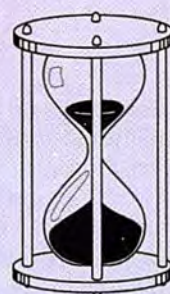
A two-disk set that includes food, mortises, symbols, travel, and a number of anthropomorphic birds and bears. Drawing style varies, but most images exhibit a charm and lightheartedness lacking in many clip art collections. The style is sometimes too cute for my taste—but I never did like anthropomorphic bears. List price: \$99.95.

T/Maker

ClickArt EPS Illustrations ★★★★★

A four-disk set encompassing food, leisure, office items, sports, tools, U.S. states, and numerous miscellaneous items. Images are crisp, detailed, and skillfully rendered. A good choice for menus, party invitations, and the like. My only complaint is that the collection includes few dingbats. List price: \$129.95. □

See *Where to Buy* for contact information.



Getting Smart

Choose an expert-system shell or write your own to develop rule-based systems on the Mac

by Dan Shafer

Artificial intelligence. The catchphrase conjures up images of wild-haired scientists in university and corporate laboratories pounding furiously on \$100,000 computers as they try to emulate the inner workings of the human brain. To the uninitiated, the world of AI is a rarefied atmosphere where only the machine-wealthy can afford to tread.

But that image is simply wrong. And an increasing number of Macintosh software developers are taking advantage of a range of powerful tools to develop the first round of artificially intelligent Mac programs. This article takes a look at a few select tools for AI development on the Mac—both programming languages and expert-system design aids.

When Apple Computer and Texas Instruments (a major player in the AI systems arena for many years) jointly announced the microExplorer last spring, the Macintosh suddenly was seen as a viable AI development and delivery platform. But serious and interesting AI work had been under way on the Mac long before the microExplorer appeared. Large-scale tools are now available for the microExplorer (see "The microExplorer Adds AI Clout to Mac Platform"), but these are not the primary focus of this article. After all, even the \$15,000-minimum price tag for the microExplorer is out of reach for most Mac users. Therefore, for the moment at least, users must concentrate on what they can do on the Mac Plus, SE, and II platforms.

Focus: Expert Systems

Expert systems—programs that attempt to emulate the reasoning process and to represent the knowledge of human experts within well-defined domains—make up the most commercially viable aspect of AI today. Other subcategories of AI include robotics, vision, natural language processing, and machine translation. These fields tend to be largely experimental so

far, confined to university research facilities and to the backrooms of large corporations that can afford blue-sky research.

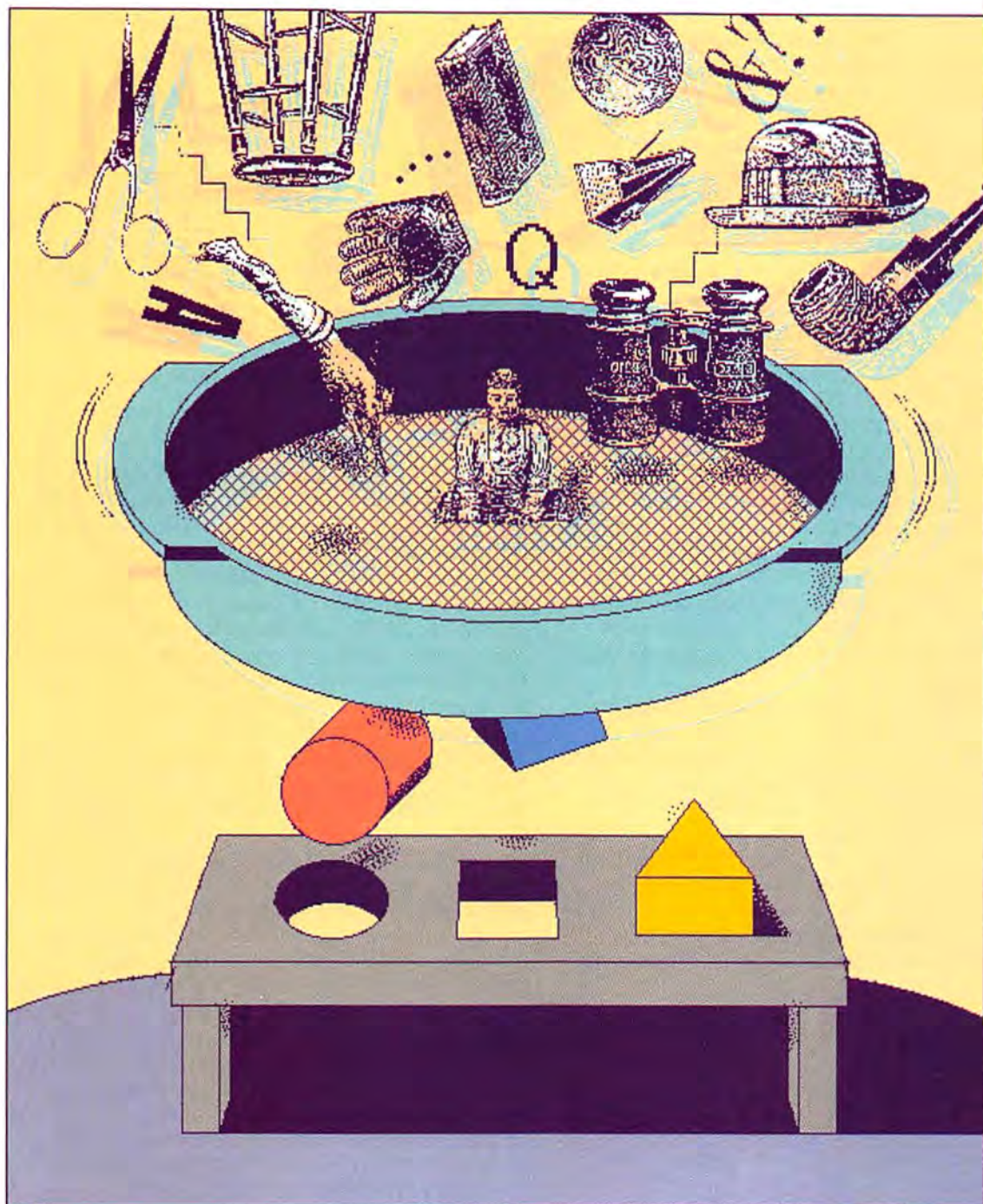
An expert system consists of two major pieces: an *inference engine* and a *knowledge base*. The inference engine is the part of the software that processes knowledge to produce recommendations and answers from a set of conditions furnished by the knowledge base and the user. The knowledge base consists, usually, of facts and rules about how to deal with facts. Rules—more properly, *production rules*—form the basis of most, but not all, expert-system knowledge bases. A production rule takes the form of an IF-THEN statement, not unlike such statements in BASIC and Pascal.

To build an expert system, you must obtain or build an inference engine and then construct a knowledge base with which that inference engine can work. There are two fundamental approaches to the task: use a programming language to construct the inference engine to meet your specific needs, or use an expert-system *shell*. A shell consists of an inference engine and some interface components that facilitate the construction of the knowledge base of rules and facts.

Language or Shell?

The trade-offs between using a programming language and using an expert-system shell are straightforward. If you want complete control over the way the inference engine works and over the user interaction with your finished expert system, then you should choose a programming language. If, on the other hand, your problem is one that can be solved with in-

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MARK ULRICH

ference-engine techniques that are implemented in one or more shells, and if the user interface they supply is acceptable, then you should probably stay with a shell. (There are other, sometimes more complex, issues involved in this decision. These include questions like cost of run-time versions of the appropriate shell, execution speed, and knowledge representation options. But they are beyond the scope of this discussion and generally arise only when the differences between a language and a shell are quite small.)

If you decide to use a programming language for

expert system development, you must then decide between a specialized AI language (such as LISP or Prolog) and a conventional language like Pascal, C, or BASIC. There is no reason why an inference engine cannot be written adequately in any traditional programming language. AI languages have some features that lend themselves to rule-based applications, in much the same way that C's design makes it more suitable for some system-level programming than, say, BASIC. LISP, for example, excels at the representation and manipulation of symbols, particularly in the form

of lists (which is the source of its name, LISt Processing). Prolog, on the other hand, is enhanced for logic programming and includes what amounts to an inference engine as part of its design.

Computer scientists and AI researchers exchange sometimes-emotional words over the issue of whether LISP or Prolog is a better choice for AI programming. That is not an issue we can resolve here. What we can do, however, is suggest which LISP and Prolog implementations on the Mac merit your consideration once you've decided to use one of these languages for your AI development.

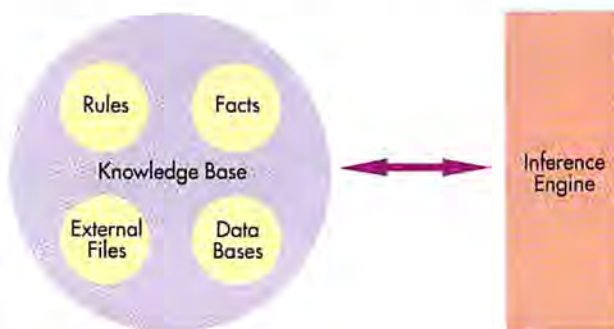
Three LISPs

LISP is one of the oldest programming languages still in use. It was invented in 1954. During the nearly 35 years of its existence, it has undergone numerous metamorphoses. Along the way, dozens of dialects of the language appeared. In the past two years, however, the LISP community has settled on a standard for LISP known as Common LISP. The widespread acceptance of that standard has effectively ended the often acrimonious debate in the United States over which LISP was to be preferred. There are still some adherents of a simpler form of LISP known as Scheme, but even they admit that they have all but lost the war for dominance to Common LISP.

On the Macintosh, you have three implementations of Common LISP from which to choose:

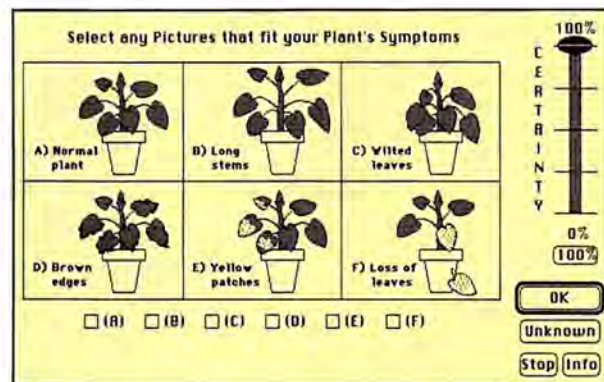
- Allegro Common LISP from Coral Software;
- ExperCommon LISP from Expertelligence;
- Pearl LISP, also from Coral Software.

Of these three, only Allegro claims to be a complete implementation of the Common LISP standard; the other two are subsets of the complex and wide-ranging standard. Because the standard encompasses a tremendous number of primitives and functions that are of arguably limited use, these subsets are not nec-



Components of an Expert System

An expert system has two main components: a knowledge base (left) and an inference engine. The knowledge base contains the facts, rules, and other information that constitute the expert system's knowledge of the domain. The inference engine is generic to all kinds of knowledge bases and domains and contains the logic that determines how answers are reached and how conclusions are drawn from the knowledge base and from interaction with the user.



Intelligent Developer

Houseplant clinic diagnostic expert system written in Intelligent Developer.

essarily less usable. However, if you are working with an existing application written in Common LISP, the port to the Macintosh will be greatly simplified by selecting Allegro Common LISP as your Mac vehicle.

Allegro, in addition to being a full implementation of the Common LISP standard, incorporates a programmable editing environment dubbed FRED (an acronym for the unlikely tongue-in-cheek name FRED Resembles EMACS Deliberately, a reference to one of the most popular LISP-based editors on larger machines). On the other hand, Allegro's implementation of the Macintosh Toolbox calls is relatively incomplete. In extending Common LISP for use on the Mac, Coral chose to build in calls only for the Toolbox calls that Coral's designers thought would be used frequently. If your program must make any of the unimplemented calls, you must delve into *Inside Macintosh* and use a primitive level of access to the other traps.

ExperCommon LISP, on the other hand, is not a complete implementation of Common LISP but includes a built-in call for every Toolbox command. The subset of Common LISP that Expertelligence chose to implement is robust and, in the eyes of most LISP programmers, more than adequate. If you are beginning a Mac development effort rather than porting one from another system, and if portability to another Common LISP environment is not an issue, you may find ExperCommon LISP much easier to use than Allegro LISP. ExperCommon LISP has also been available longer; one consequence of its age is the wider availability of support tools. Two of those tools, expert-system tool ExperCommon OPS5 and front-end construction aid Exper Interface Builder, are worthy of particular note and consideration.

Pearl LISP is a low-cost alternative to the other two implementations of Common LISP. It is also the best documented of the trio. Its subset of Common LISP was carefully chosen to omit only features that are needed by relatively advanced LISP programmers. It is easily the best price/performance selection of the lot, though it suffers from the same defects as Allegro Common LISP and lacks that product's programmable editor and other helpful support features.

The microExplorer Adds AI Clout to Mac Platform

Last spring, Texas Instruments (TI) and Apple Computer jointly announced the development of the TI microExplorer. This hybrid puts a high-end dedicated LISP machine on a single printed circuit board inside a Mac II. In the process, it creates a platform for the delivery and, ultimately, the development of serious, large-scale AI applications.

This response to the outmoded, specialized AI workstations that have dominated research facilities has drawn great attention from AI tool designers. Most of them already have tools that run on TI's Explorer workstation family. The microExplorer slashes by 50 percent or more the price of admission. Still, a full-blown microExplorer development system carries a hefty price tag of nearly \$30,000. It requires a minimum of 8 megabytes and a recommended 12MB of memory; occupies most of an 80MB hard disk, and takes about 10 minutes to load. The add-on tools are equally large and formidable.

The two best-established tools for expert systems in the AI community are ART and KEE. Both will be available by early 1989 on the microExplorer platform. ART (Automated Reasoning Tool) is from Inference Corporation, one of the "Gang of Four" that is generally viewed as the seminal group of companies from which most AI research and

products have flowed. The program has been widely used in the engineering community and by university and corporate laboratories. "But what we needed," says Inference's chief technical officer Chuck Williams, "was a platform that would get us into DP and MIS organizations. The microExplorer gives us that." Williams cites the example of American Express Life Insurance, which plans to deploy an expert system on the microExplorer this year. "It's been under development for some time," Williams says, "but the cost of delivering one to each site where the expertise was needed became prohibitive with dedicated workstations. Now the microExplorer permits delivery at less than \$20,000 per installation and gives them the power of the Mac II besides." ART, which was announced at the March press conference introducing the microExplorer, began shipping in June. It thus enjoyed a lead time of several months over its competitors.

Intellicorp's KEE (Knowledge Engineering Environment) is slated to be ready for deployment on the microExplorer by the end of 1988 or early 1989. Carnegie Group's KnowledgeCraft tool is also being ported to the microExplorer and should be ready about the same time as KEE.

One of the more interesting and potentially useful products being implemented on the

microExplorer is Graphael's G-Base, an intelligent, object-oriented database product. The program has gained widespread acceptance, particularly in Europe. It has generated excitement in several recent AI trade shows and could become a major player, particularly since it was available at the same time as ART and thus gained a significant head start over potential competitors.

Three specialized expert-system tools that became available soon after the microExplorer's introduction are also worth noting:

- Gensym's G2, which is designed to facilitate the design of expert systems that work in real-time environments such as manufacturing and process control;

- ICAD, an engineering automation tool for mechanical and manufacturing engineers from the company of the same name;

- Concept Modeller, from Wisdom Systems, an intelligent CAD tool that builds on a library of 3-D objects and knowledge about those objects to facilitate engineering design and analysis.

Because the microExplorer supports Common LISP in a special-purpose chip on its system board, other Common LISP-based tools and applications will undoubtedly migrate to this new platform.

A Pair of Prologs

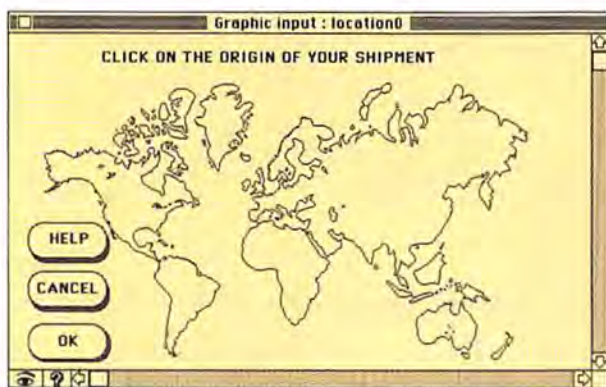
Prolog has not gained the widespread acceptance in the North American AI community that it enjoys everywhere else in the world. Nonetheless, it is a powerful language for developing complex and intricate intelligent applications. Two versions of Prolog are particularly noteworthy because of their robustness and value. Both implement the de facto industry Prolog standard referred to as the Edinburgh (or Clocksin and Mellish) standard.

AAIS Prolog from Advanced AI Systems is a fast, powerful version of the language. It represents a sort of minimalist approach to the user/designer interface, offering a standard Macintosh editing-window approach to program construction. Its implementation of Toolbox calls is similar to that of Allegro Common LISP, requiring the programmer to master *Inside Macintosh* and deal with trap-level calls. However, its affordable price, good support, and first-rate performance make it a product you should consider if you are planning to use Prolog.

LPA MacProlog from Logic Programming Associates in the United Kingdom is a long-established product on other hardware platforms, including other microcomputers as well as minicomputers. It has undergone several evolutions on the Mac and has finally become a powerful, usable, well-documented, and full-featured implementation of this intriguing language. Some of its user interface elements are nonstandard, but not sufficiently so as to pose barriers to its ease of use. LPA makes two versions of its Prolog available and offers a number of options as well. Its Student Edition is an entry-level Prolog with a complete implementation of the Mac Toolbox and a solid interface. The Wizard Edition includes the ability to compile your Prolog programs for greater execution speed and offers easy-to-use hooks to programs written in C or Pascal. Both versions support color on the Mac II.

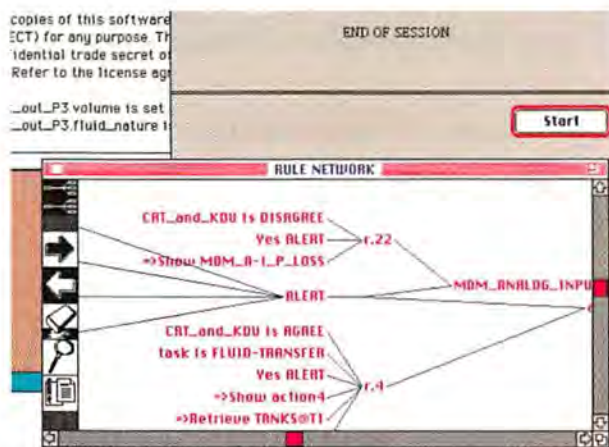
Under This Shell

An expert-system shell is a program that incorporates an inference engine, quite often some assistance



Instant-Expert Plus

Entry screen for a package-shipping advisor program written in Instant-Expert Plus.



Nexpert Object

Nexpert Object's rule browser uses a graphic tree representation.

in the entry of rules and facts, and generally an interface that eliminates most of the feeling of a programming language or environment. In such an atmosphere, expert-system development can feel more like database construction than like programming, which is the whole point of the shells.

A dozen such programs vie for attention on the Macintosh; we focus here on four that are immediately available and with which we have some positive experience. In addition, we take a quick look at one new shell that may have a significant impact on this aspect of the Mac AI market.

The high ground of expert-system shells on the Macintosh belongs indisputably to Neuron Data's Nexpert Object (see "Nexpert Object"). This shell features major-league development power on a par with shells costing ten or more times its seemingly high price tag, as well as the best hardware platform transportability and integration of any shell available. Nexpert Object is the BMW of the expert-system shell set. It features a user-definable mix of rules and objects for knowledge representation, a highly graphic interface, and unexcelled execution speed. Beyond that, on the Mac Nexpert Object includes a set of libraries that enable you to integrate expert systems created using Nexpert Object with existing and future Mac applications that can take advantage of the MPW library approach. If you can afford it—and the cost of the shell in a large-scale project is almost always the smallest item even if it is very large indeed—Nexpert Object is the one to go for.

But not everyone can justify spending several thousand dollars on a tool to explore expert systems. If you are indeed at the exploration stage, or if you are building a product on speculation with no guarantee of recovering your investment, then you should consider using Instant-Expert Plus, Cognate, or Intelligent Developer/IntelliCard.

Instant-Expert Plus from Human Intellect Systems is a robust shell with a built-in programming language that has the flavor of a Modula-2 (see "Instant-Expert Plus"). Instant-Expert Plus features incredibly easy-to-

A Brief Expert-System Vocabulary

Backward-Chaining An expert-system inference engine designed to start with a goal to achieve and then proceed through a set of rules by building up subgoals until it can prove one of them. Then it backtracks through the previously examined rules (thus its name) and looks for still more subgoals until it finally satisfies its primary goal. At that point the consultation ends.

Consultation The interaction between the user and the expert system in which the system attempts to find an answer or satisfy a goal by making inquiries of the user. Generally closely resembles a dialog.

Domain The subject matter of the expert system. Usually defined to be quite narrow to avoid overly general conclusions and overly large knowledge bases.

Expert System A program that attempts to emulate the reasoning of a human expert in a limited field of expertise (domain). By interacting with the user and perhaps examining external files or consulting other applications, an expert system helps a user reach a conclusion about a set of facts in much the same way a human consulting expert would.

Facts That part of the knowledge base that contains data about the problem under examination. Facts in an expert system are similar in many

ways to variables in conventional programming languages. They have values (sometimes more than one at a time), which can be displayed.

Forward-Chaining An expert-system inference engine strategy that begins with known facts and a hypothesis proposed by the user. It then sets about the process of examining rules in the knowledge base to see if it can confirm or deny the validity of the hypothesis. Rather than reasoning to an answer as a backward-chaining inference engine would, a forward-chaining inference engine helps the user with a predetermined idea of what the outcome should be.

Frames An alternative method to rules for representing knowledge. Frames are quite similar to objects in the programming world. They have one or more slots, each of which can have one or more values associated with it. A frame can be used to describe some or all of the knowledge about a domain in shells that support this form of knowledge representation.

Induction The process of creating rules from examples. In some expert systems, users enter examples of their decision-making process by providing a definition of the factors that make up the decision, the values each factor can have, and the outcome or decision from each combination of facts.

The system then induces or derives a rule set to describe the conditions presented by the example set. Induction is often used as a means of beginning construction of a knowledge base.

Inference engine That part of an expert system that performs the consultation by examining the rules and facts that make up the knowledge base, determining which rules to use in which order and what questions to ask the user. It is in essence the brain of the expert system.

Knowledge base That part of an expert system that contains the rules and facts that make up what the expert system knows about the domain for which it is created.

Rules Also called *production rules*. A rule consists of one or more conditions in an IF clause and one or more conclusions or actions in a THEN clause.

Experts Compared

	Cognate	Intelligent Developer	Instant-Expert Plus	Level 5	MacSmarts	Nexpert Object	SuperExpert
Inference/Logic							
Forward chaining	•	•	•	•	•	•	•
Backward chaining	*	•	•	•	•	•	•
Mixed inference	•	•	•	•	•	•	•
NOT	•	•	•	•	†	•	
OR	•	•	•	•	•	•	
Variables	•	•	•	•	•	•	
Induction					•		•
Certainty factors		•	•	•		•	
Exhaustive search	•	•	•	•		•	
Built-in programmability	•	•	•	•		•	
Rule prioritization	•		•		‡		‡
Capacities/limits							
No. of premises	∞	∞	5	∞	5	∞	n/a
No. of conclusions	∞	∞	3	∞	1	∞	n/a
Partitioning		•	•	•		•	
KB chaining		•	•	•	•	•	•
External Interfaces							
Procedures	•		•	•		•	
Database/spreadsheet files	*	§	•	•	•	•	
HyperCard	*	||	•	||	•	•	
Other applications	•	•	•	•	•	•	
Static graphics		•	•	•	•	•	
Interactive graphics		**	•		•	•	
Text files	•	•	•	•	•	•	•
Metrics							
Tool price	\$250	\$295	\$498	\$695	\$150	\$6000	\$200
Run-time	free	TBA	free	\$200	none	\$150	\$50
Subjective Evaluation							
(Scale: 0–10)							
Developer ease of use	7	9	8	6	9	7	9
End-user ease of use	6	9	9	9	9	9	9
Documentation	4	9	5	10	3	7	6
Sample knowledge bases	6	10	5	10	4	9	6
Macintosh interface	9	7	7	8	10	10	10
Debugging power	6	10	5	7	0	10	0
Overall value	7	9	7	8	5	9	4

* Programmable. † Permits use of IF YES (fact) and IF NO (fact). ‡ May be controlled by designer setting options in knowledge base. § Includes internal database that can be managed entirely within shell. || Can launch HyperCard and pass values via an intermediate file in both directions. ** Available at run-time via IntelliCard, a HyperCard stack delivery option.

implement interactive graphics. It uses a template approach to rule entry. It limits each rule to five premises (IF clauses) and three conclusions. It is possible to chain rules, however, so that these limitations can be overcome if necessary. Facts can be entered into the system in any of several ways. Two fact-entry methods that are unique to Instant-Expert Plus use vocabulary and graphics strictly to assert new factual information into a knowledge base. If you choose to enter facts by vocabulary, you consult a list of known propositions in the system and simply assert one or more of them to be true by clicking on it. Questions that would nor-

mally lead to determining the values of such facts are then skipped during the consultation. Rule editing can be somewhat nonintuitive; the Mac interface is not flawless and variables must essentially be declared before they can be used. In addition, the documentation leaves much to be desired, though it was undergoing a major revision as this was being written. Human Intellect Systems has a well-deserved reputation for first-class product support.

Cognate's real strength derives from the fact that it is written entirely in MPW C and MacApp (see "Cognate"). This makes it easier to integrate Cognate-based

systems into existing and new Mac software than systems based on any other low-end shell. Aside from that considerable value, Cognate, from Peridom, is a relatively ordinary but highly usable shell. It uses a programming-language approach to system development, so it has no rule or fact editor. Rules and facts are simply typed into a work space and evaluated under menu control. The program includes several styles of browsers through which you can list and examine existing facts and rules. Cognate's rule syntax is obtuse, patterned after the popular but fading OPS5 approach. The inference engine is primarily a forward-chaining design, but it does permit stronger pattern-matching in rule and goal satisfaction than the other shells. In that sense, it is more nearly a programming language.

Intelligent Developer/IntelliCard from Hyperpress Technology Group is an industrial-strength shell that features the strongest debugging support of any microcomputer-based shell I've seen (see "Intelligent Developer"). During development, you can test rules to see if they've fired and what their results were, force a rule to fire, set a limit on the number of rules to execute before interrupting (to avoid endless loops), and set break points on both rules and facts in several optional ways. You can also trace the consultation session. Options for printing out the knowledge base, another debugging aid, make Intelligent Developer more flexible than the other shells. You can print rules, facts, databases, output screens, and rule sets and can even cross-reference them. This permits you to examine only those rules that alter a fact's value, for example.

Intelligent Developer also features flexible fact- and rule-definition via easy-to-understand templates. When you define a fact, you can specify a set of valid parameters for it. The system will then devise the appropriate type of button for user response and, in the case of free-form fact entry, validate the user's answer before moving on in the consultation. The program also includes a small but effective integrated database manager that permits knowledge bases to access and manage large amounts of factual information. Finally, the program permits the creation of stand-alone appli-

cations for end users, either as double-click programs or as HyperCard stacks the designer and/or end user can modify without affecting the underlying knowledge base. Both options require separate licensing fees for each product on which they are used. Intelligent Developer's interface to the outside world is limited to text-only file reading and writing and to launching other applications. Its strategy of compiling knowledge bases after changes is foreign to expert-system developers but is fast enough not to be cumbersome during the development cycle.

More Shell Options

There are several other expert-system shells available for the Mac at this writing. They include:

- Level 5/Mac, a Mac implementation of a long-used, PC-based shell that features a strongly procedural language, no real designer support, but a relatively clean end-user interface;

- MacSmarts, which has excellent hooks to the outside world but a limited inference engine that permits only yes or no answers to questions;

- SuperExpert, a rules-from-examples inductive shell that limits the designer to 31 criteria per problem and to 8 possible values for each criterion, and which is limited and limiting in several other important ways.

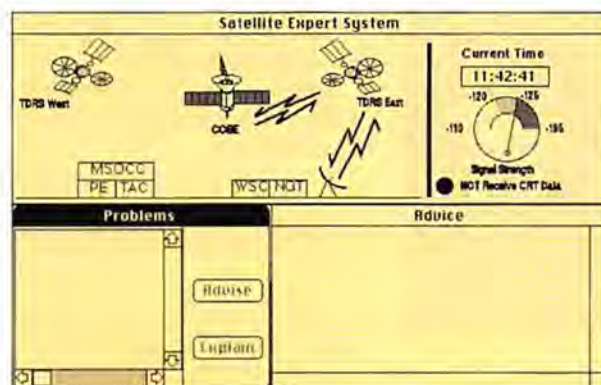
As this was being written, the best-selling expert-system shell in history, VP-Expert from Adam Osborne's Paperback Software International, was being converted to the Mac. It has sold in excess of 20,000 copies for the PC and has significantly altered the shell landscape on that platform. If the Mac version succeeds in retaining the power of the PC product while conforming strongly to Mac user-interface guidelines, it could become the definitive entry. Paperback has traditionally priced its products at the very low end and has indicated it intends to continue that tradition on the Mac.

Which Way to Go?

Unless your project has some peculiarities or demands that make using a shell unsuitable, I would strongly recommend that you consider using an expert-system shell rather than a programming language. The time you will save by not having to learn a new language, by not having to construct an inference engine, and by making design decisions along the way will become considerable, particularly if your project is large. If you are not an experienced programmer, the argument in favor of using a shell is compelling.

But whichever way you decide to go, you should know that it is possible to build intelligent applications on the Macintosh today. There's no need to wait until you can afford a microExplorer, or until more sophisticated tools migrate to your favorite computer. The time to begin using these AI approaches to product development is now. □

See *Where to Buy* for contact information.



Cognate

Satellite communications application written in Cognate.

A Full House

*Five relational databases for
challenging applications*

by Charles Seiter



AARON CHANG

dBase Observer

John Canfield, of the San Diego firm Compu-Sult, developed this multiformal pictorial database (that's Lick Observatory on the screen).

It usually comes as a surprise to microcomputer users familiar with word processing, page layout, and spreadsheets to find that databases are the dominant applications in the mini and mainframe world. When talking about connecting the Mac to other computers, most people are referring to providing easy access to data files. Similarly, in catalogs of minicomputer applications, most programs are simply custom databases tailored to the standard requirements of an industry.

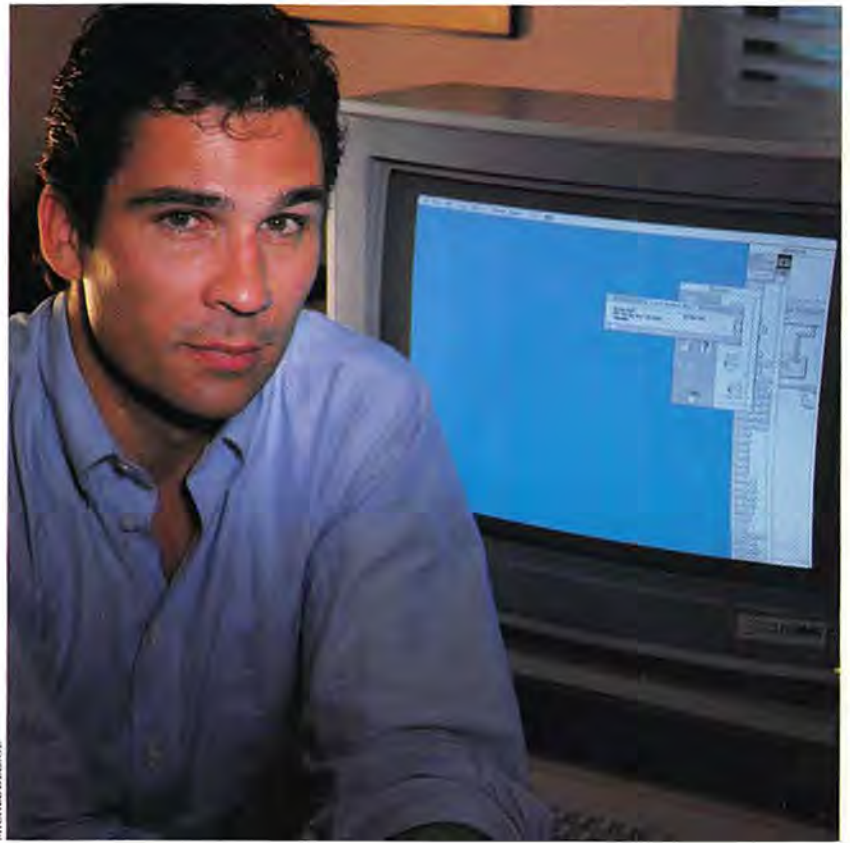
Thus "applications development" is often synonymous with "customizing a database." In practice there are two kinds of database development: custom database programming for an individual client, and programming of applications for an entire vertical market.

The following is an overview of five relational databases used for application development, all of which can handle a

Charles Seiter is a chemistry professor turned computer writer and a Macworld contributing editor. He's written several books on programming languages and financial modeling.

Helix Twister

Brian Smiga of Portfolio Systems in New York boasts an impressive array of Fortune 500 customers for database systems developed in Double Helix II. He finds that managers can exploit all Helix database features without extensive training.



wide variety of custom database chores. These databases—Omnis 3 Plus, Double Helix II, dBase Mac, 4th Dimension, and FoxBase+/Mac—are much more complicated products than the file managers discussed in an earlier roundup (“Data Basics,” *Macworld*, June, 1988). Any of these should be a first choice only for programmers tackling a large, fairly complicated job. I’ll try to help you identify the right development tool, whether you’re programming a personal database, an in-house office database, a client-requested application, or a commercial product.

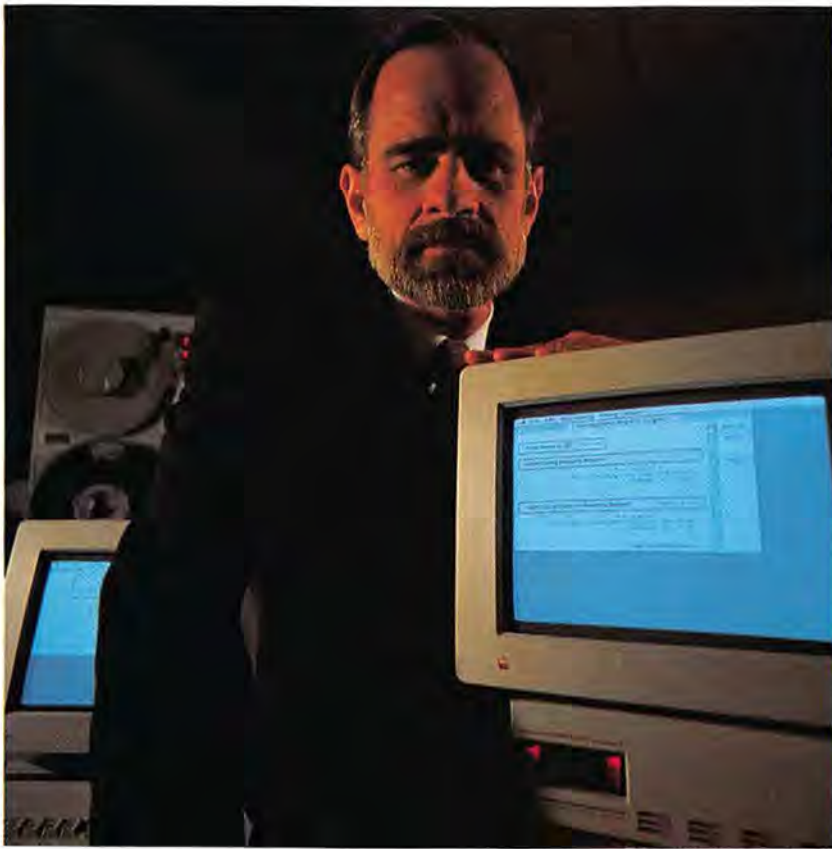
I supplemented my own appraisal of these databases with extensive—and sometimes surprising—interviews with developers. For example, I learned that, almost universally, developers consider published timing benchmarks to be misleading or even irrelevant. It’s true that some databases are generically slower or faster than others, but the actual numbers for sorting, searching, and other operations depend heavily on the details of relational database structure and on memory configuration; skilled developers always have a repertoire of tricks for working around a particular program’s performance deficiencies.

Most of the developers I interviewed were openly scornful of the common practice of using the same types of benchmark tests for flat-file managers and relational databases.

Another surprise is the extent to which personality rather than performance determines a program’s appeal. Developers using 4th Dimension, for example, often have previous experience with programming languages like Pascal and feel at home in this powerful procedural environment; Double Helix II developers, by contrast, tend to have business backgrounds and find using Double Helix II’s icon-based interface more congenial than programming. “No single product is the best for all tasks” is a common remark from people who work with more than one of these databases every day. As I look at each database, I’ll try to highlight its distinctive features and match it to different work styles and project requirements.

Omnis 3 Plus

Omnis 3 Plus is the latest version of a program with a distinguished history in the Macintosh market. Hundreds of com-



Omnis Potentate

Will Tompkins of San Diego develops financial applications in several different databases, but favors Omnis 3 Plus for large applications that process transactions in real time. He suggests matching the database to the application, rather than assuming one database is always the right one for any job.

mercial applications for vertical markets are available for use with the run-time version of Omnis, and hundreds of developers have extensive Omnis experience. Multi-user support is highly evolved, and Blyth Software offers a development tool called Omnis Express for rapid prototyping of applications.

Express is the key to understanding Omnis 3 Plus's position in the Mac database world. Omnis 3 Plus is a powerful system with a *procedural* language (one in which developers use programs, looking much like those in C or Pascal, to automate complex actions). The language has constructs to customize menus and dialog boxes. The problem, which Express aims to solve, is that it's not easy to master all of Omnis's features. Express provides a set of simple defaults (preset formats), so that beginners can set up a plain database quickly, with the possibility of customizing it later (see "Omnis Express").

Omnis 3 Plus has three particularly strong points that have enabled it to hold on in the face of fierce competition in the past year. First, it's faster at record processing (sort, search, append) than 4th Dimension, Double Helix II, or dBase Mac. While

the exact benchmark numbers depend on hardware and database structure, speed is never a source of complaint; Omnis 3 Plus is fast enough to handle business transactions in real time. Second, Omnis is excellent at preserving data integrity in tricky situations, such as a network crash—it's very hard to lose work or destroy data by accident. Finally, the Omnis 3 Plus Utility program has a provision for segmenting large datafiles and easily formatting various preprinted forms.

What some developers don't like about Omnis 3 Plus is that, when all the programming is done and the database is humming away at high speed, the resulting application doesn't seem very Macintosh-like (see "Personnel Management"). There's no provision for graphics or fancy kinds of font work, so the application often looks like plain old dBase on a PC (it's not, however, dBase compatible). In database work, the trade-off between a program's good and bad points is a result of the way the program allocates computing resources. If you can live with a straight text-and-numbers database with tables for data

entry and reports, you can have a very fast database indeed (MacMax, the spartan dBase work-alike, is an example). If you want a program with flashy graphics, multiple windows, and full control over report aesthetics, it will usually require more processor time to handle the overhead. This situation, for brevity, will henceforth be referred to as the Iron Law of Mac Database Computing.

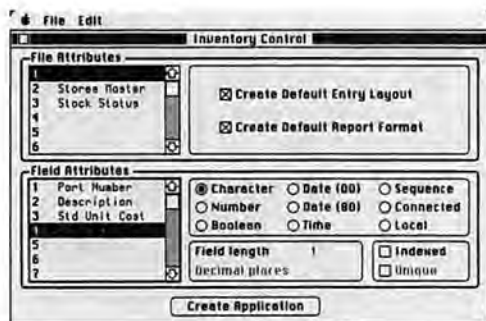
Double Helix II

Double Helix II is the only program in this group that was specifically designed for nonprogrammers (this approach is something of a trademark with Odesta, which also offers Data Desk, the only professional statistics package for nonstatisticians). Although the Helix method requires manipulation of a large library of icons (see "Helix Collection") to replace the statements of traditional procedural languages, Odesta has produced a clear and entertaining tutorial on this unique approach, for the benefit of absolute computing beginners.

A *Helix collection* is a user-selected tableau of icons that contains all the information about a project: the data fields; groupings of data fields into views; *abacus*

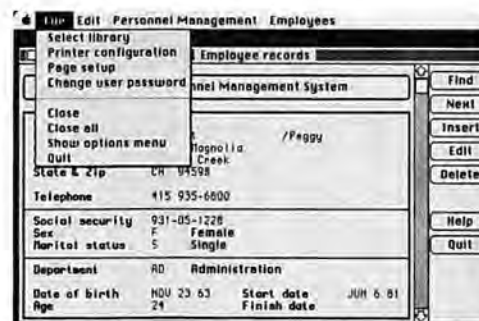
icons for calculations; relations; links; and queries. This system makes changing aspects of database structure very easy—to add a field to a Helix database you simply drag in another field icon, name it, and set up a view for data entry. By juggling icons called *calculation tiles*, you can produce complex calculations one step at a time (see "Calculation by Tile"). You can design reports with an almost lurid profusion of fonts, styles, and graphics. There are few other products with as much amusement value in the cool gray world of databases.

The practical strength of this approach is that it produces custom applications that can be further customized by end users. As a demonstration of the product's ease of use, Helix developers describe dozens of examples in which they've walked customers through minor database modifications over the telephone(!)—a near-impossibility with a complex procedural product. Multiuser applications are also simple in Helix, requiring only the purchase of a special multiuser product (it "networks itself," requiring no extra hardware or application rewriting). The final key feature of Double Helix II in the current market is its superior link to the VAX world, through a version that runs under



Omnis Express

Omnis 3 Plus's Express application (above) allows developers to set up databases rapidly through use of preset data entry and report formats. Though plain (no graphics, limited fonts) by typical Mac standards, the resultant Omnis database applications are invariably fast.



Personnel Management

In this typical Omnis 3 Plus example, note the nonstandard File menu and the record-manipulation buttons at right. (These choices can also be accessed from the Personnel Management menu.)



Helix Collection

Double Helix II uses a programming technique so exclusively icon-driven it could be thought of as programming by cartoon. A Helix Collection such as this one is a set of fields, relations, forms, and calculation definitions and other components that form the structure of a database.

the VMS operating system. It's possible to design a Double Helix II custom database using a Mac as the development platform. Then you can run it on a VAX to serve dozens of users who access the application with Macs or VT-series terminals. Helix also interfaces transparently to Odesta's outstanding statistics package, Data Desk (see *Reviews*, in this issue).

Because of its unique interface, Double Helix II frequently finds itself on the wrong side of the Iron Law—without adequate planning, applications can be sluggish indeed. To its credit, Odesta provides extensive documentation of speed tips for developers, but people buy Double Helix II for its friendliness rather than its brute-force sorting on 50,000 records.

dBase Mac

Ashton-Tate's dBase III rules the MS-DOS database world, and developers awaited the release of dBase Mac with great curiosity. Would it be the ultimate development environment, dominating the custom database field as thoroughly as dBase III does its market?

The product, when it finally emerged, was surprisingly avant-garde and not par-

ticularly compatible with IBM PC programs (it is, of course, compatible with dBase III data files). Instead, it's a true Macintosh system producing true Macintosh applications (see "dBase Structure"). It owes more to advanced programming languages such as SmallTalk than to the primitive programming techniques of its PC-based relative. Specifically, much of the power of dBase Mac lies in object-oriented programming. Rather than requiring an overall program or procedure file for a database, dBase Mac can attach small procedures to nearly any object the system allows, including individual fields (see "Unformed Form"). This makes it easy to write, and later modify, sophisticated error-checking routines for data entry. Nifty Mac touches like pop-up menus are relatively easy to implement, and the current version of dBase Mac also supports external commands and functions for applications involving a HyperCard interface.

Version 1.01 corrects some initial problems, and a run-time version recently became available. In this group of five products, however, dBase Mac is the only one that does not yet support multiuser databases, an omission that slows the product's acceptance in an increasingly networked world.

The object-oriented approach may sound complicated, but more nonprogrammers use dBase Mac for development than any other database product except Helix, and basic operations are simple. Because so many of the options in database design are menu-driven, you can construct applications without resorting extensively to the procedure language. Furthermore, checking facilities built into the program's editor prevent many common errors—you can't write a syntactically incorrect procedure.

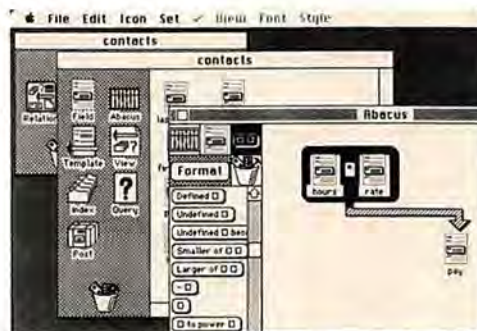
Once again, a program offering a high degree of friendliness is penalized by the Iron Law. dBase Mac allows you, for example, to display so many views (with attached preprocessor procedures) in windows at once that screen updates can take several minutes at a time. With experience, developers learn a set of disciplines to improve performance, but nearly all of them complain about this program's speed.

4th Dimension

It is a tribute to the public relations skills of Guy Kawasaki—former Mac software evangelist with Apple, now leading

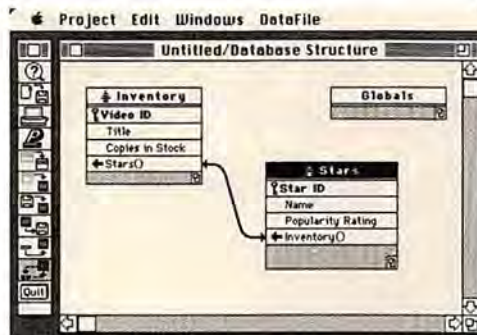
Calculation by Tile

Calculations in Double Helix II make use of a large set of tiles, which incorporate operations and special functions. Here a new field called "pay" is formulated from the previously defined fields "hours" and "rate."



dBase Structure

The dBase Mac user interface is largely pictorial, with palettes of icons replacing standard text commands. This dBase Mac structure window shows a relational link between two files.



the 4th Dimension crusade—that this large, complex, and sophisticated package has been the subject of constant speculation and comment in the Macintosh press for more than a year. Even before its release, as the mysterious entity code-named Silver Surfer, 4th Dimension was the subject of more headlines than any actually released program.

The excitement over 4th Dimension has been caused by Acius's promise of complete control of your Mac database system. 4th Dimension delivers on that promise, with all that the phrase *complete control* implies. Somewhere in its 1056 pages of documentation and pounds of technical notes lie the commands required to do nearly anything that can be done with a Mac. For databases, this means flexibility of data entry screens and report forms, and sophisticated constructs, for example, scrolling clickable lists for data access (see "Searching the 4th Dimension").

Although it's possible to plod along in the User environment of 4th Dimension without appreciating much of its scope, the Custom and Design environments are where the program shows its value. Mastering these environments is not a trivial matter, but many developers feel the results are worth the effort because these environments offer superior flexibility (see "Expense Reports"). "You can make it do anything you want" is the verdict reached by all 4th Dimension developers I interviewed. Of the five products in this group, 4th Dimension has the steepest learning curve ("You live with the manual in your lap," remarked one developer). And commercial applications from developers have appeared on the market relatively slowly.

Unfortunately, when a development tool gives programmers a great deal of control, it invokes in me a response straight out of my high school civics class: with freedom comes responsibility. While it is nearly impossible to produce a crashable application within the limits, for example, of Blyth Software's Omnis Express, Acius concocted a miniature five-record demo program that managed to crash in front of dozens of journalists at a major trade show. Aside from the ability to create beautiful custom applications, power carries a certain amount of danger. But it also implies scope: in complex applications that inter-

face with mainframes and exotic minis, 4th Dimension has an impressive track record. These communications possibilities are further explored in applications that can be successfully updated and modified by modem.

Although not to the extent first reported, 4th Dimension is another Iron Law victim. Deplorably slow benchmark times for file import and searching in 4th Dimension (some developers feel it should only be recommended for 68020-based Macs) are the result of poky disk-access routines, not intrinsic problems with labyrinthine file structure (a frequent culprit in rich database environments). Developers have ingeniously worked around these problems while waiting for Acius to finish its promised speed fix-up. Despite competition and notorious speed problems, 4th Dimension remains the database of choice for a class of application solutions that calls for extreme flexibility.

FoxBase+/Mac

FoxBase+/Mac is the latest competitor for the Mac database developers' market, and it is formidable. Originally, because the product was quite new, it seemed prema-



Unformed Form

This default dBase Mac input form can be customized with a variety of graphic features and automatic error-checking facilities. Although initially you must memorize what the palettes do, with practice they become a speedy alternative to more traditional programming methods.



Searching the 4th Dimension

The scrolling lists for selecting fields in this search dialog box are an example of a sophisticated 4th Dimension feature that's easy to implement.

ture to include it in an article based on the experiences of the developer community. In the course of polling developers, however, I found that almost half of them were seriously evaluating FoxBase+/Mac as a development vehicle, citing its speed, flexibility, and relative simplicity.

Fox Software's original market was MS-DOS, and the company survived competition with the giant Ashton-Tate by producing a dBase clone that could outperform dBase III in many areas, notably speed. FoxBase+/Mac continues this approach, offering several compelling virtues. It's the fastest general-purpose Mac database, often ten to a hundred times faster than its competitors on routine tasks. It offers a flexible environment and a relatively uncluttered interface. With FoxBase+/Mac you can run dBase III programs imported from MS-DOS with no modification, or you can decorate the dBase III programs with Mac fonts and graphics after porting (see "Customizing FoxBase+/Mac"). It is FoxBase+, rather than dBase Mac (or the strict dBase clone McMax), which will be the main entry point for scores of IBM PC applications looking for a share of the Mac market (see

"FoxBase+/Mac's View Window").

There is a networked version, which specifically allows easy data interchange between PCs running FoxBase+ and Macs with FoxBase+/Mac. Obviously, there's no way to make the full Mac-featured version appear on the PC screens, but nongraphic data is compatible, and Fox Software distributes a run-time version.

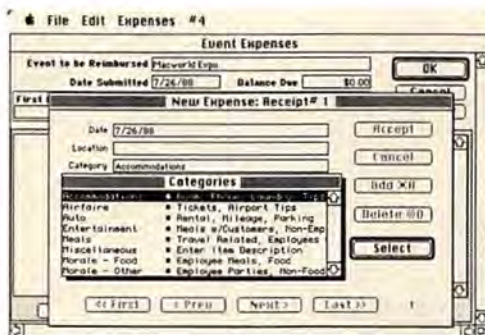
By restricting some interface options, using clever memory management, and compiling rather than interpreting procedure files, FoxBase+/Mac puts itself squarely on the speedy side of the Iron Law. FoxBase+ applications share most of the performance virtues of Omnis applications, but an additional touch really breaks barriers. FoxBase+ automatically inspects available memory and adjusts allocation when performing sorts and searches—minimizing disk access and giving astonishing benchmarks on multimegabyte Macs.

Quick Sort

Omnis 3 Plus A mature product capable of producing fast, multiuser applications that look like traditional minicom-

Expense Reports

4th Dimension's extensive control over display features permits developers to completely customize an application's appearance. In this custom expense accounting application, users can further customize the categories list.



Customizing FoxBase+/Mac

FoxBase+/Mac attempts to anticipate most typical database requirements and offer fast menus for customizing them. The program menu also displays one of FoxBase's key speed features—compiled program files for database manipulation.

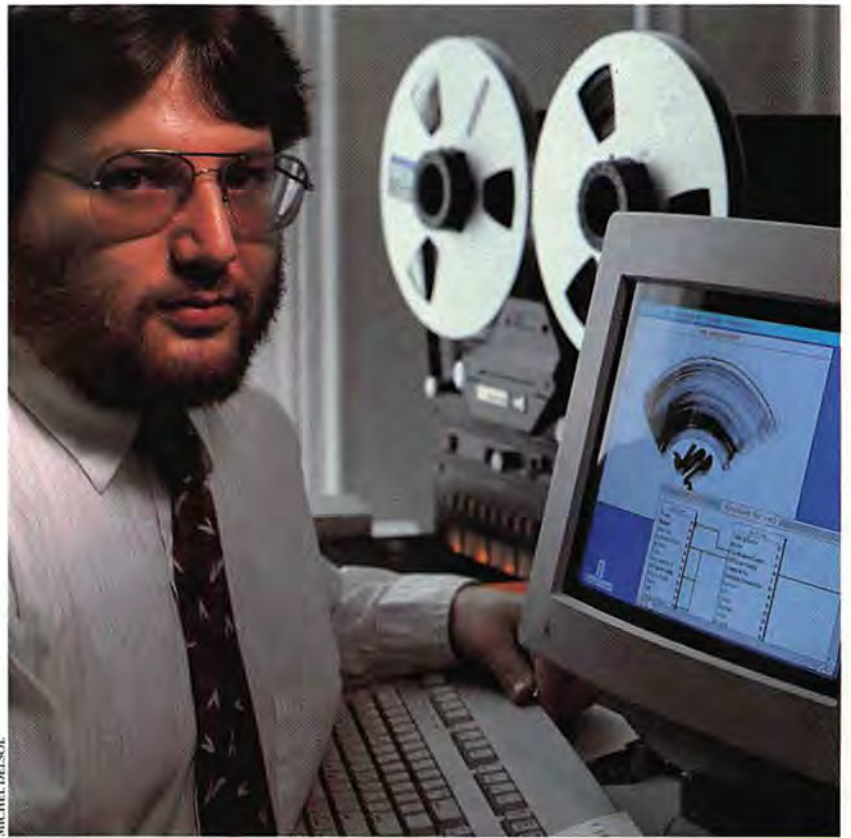


FoxBase+/Mac's View Window

FoxBase+/Mac's View window (above) shows relations between opened files and offers four buttons in the lower left corner for record manipulation. Quick access to multiple open windows is a FoxBase+ strong point.

4th Dimension Explorer

New York-based 4th Dimension developer Tony Oppenheim has designed custom databases for the Associated Press, Financial Performance Corporation, and CitiBank. The colorful display is the opening screen of Acius's own *MiniFans* application.



puter databases. Of the original Mac products, it's the champion at transaction processing.

Double Helix II This is a serious attempt to put database power in the hands of nonprogrammers. It's no speed demon, but the uniquely friendly interface has produced fervent admirers among nonprogramming business consultants.

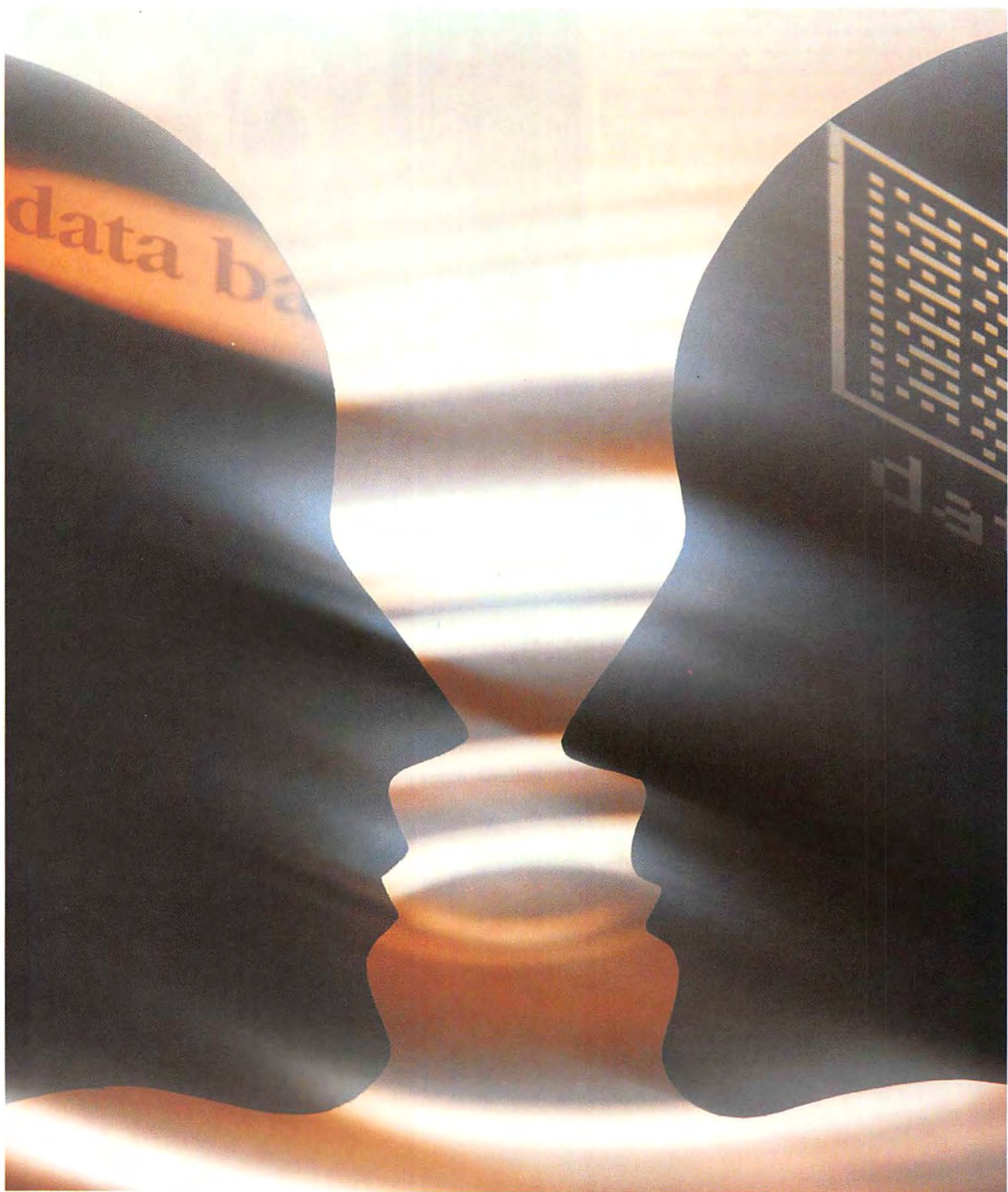
dBase Mac Not what everyone expected from Ashton-Tate, but it's a sophisticated development environment with considerable potential, even for nonprogrammers. Lack of multiuser capability and sluggish performance are its chief drawbacks.

4th Dimension A complete universe for database development, it gives you the power to do anything on a Mac. Its vast scope makes for a long apprenticeship, and it takes its time about many common tasks; but the most demanding database jobs call for nothing less.

FoxBase+/Mac This newcomer offers dazzling speed and compatibility with MS-DOS dBase files, for both programs and data. Not just a dBase clone, it offers a respectable array of features as a stand-alone Mac-only program, and it has rapidly emerged as a serious competitor.

When you're looking at databases, remember that relational products with programming capabilities will represent a considerable investment of time and effort to yield optimal results. If you have only a few mailing lists to manage, these products may represent more power (and complication and training time) than you really need. If you're serious about picking a development system, I hope these remarks are a useful starting point. □

See *Where to Buy* for contact information.



UNIX à la Mac

An introductory look at A/UX. What's so different about the Mac's alternative lifestyle?

by Matt Zeidenberg

Much has been made of the coming of UNIX, an operating system developed at Bell Laboratories in 1970. Despite manufacturers such as Sun, Hewlett-Packard, and Apple, who have managed to add a user interface to an otherwise faceless system, operating in a standard UNIX environment has never been for the faint of heart. Although Apple's version, A/UX, is based on AT&T's System V version of UNIX, Apple has added major extensions for network operation and support for Macintosh applications. Even so, operating A/UX on a Mac is in many ways just like running UNIX System V on any other microcomputer, minicomputer, or workstation. The day may come when operating A/UX will be as easy as running the Macintosh operating system, but until then a basic knowledge of A/UX and how it differs from Mac OS will satisfy the curious.

Multiprocessing and Security

First and foremost, A/UX is a multi-user, timesharing operating system. When you sit down in front of a UNIX system, it

prompts you for your name (or a user code that has been set up for you) and then asks for your secret password. If the password is valid, it logs you on—that is, allows you to use the system—and places you in your directory. Every user has a personal directory of files. Thus, unlike most stand-alone personal computer operating systems (including the Mac's), A/UX provides security, protecting the system and individual files on the system from unauthorized access, and individual users from each other.

UNIX, in addition to being a multiuser system, is a multiprocessing system (see "Multiuser A/UX"). Under UNIX, each user may run several programs simultaneously. For instance, you can edit a file, compile a program, and run a third program, all at once. Apple's MultiFinder runs only one application at a time, even though several may appear on the desktop.

Command Language versus Graphics Interface

While the Macintosh OS is a graphics-based system, A/UX is command oriented. Instead of selecting menu items, you type commands, a procedure that has both disadvantages and advantages. The main drawback is that you have to remember the commands and their syntax.

The main advantage of a command language is its flexibility. With a command, you can easily accomplish many tasks that

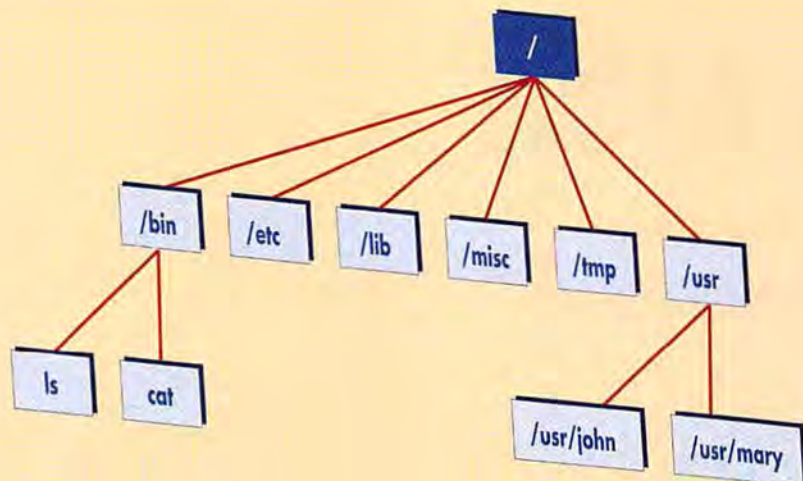
you cannot do using a graphics interface. For instance, in A/UX, to remove all files that begin with the letter *b*, you type the command `rm b*`. (The asterisk character is called a *wild card*; it matches anything.) Using the Macintosh Finder, by contrast, you must select each file individually.

Of course, you need not make a choice between a graphics interface and a command language; graphics interfaces that have been built on top of UNIX—such as X, Andrew, and NeWS (see "What's in a Window?" *Macworld*, November 1987)—give you both. Menus, icons, and dialog boxes are ideal for simple commands, while a command language enables you to issue complex commands. Both X and NeWS interfaces are available for A/UX.

The File System

A/UX is very similar to the Macintosh OS in the structure of its file system. Both UNIX and the Mac OS use a hierarchical file system (HFS) (see "Tree Views"). Under A/UX, folders are called *directories*. As in the Mac OS, A/UX directories can contain other directories. With the Macintosh OS, the top-level directory is the particular disk or volume one is using; under A/UX the top-level directory is always called the root (as in the root of a tree—albeit an upside down tree).

Matt Zeidenberg, a graduate student in computer science at the University of Wisconsin, Madison, has written on artificial intelligence, computer graphics, and networking.



Tree Views

The top-level directory, called the root, is denoted by a single slash (/). The root contains several subdirectories. The subdirectory /bin contains the programs that are executed by most commands, such as ls and cat. When you type a command at the shell, the shell usually looks first in /bin for a program to execute. Various other files are stored in the subdirectories /etc, /lib, /misc, and /tmp (these may have their own subdirectories, not shown). User files are stored in subdirectories of /usr. The directory system is similar to the Mac's HFS, but in A/UX there are large areas of the directory structure that are used by the system, whereas in the Mac HFS, system files are confined to the System Folder.

Virtual Memory

A/UX, unlike the Mac OS or MS-DOS, has an advanced feature called *virtual memory*, which allows applications to behave as if they had much more memory than is actually installed. For instance, an application that requires 2 megabytes of memory can run on a system with only 1MB of RAM. When the program starts up, A/UX loads the first portion of the program from the disk into memory. Later, when more of the program is needed, A/UX loads the required sections into memory, swapping out unnecessary parts to make room. The application designer need know nothing about virtual memory. A program can be written as if it were running in 2MB. Program and data space is limited only by available space on the hard disk.

This is a somewhat oversimplified de-

scription of the way A/UX operates. Actually, virtual memory techniques almost always bring data in and out of memory in chunks of one to several disk blocks, for efficiency's sake. These chunks are called *pages*. For each page that is brought into memory, another page must be overwritten. If any changes have been made to the page that is being overwritten, it must first be copied to the disk.

Virtual memory is complicated by the fact that UNIX is a multiprocessing system; many programs, as well as the operating system itself, share memory. The operating system must take care that users don't step on each other's toes and that each has enough memory to run.

Virtual memory requires hardware support in order to run efficiently. This is because every time a program references a memory address, the hardware must deter-

mine whether the data associated with that address is in memory. If it isn't, a *page fault* occurs, and the operating system must load in the page containing the required data. This process, called *address translation*, occurs so frequently that it needs hardware support. The Macintosh II provides this support via the paged memory management unit (PMMU), which is available as an option. A/UX requires both the PMMU and increased memory for operation. The 68030 microprocessor has a built-in PMMU; future 68030 versions of the Mac II will therefore not require additional PMMU hardware.

C Shells versus the Finder

A/UX has a program called the *shell*, or *command interpreter*, that interprets typed commands and passes them to the operating system for execution. Because UNIX was written by and for computer experts, its commands tend to be cryptic. For instance, we have *cp* for copy and *mv* for move; UNIX users don't like to type.

The shell is so named because it surrounds the operating system. The user interacts with the shell rather than with the operating system. Similarly, on the Mac, the user interacts with the Finder rather than with the Mac OS. There are several versions of the UNIX shell, the most popular being the C shell, the Bourne shell, and the Korn shell. The following discussion applies to the C shell.

The shell does more than interpret individual command lines. It is actually a programming language that lets you specify loops, conditional branching, and so forth. Thus if you have a particular se-

Comparing the Finder and the Shell

Action	Mac Finder	A/UX Shell
Running a program	Double-click on application icon	Type program name
Deleting a document	Drag icon to trash	Type rm
Renaming a document	Use cut-and-paste editor on document name beneath icon	Type mv
Examining contents of a folder (directory)	Double-click on folder to open window	Type ls
Duplicating a folder or document	Choose Duplicate from menu, or drag icon to destination	Type cp

quence of shell commands that you use frequently, you can put them all into a file and execute the file as a shell program.

Comparing Commands

Let's compare the most basic user actions in the Mac OS and A/UX. The operations are only roughly analogous, though, since UNIX normally lacks a graphics interface. For instance, to see the contents of a directory (folder) on UNIX, you need to type a command—on the Mac you need only open the folder.

■ Double-clicking on the Mac either starts an application or displays the contents of a folder. Under A/UX, to start an application, you must type its name. So, for instance, to start the text editor *vi*, you type *vi*.

■ On the Mac, when you are using the Finder, typically you have an active window that represents the contents of a folder. Under A/UX, you have a default directory, which is like the active window in the Finder. When you log on to A/UX, the default directory is set to an area in the file system called the *home directory*. You can create subdirectories of a home directory, subsubdirectories of subdirectories, and so forth.

By typing *ls* (for list) you can see the contents of the default directory. This is roughly analogous to opening a folder by double-clicking on it. Type *ls -l* to display an extended or long version of the directory (see "Directory Displayed"). The *-l* in *ls -l* is a flag; it tells the *ls* command to do something special. In this case the flag makes A/UX print out more information about each file: its owner and its protection status (that is, who is allowed to read, alter, or execute it).

In order to change the default directory, you use the *cd* (change directory) command. For instance, suppose you are currently in your home directory. The path name of the home directory might be */usr0/matt*. The term *path name* derives from the fact that the name shows the path from the top level (root) directory to the user's directory. Imagine that your home directory contains a subdirectory called *macworld*, you can change to this subdirectory by typing *cd macworld*. Now the default directory path name is */usr0/matt/macworld*. Now typing *ls* lists the files in this directory.

Under A/UX, there is a way to get quickly to any directory. For instance, if you want to get to a directory called *foo*, but you don't know exactly where it is, type *cd*

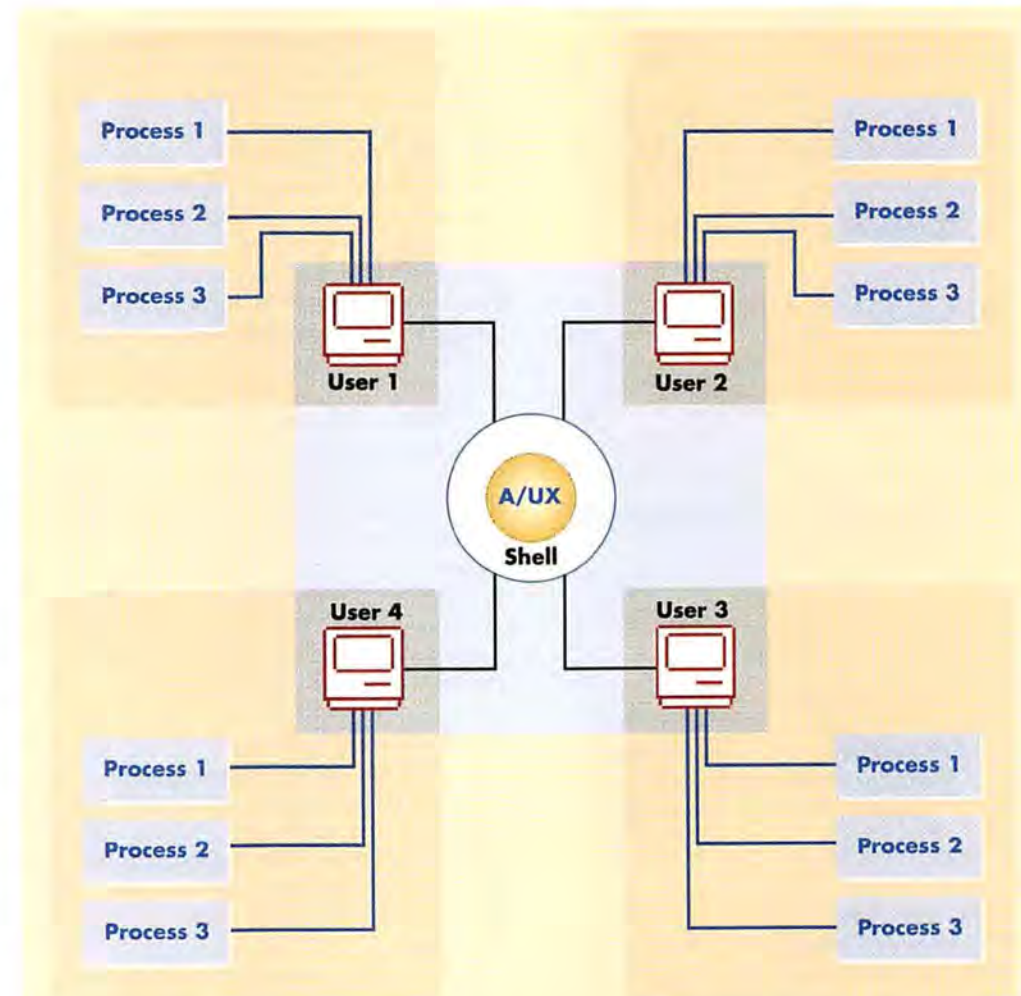
~foo. The tilde (*~*) acts as a wild card for any prefix in the path name.

■ To create a folder in the Finder, you select the command New Folder from the File menu. You then name the folder by editing the name beneath its icon. Under A/UX, to create a new directory called *foo* in the current default directory, simply type *mkdir foo*. You can then open it by typing *cd foo*.

■ In order to delete files and folders with the Finder, you select them and drag them to the trash. Under A/UX, to delete a file called *bar*, type *rm bar* (*rm* being short for remove). To delete a directory called *foo*, type *rmdir foo*. Using wild cards makes this command more versatile; to delete all files ending in *.for*, for example, type *rm *.for*.

■ With the Finder, renaming a file is a simple matter; you edit the name of the file beneath its icon. Under A/UX, if you have a file called *fromage*, and you want to rename it *cheese*, you must type *mv fromage cheese*. The *mv* stands for move; this command also moves a file from one directory to another.

■ To duplicate a file under the Finder, use the Duplicate command in the File menu. To copy a file from one disk to another, you drag the file's icon from the first disk to the second. Under A/UX, you use the *cp* (short for copy) command. For instance, if you are in your home directory, and it contains subdirectories called *foo* and *bar*, and you want to duplicate a file called *data* that is in subdirectory *bar*, you type *cp foo/data bar/data*.



Multiuser A/UX

A/UX is a multiuser, multiprocess system. Users can have as many processes as they wish. Here

four users have three processes apiece. Each user communicates with A/UX via a special program called the shell.



Connecting Pipes

The command `cat file1 file2 | nroff | lpr` takes the two files, `file1` and `file2`, concatenates them using the program `cat`, and pipes the output directly to the typesetting program `nroff`. This program typesets the combined file and pipes it to `lpr` (line-printer), a printing program, which prints it.

A/UX-Specific Command Features

The A/UX command language, or shell, has a number of advanced features that have no equivalent under the Macintosh OS.

As mentioned earlier, A/UX protects files against unauthorized access. The only file-protection mechanisms available on the Mac involve either making files invisible or encrypting them. Of course you can store floppy disks in a safe, but assuming you want to protect files stored on a hard disk, you must rely on the file protection provided by the operating system.

Each file under A/UX has three levels of permissions: permission to read the file, to write (change) the file, and to execute (run) the file. As the owner of a file you can grant these permissions to three categories of users: yourself, your group, and others. Your group consists of people you designate by using the `set group` command. *Others* means everyone on the system, other than the user and the group members.

To set permissions on a file, you use the `chmod` (change mode) command. For instance, if you want members of your group to be able to read and execute the file `foo`, type `chmod g+rx foo` (`g` stands for group, `r` stands for read, and `x` for execute).

You control access to the contents of your directory by setting the execution permission level of the directory. If you want everyone to be able to look at your subdirectory `macworld`, simply type `chmod o+x macworld`, when you're in the parent directory.

Redirection

A/UX assumes that all interactive processes take their input and output from the terminal. The terminal is viewed as two files, `stdin` and `stdout`, standard input and output.

UNIX allows you to get input and output from files other than `stdin` and `stdout` (see "Redirecting Input"). For instance, suppose you want to use the UNIX typesetting program `nroff`. You have an input file consisting of typesetting commands and text, called `article.in`. You want to create a file called `article.out` consisting of the typeset text. To do this, type the command `nroff < article.in > article.out`. The less than sign (`<`) tells `nroff` to take its input from the following argument (in this case, `article.in`); the greater than sign (`>`) does the same for output. This is called redirection of input and output.

Move Commands Compared

■ On the Mac, it is easy to duplicate a file, but not so easy to simply move it. If you drag a file's icon to a new folder or disk, a copy of the file remains in the original location; you must then remove the unwanted copy. A/UX lets you move a file in one step using the `mv` command. For instance, to move the file `data` in the example above instead of duplicating it, you simply type `mv foo/data bar/data`. This moves the file `data` from directory `foo` to directory `bar`.

With A/UX, the full name of a file is the full path name of the directory it is in, followed by the file name. For instance, a file containing the text for this article might be titled `/usr0/matt/macworld/article`. Viewed in this light, you can see that the `mv` command is actually a sort of rename command, since it changes the file's full name. (This is why the `mv` command also renames files, as we saw earlier).

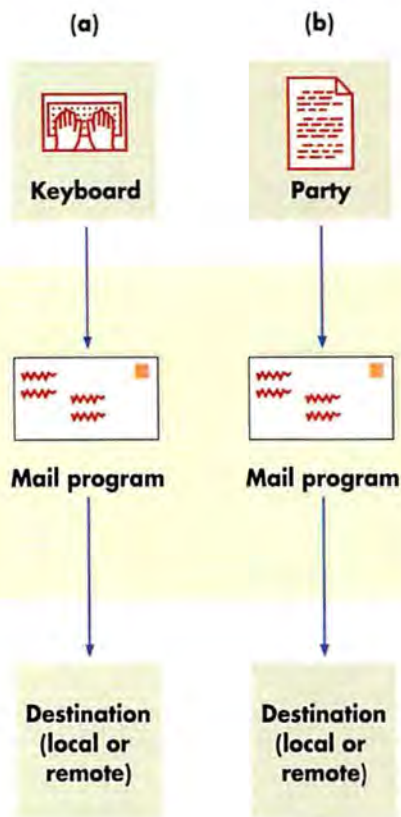
Examining Files

With the Mac operating system, in order to examine a file, you have to enter an editor, such as MacWrite. Under A/UX to see the contents of the file `foo`, you type `cat foo`. The `cat` command concatenates, or outputs, the file to the standard output device, the screen.

The more command is a slight variation on the `cat` command: more displays a file on the terminal one screenful at a time. After each screenful, you simply hit the space bar to see more; when you're finished, you press `q` (for quit). The more command prevents files from flying by so fast that you can't even see them.

Redirecting Input

(a) Normally, in using a UNIX mail program, you type messages interactively from the terminal. Alternately, as shown in (b), you can create a message file using a UNIX editor such as `vi`. Then when you type `mail john < party` the message contained in the file `party` is sent to John. The less than symbol (`<`) indicates that the mail program takes its input from the file instead of the terminal.



The Pipe

The *pipe* in UNIX is a way of directing the output from one program to the input of another (see "Connecting Pipes"). For instance, if you want to print the contents of the current directory, you type `ls | pr`. The vertical bar is the pipe; it indicates that the output of the `ls` command should be used as the input to the `pr` (print) command.

You can string more than one pipe together; for instance, the command `cat file1 file2 | nroff | mail joe` concatenates the two files *file1* and *file2*, uses the result as input to the typesetting program *nroff*, and sends *nroff*'s output as mail to user *joe*.

The closest thing to a pipe in the Mac OS is the Clipboard. You can think of a pipe as a sort of automatic Clipboard—a way of instructing one application to deliver its output to another, instead of your having to move the information using cut, copy, and paste commands.

Background Processes

What Mac user hasn't had the frustrating experience of waiting for a program to finish running? With A/UX, this is not a problem.

For instance, suppose you want to do other things while you are waiting for a long document to be typeset. You simply type `nroff < article.in > article.out &`. The shell returns the number of the *nroff* background process that you started, while allowing you to continue working and typing other shell commands. When the background process is complete, the process number is displayed. You can run as many background processes as you like, but since they all share one central processing unit, they compete for time.

A/UX on the Network

One reason for using A/UX is the wealth of software for UNIX in the network environment. In its initial release, A/UX doesn't support AppleShare, Apple's own network file-access system, although support for AppleShare is planned. In the meantime, A/UX uses Sun Microsystems' Network File System (NFS). NFS was developed under UNIX but can provide network file services to machines running heterogeneous operating systems.

The basic advantage of NFS is that it nests remote machines' files in a user's own local, hierarchical file system. Suppose you have a top-level directory called

disk blocks in directory

d if directory

number of links to file

```

& ls -l
total 244
drwxrwx--- 2 g-zeiden 512 May 29 1988 10:13 577
drwx----- 2 g-zeiden 512 Oct 27 1987 8:21 Mail
drwxrwx--- 2 g-zeiden 512 Mar 19 1988 2:19 News
-rw-rw---- 1 g-zeiden 3559 May 13 1988 11:01 anecdotes
-rw-rw---- 1 g-zeiden 278 Feb 23 1988 15:39 commands
drwxr-xr-x 2 g-zeiden 512 Nov 21 1987 16:14 hiray
drwxrwx--- 2 g-zeiden 512 May 29 1988 3:23 lang
-rw-rw---- 1 g-zeiden 4024 Apr 23 1988 19:09 lpr
drwxrwx--- 2 g-zeiden 1024 Mar 24 1988 12:34 mailmsg
-rw----- 1 g-zeiden 216223 May 12 1988 13:18 mbox
-rw-rw---- 1 g-zeiden 3706 Apr 28 1988 14:26 mess
-rw-rw---- 1 g-zeiden 3707 Apr 28 1988 14:26 mess2
drwxrwx--- 2 g-zeiden 512 Apr 23 1988 12:10 netstuff
drwxrwx--- 2 g-zeiden 512 Mar 21 1988 12:53 psych
-rw-rw---- 1 g-zeiden 2011 Aug 31 1988 2:12 syllabus

```

privileges of user

privileges of others

privileges of group

owner

bytes in file

file name

modification date, time

Directory Displayed

The long version of the list command (`ls -l`) prints information about the file, as shown here. Links show the number of times that a file appears in directories.

usr with subdirectories *bin*, *lib*, and *doc* on your machine, which is named *client*.

Now suppose you have a second machine, named *server*. On this machine, there are some documents in the directory called */usr/text* that you want to access. You can place this entire directory in your local file system by using the command

```
mount server:/usr/text /usr/doc/text
```

The `mount server` command makes all the files in *usr/text* on server available locally on client in */usr/doc/text*.

Whenever you access a file in this new directory, NFS actually sends a request to the server machine to read or write it. The file is not actually copied to the client machine. If you use a file often in a particular program or application, NFS may make a local copy for the duration of your work session, for efficiency's sake.

Here's how it works: the NFS running on the local machine makes a remote procedure call (RPC) to the NFS on the remote machine over the network. The server process then ships back the data or file, and the client process proceeds. The whole thing looks, from the programmer's point of view, like an ordinary procedure call, as in C or Pascal.

The nice thing about NFS is that it makes the network transparent to the user. The remote files are simply embedded in the local file system, and users have no idea whether they are working with local or remote files. A file that looks like it's on your disk may actually be on a disk across the hall or across the country. □

See *Where to Buy* for contact information.

Reviews

Illustrator: This Year's Model

Adobe Illustrator 88 1.5

PostScript graphics program. **Pros:** New features such as Freehand and Auto Trace tools make program easier to use than its predecessor. **Cons:** Limited text handling. **Company:** Adobe Systems. **List price:** \$495. **Requires:** Mac Plus, 800K external drive or hard disk; PostScript printer recommended.

According to the introductory videotape that comes with Adobe Illustrator 88, "Now anyone can create high-quality graphics and illustrations quickly and easily." One has to take promotional videos with a grain of salt, of course; the tape also presents a world in which all graphic designers are 28 years old, very good-looking, and sitting at clean desks. While Illustrator 88 won't make just anyone into a professional graphic artist, it will automate many of the steps involved in creating illustrations, saving professionals time and effort. And Illustrator 88 adds several new tools that make the program easier to use than its predecessor, aiding aspiring artists as well.

Like Adobe's original Illustrator, Illustrator 88 uses PostScript to create illustrations. Illustrator 88 employs the same technique as the original program: drawings are made up of bezier curves, which can be precisely adjusted by dragging the curve itself or by manipulating handles attached to points on the curve's path. PostScript lets you assign attributes such as weight and color to a line or shape, and enables you to resize, rotate, skew, and otherwise alter text or graphics. You can convert scanned images into PostScript by tracing a template, or draw an illustration from scratch. DrawOver, a new utility, converts MacDraw illustrations into Illustrator 88 format, allowing you to enhance them with Illustrator 88's PostScript talents.

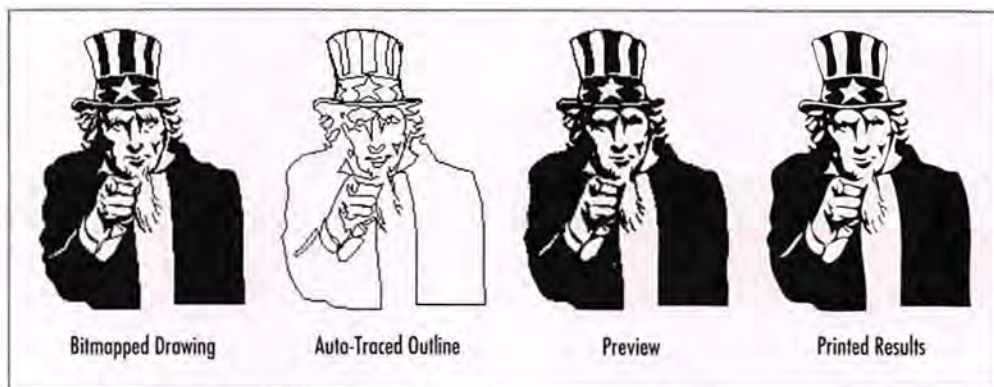
New Tools of the Trade

Since it would be impossible to cover all the features of this complex program in a review of this size, I'll focus on Illustrator 88's improvements over Illustrator. For a description of the original program, see "Illustrator: The Tracer's Edge," in the June 1987 issue of *Macworld*.

One important enhancement is the Freehand tool, which operates much like a pen or pencil—you simply position the cursor and drag the mouse to draw. If you make a mistake, press the ~ key for an instant eraser, back up over the mistake, then continue drawing. The Freehand tool makes Illustrator 88 more accessible to beginners than the original Illustrator, which required users to jump right into the often-

tricky manipulation of bezier curves. The Pen tool, which draws bezier curves and straight lines, still exists in Illustrator 88 and can be used with the Freehand tool when drawing a shape.

While the Freehand tool is a major innovation, Illustrator 88's most spectacular feature is its Auto Trace tool. With Illustrator you had to trace a template by hand, a procedure that required patience, dexterity, and often hours. Illustrator 88's Auto Trace feature traces a template for you; click on a portion of the template and Auto Trace draws an outline around an edge or a shaded area. You can then edit the outline as you would a path you drew with the Pen or Freehand tool. This tool works best with fairly simple drawings; a scanned image with numerous small strokes or areas that blend into one another can be difficult to trace and may cause an out-of-memory error. And keep in mind that Illustrator 88 templates are reduced to black and white; if you've scanned an 8-bit gray-scale image, the shades of gray are lost when the image is placed in Illustrator. But on the whole I was impressed with Auto Trace's effectiveness. I converted several clip-art drawings to templates and tried out Auto Trace; in



Tracing Sam

A bitmapped image can be automatically converted to PostScript's bezier curves with Illustrator 88's Auto Trace feature. Here, the transition from MacPaint document to printed Illustrator 88 document is shown. This sample was not retouched; in most cases you would automatically trace a drawing and then touch up rough spots before printing.

one test it traced all 48 states in a United States map in about a minute, and did a pretty accurate job. "Tracing Sam" shows what this tool can do.

Another impressive enhancement is the Blend tool, which places intermediate shades between two selected areas. You may have seen blend tools in other PostScript graphics programs that produce a gradient fill, performing a smooth transition from one color or gray scale to another. But Illustrator 88 blends shapes as well as shades. For example, you can start with a circle and transform it into a square, specifying the number of intermediate shapes between the original shape and the final one. Like the Auto Trace tool, the Blend tool works better with some shapes than with others; you'll have to experiment to see whether one shape will smoothly metamorphose into another. "Two Blends" shows samples of the Blend tool's work. You can create some impressive effects by combining the program's masking feature with a blend. This feature lets you "cut out" a shape and let a blended area show through, filling the shape with a blend.

Another new addition, the Measure tool, is less spectacular than the other new tools, but useful nonetheless. This tool calculates the distance between two points and displays the results in a dialog box. The box indicates the horizontal and vertical distance between the specified points, in centimeters, inches, or picas, as well as the angle between the two points. Although the Measure tool is helpful, I prefer to see measurements dynamically displayed as I draw, the way MacDraw's Show Size command displays them.

Color Printing Tools

Many designers will use Illustrator 88 to create color artwork. If you have a Mac II with a color monitor, you can work with color on the screen, previewing your illus-

tration and trying out color combinations as you work. Illustrator 88 lets you print with process colors or custom colors.

If you use the four-color process, you indicate percentages of cyan, magenta, yellow, and black to create colors. The Color Guide manual includes color tint charts showing the percentages of the four base colors for every process color you can create. Although the colors you see on the screen will rarely match your printed output, Illustrator 88 provides a special dialog box that lets you adjust on-screen colors to match a sample color bar from your printer as closely as possible.

If you use custom colors, Illustrator 88 lets you create your own colors or choose from over 700 Pantone Matching System (PMS) colors; screen representations of the PMS colors are built into the program. To

apply PMS colors, you consult a Pantone color guide to determine the color you need, open a dialog box, and select the color from a list. Although the manual states that two PMS files—one for coated paper and one for uncoated—are included, the company made a last-minute decision to ship only coated-stock colors. After you've assigned either process or custom colors, you use the Adobe Separator utility included with the program to print negatives for your printer.

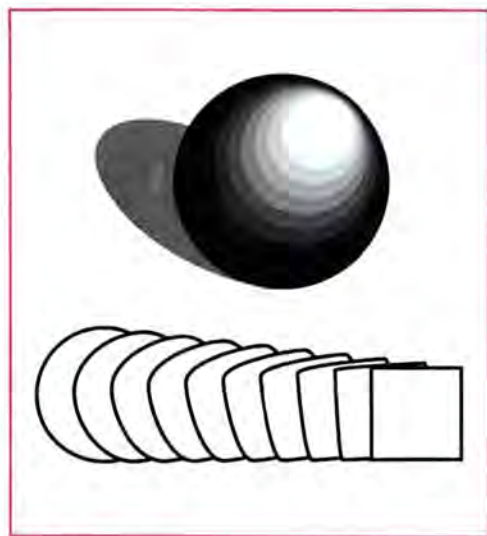
Pictures Worth More than Words?

As you can see, Illustrator 88 offers some impressive enhancements. I was disappointed, however, that one area of the

(continues)



original program was not improved. Illustrator 88's text handling falls short of that of its competitor Aldus FreeHand. For example, FreeHand offers precise kerning—the addition or removal of space between letter pairs—while Illustrator 88 lets you apply spacing changes only to an entire block of text (at least Illustrator 88 corrects the terminology in the Type dialog box, calling the feature Spacing instead of Kerning, as in Illustrator). Also, Illustrator 88 doesn't offer FreeHand's ability to mix font styles in a block of type, letting you place an italic word in a sentence, for example.



Two Blends

Illustrator 88 can blend from one shade of gray or color to another, or from one shape to another.

On the other hand, Illustrator 88 allows you to treat text as graphics, letting you change fill color, outline weight, and so on.

Other items on my wish list are a Revert command, an Align Objects command, and the ability to place text on a path—all of which are available in FreeHand. Overall, however, Illustrator 88 is a magnificent program. In my opinion, features such as Auto Trace, Blend, the Freehand tool, and the inclusion of Pantone Matching System colors—on top of the already solid foundation of the original program—make Illustrator 88 the premier PostScript graphics program. —*Erfert Fenton*

See *Where to Buy* for contact information.

Mapping Your Business

GeoQuery 1.01

Electronic map and map-pin database.

Pros: Graphically displays geographical data; produces multiple reports; provides a lot of latitude in creating regions and redesigning the map. **Cons:** Does not have route map; slow; not enough on-screen help. **Company:** Odesta Corporation. **List price:** \$349. Additional maps \$100 to \$500. **Requires:** 1MB, two 800K drives; hard disk recommended.



Say you're the new sales manager of a firm that plans to sell ice to the Eskimos. You might hang up a map of Alaska and stick colored pins in it to represent population centers. You might also draw symbols on the map to represent landmarks like warehouses and service centers. Based on the location of the pins and symbols, you could carve out territories and decide where to base salespeople.

GeoQuery automates that process. The program comes with three maps: the continental United States, Alaska, and Hawaii. You can also buy maps of individual states and geographic regions, as well as specialty maps such as ADI and DMA (for analysis of broadcast media coverage) and SMSA (for demographic information).

To use the program, you import information from a word processor, database, or spreadsheet. GeoQuery knows the location of every zip code in the United States; so as long as the data is related to a zip code (as it is with most demographic services), GeoQuery can display map pins to represent information. You can, for example, display pins on the map location of each prospective dealer, and you can use different types of pins to distinguish the size of dealerships. Then you can change the screen so the pins represent advertising media such as TV or radio stations. Pins can also represent permanent landmarks. GeoQuery makes it easy to visually determine whether distribution among territories is correct, where to place salespeople, how to manage sales calls most efficiently, and which advertising medium best reaches your potential market.

GeoQuery has 20 symbols to represent different pins. On a Mac II, pins can be distinguished by color, symbols, or a com-

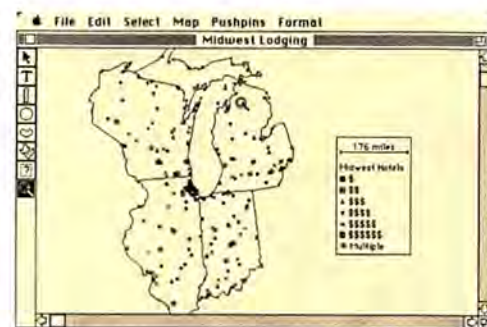
bination of both, thereby allowing you a large number of data sets. You'll find, however, that if you use more than 10 different kinds of pins at once, the map becomes confusing. GeoQuery also allows you to hide pins. For example, you can hide all pins that represent population centers of less than 10,000, in order to make your map easier to read.

Map Regions

GeoQuery provides summary reports to answer questions like, How many prospects are there within 15 miles of Anchorage? To get these reports, you first delineate regions. When you open a new map of the United States, each state is treated as a region—but you are given a good deal of latitude in redesigning the map. You create your own regions by drawing them with the Circle, Slicer, or Free-Draw tool, or by selecting a zip code to be the center of a circular region of any size you specify. You can also join states or other regions to form new regions. If a region is cut up into smaller regions, you can opt for reports on both the larger, underlying region and the smaller, superimposed regions. GeoQuery also lets you eliminate states, resize the map, choose patterns for boundaries, and add text.

Reports and pin data can be exported to other programs. You can load a list of large population centers into Excel to determine average population, or you can load the names of all distributors into Microsoft Word to send mail merge letters.

(continues)

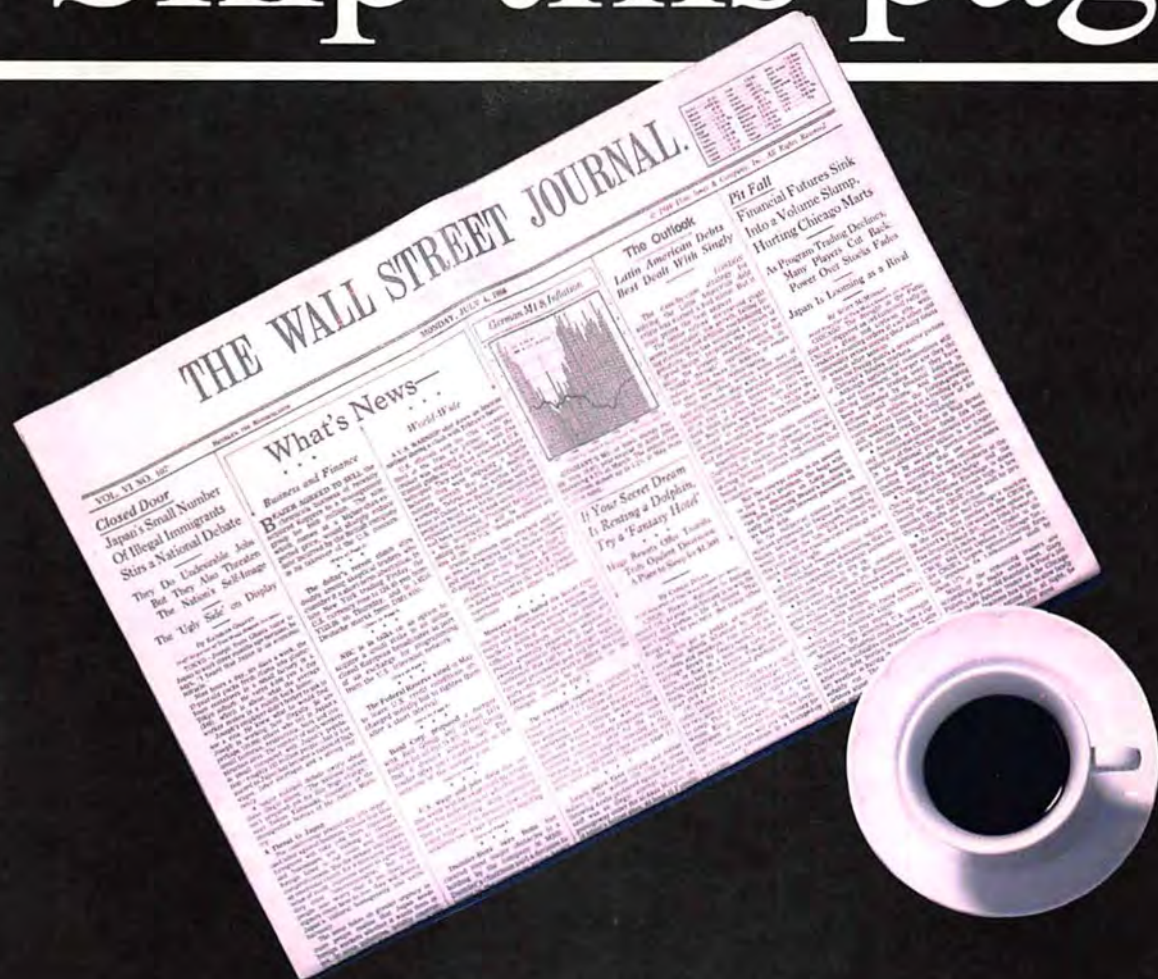


Symbols

On this map of four midwestern states, each pin represents a hotel. The cost for staying at each hotel is represented by a category ranging from \$ to \$\$\$\$\$. Each category is depicted by a symbol shown in the legend.

If your Macintosh reads the Wall Street Journal

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Room for Improvement

When I was a salesman and had to measure mileage, I would have liked to use GeoQuery in place of maps, map pins, compass, stacks of reference books, and string. But while GeoQuery is miles ahead of the manual map-pin method, it lacks certain refinements that would make it a really great program. For example, GeoQuery has a tool that works like those rollers that you run over a map route to determine driving distance. But GeoQuery doesn't provide a route map, so all measuring is done as the crow flies. GeoQuery measures one 160-mile drive I often take (which requires going south, then west) at only 113 miles.

GeoQuery is also about as slow as rush hour traffic. It takes over one minute to access the map of the United States or to join the six New England states into one region—or even to make a minor size adjustment to the map. And the program is fussy. It won't let you join dissimilar-shaped (circular and polygonal) sections of the map into one region, and you can't move two noncontiguous states closer together even if you've deleted all the states that lie between them.

Midwest Lodging Record

Hotel Name: El Rancho Stevens
 Chain: Independent
 Location: On Lake Dixon
 Address: 2332 East Dixon Lake Road
 City: Gaylord
 State: Michigan
 Zip Code: 49735
 Phone: 517-732-5090
 High \$: \$70.00
 Low \$: \$52.00
 Average \$: \$61.00
 Rate Group: \$\$
 Pool?: ☐
 Food?: ☐
 Comments:

Pushpin Reports

If you place the magnifying glass over any pin and click, a report window appears containing all data related to that pin. Although any data item in the report can be used to generate pins, only items that result in fewer than ten different pins, such as Food or Pool, are useful. You can easily switch back and forth between data sets. (Normally, this window would appear on the same screen as the map.)

Also, on-screen assistance is often lacking. For example, if you try to change the legend to one that won't fit in the designated space, the program doesn't display a warning box or even beep; it just ignores you. And some of the dialog boxes are not as clear as I would like. But while these concerns make the program less convenient than it could be, they don't detract from its conceptual ingenuity; nor do they, for the most part, seriously hinder its usefulness.

Mapping territories, deciding on routes for sales trips, choosing warehouse and sales office locations—all are complicated tasks that should not be done by sticking colored pins in a piece of paper. If you're responsible for such activities, you should seriously consider GeoQuery.

—Lawrence Stevens

See *Where to Buy* for contact information.

A Color Presentation

Cricket Presents 1.0

Desktop presentation application. **Pros:** Extensive set of drawing tools; makes full use of the Macintosh II's color capabilities. **Cons:** Awkward text handling; absence of scroll bars; output devices must be selected twice. **Company:** Cricket Software. **List price:** \$495. **Requires:** Macintosh Plus; hard disk; 2MB of RAM recommended.



According to the advertisements, Cricket Presents provides all the tools you need to develop a presentation quickly and efficiently. The first product of its kind to make full use of the color capabilities of the Mac II, Cricket Presents just about delivers on its promise.

Frame by Frame

Presentations created with Cricket Presents are composed of three closely related elements: frames, speaker's notes, and handouts. The cornerstone of a presentation, frames, are what the audience actually sees. Cricket Presents lets you design frames for a variety of media, ranging from 35-millimeter slide makers (also called film recorders) to color ink-jet printers. Even the Mac's screen can serve as a presentation device when you use the special Video Show feature.



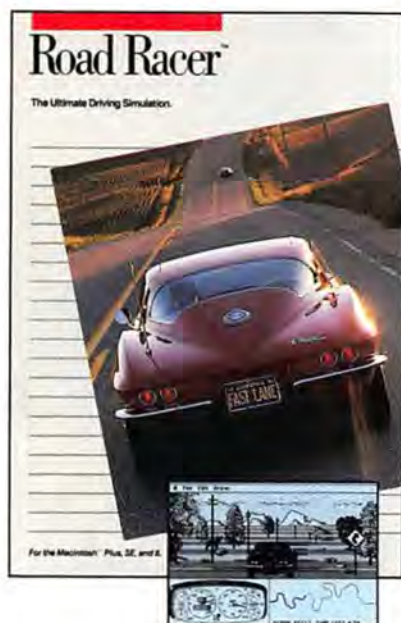
The Frame View is Cricket Presents' workbench, and consists of a drawing area, a tool palette, and a menu bar. Macintosh veterans will notice a few strange quirks in the user interface. One of the most annoying is the absence of scroll bars—while the hand tool is fine for moving short distances, scroll bars can't be beat when you need to get somewhere fast. Finding a particular frame is also a bit awkward: you either click on the dog-eared corner to page through the presentation one frame at a time or select the frame counter and type the number of the frame you want. Choosing Sequence by Image presents all the frames in miniature. Although you can cut, copy, and paste frames in this view, the small size sometimes makes it hard to distinguish one frame from another.

Tools of the Trade

Cricket Presents includes an extensive set of drawing and alignment tools. Images can be imported directly into frames if they're stored as MacPaint, PICT I, PICT II, or EPS files. To conserve valuable disk space, imported files larger than 32K aren't actually transferred into the presentation, but linked to it from their original locations, a process Cricket calls *hot-linking*. This feature is very useful if you regularly use scanned color images, for example.

As with many object-oriented programs, entering and editing text isn't easy. A mini text editor in the frame supplies a ruler, alignment icons, and tabs. Unfortunately, the editing window obscures whatever lies beneath it, so it's hard to gauge

(continues)



**Speed limit 200.
Strap yourself in for the
ride of your life.**

Road Racer's detailed graphics and digitized sounds simulate driving conditions in 5 environments ranging from high-speed desert flats to twisting mountain roads. So convincing you'll actually find yourself trying to look over the hills and around the turns.

The trees, rocks, telephone poles, and other graphics fly past your 1965 Corvette at breakneck speeds. Hear its thundering 350-horsepower engine and screaming tires as you corner around wicked curves.

Steer and accelerate with the mouse, and use your keyboard for brakes and shifting.

Each level is tougher than the last with unpredictable road hazards and many courses to travel. You score points for fast, skillful driving. Road Racer is high performance you won't forget.

Circle 291 on reader service card



**Watch out! ... SMASH! ...
A heat-seeking missile
has just slammed
into your ship.**

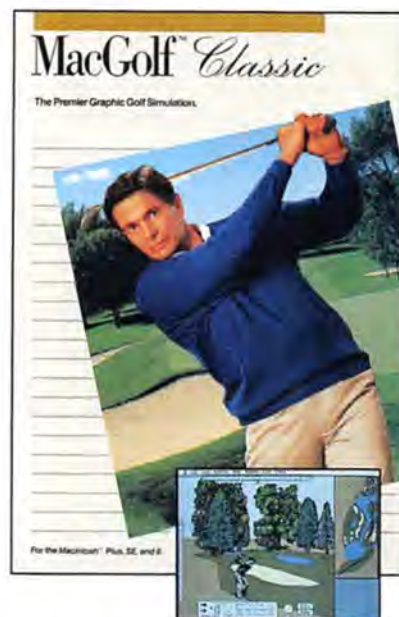
The year is 2059. Raiders have stolen five controlling crystals that maintain the defense and supply network for the moon's 26 cities. With key commodities cut off, the cities are doomed.

Your mission is to recover the fiendishly hidden crystals while transporting vitally needed goods between cities. Traverse dangerous terrain and combat relentless attacks with your arsenal of lasers, cannons, bombs and shields.

Prepare yourself for an odyssey of furious action and strategic high stakes trading.

Lunar Rescue is an addictive adventure that challenges your imagination and sets your adrenaline on fire.

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**A premium edition of the
best selling Macintosh
game in the world.**

MacGolf Classic puts you into a full perspective 3-D simulation of realistic golf action. You match your skills against fairways, roughs, sand traps, water hazards and trees.

MacGolf's two courses are together with the four MacCourses™, for a total of 108 holes, all in vivid full screen color on the Macintosh II.

MacGolf Classic gives you a player's eye view and an aerial overview of each hole with close up options. You have complete control of your position, ball placement, ball speed and direction, and selection of all 14 clubs. Spectacular digitized graphics and sounds add to the excitement.

MacGolf Classic is so close to the real thing it will improve your golf game. Every challenge should be this spectacular.

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Reviews

how well the text blends into the frame until you finish typing. I'd prefer to see the ruler as an option. On the plus side, creating tables is a snap, thanks to a specialized tool that bypasses the text editor.

Charts add visual punch to a presentation, and Cricket Presents lets you incorporate graphs without quitting the program. You enter your data into a spreadsheet-like window and then choose from among eight types of graphs to create. The bad news is that you're limited to 25 rows and 8 columns of data, and there's no way to import or paste data into a graph—Cricket Presents' graphing tools are too limited for many scientific and business applications.

Color Schemes

With the ability to choose from approximately 16 million colors available on the Mac II, it's hard not to feel like a kid in a candy shop. Cricket Presents does a good job of giving you access to the full range of colors without overwhelming you. Virtually anything that goes into a presentation, whether it's a drawing, graph, or text, can be colored with a few mouse clicks. The program works with palettes of 64 colors, of which you can freely customize 56. And Cricket Presents doesn't leave Mac Plus and SE users in the dark. Every color in a palette can be given a unique name, like Big Blue or Candy Apple Red. On monochrome screens, you can assign hues by picking the name of a color from a scrolling menu. It's not as elegant as seeing your work in its brilliance, but it's a lot cheaper than buying a Mac II.

To help you maintain frame-to-frame consistency, Cricket Presents lets you

apply all the features common to a presentation (such as a background color or company logo) to all frames. The only thing missing is a way to add smooth shading to a background. The template function also encourages consistency by letting you store custom frame formats. Cricket Presents comes with an extensive library of templates.

Hard-Copy Help

Although Cricket Presents lets you create speaker's notes and audience handouts, its text and drawing tools aren't as well suited to these tasks as they are to designing frames. Whatever type of output device you decide to use for each element of your presentation, though, Cricket Presents forces you to select it twice—once in the Chooser and a second time in a special "Assign Devices" dialog box. It's an extra step I could easily do without.

For those without a film recorder or ink-jet printer at their disposal, Cricket Presents comes with specialized software designed to work with the Autographix Imaging Centers. You send your presentation on disk or by modem to the nearest center and receive your output the next business day. The standard charge is \$12 for slides and \$9 for color overhead transparencies.

If you can live with a few quirks and limitations, Cricket Presents provides an efficient, cost-effective way to create material for professional-looking presentations. About the only thing it *won't* do is stand up and give your speech for you.

—Franklin Tessler

See *Where to Buy* for contact information.



A Publisher's DEST Friend

PC Scan 2020

Scanner. **Pros:** Compact; high-quality output; fast scan times; OCR software accurately reads typewritten text. **Cons:** Expensive; sheet-fed mechanism makes image alignment difficult; sheet sensor on review unit needed adjustment.

Company: DEST Corporation. **List price:** \$2345; Publish Pac software \$595; PC Scan 2000 (no OCR) \$1495. **Requires:** 1MB.



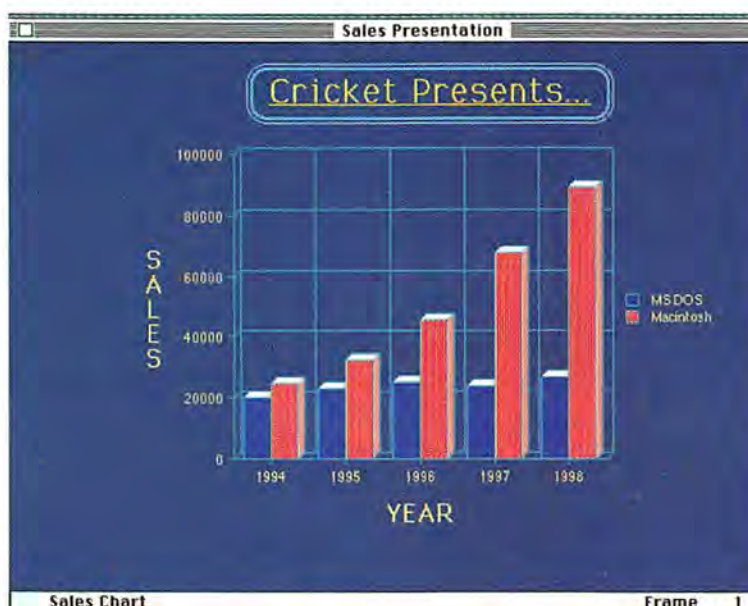
Few peripherals have promised so much but delivered so little as scanners. The notion of including scanned pictures in documents has long enticed desktop publishers, but grainy photos have often been the result.

All that is changing, however, thanks to several developments. First, today's scanners can detect and transmit gray-scale information, allowing higher-quality renderings of photographs. Second, file-compatibility headaches are fading as more developers accept tagged-image file format (TIFF) as a standard for exchanging scanned images. Third, image processing programs such as Letraset's ImageStudio and Silicon Beach's Digital Darkroom make on-screen retouching a reality. Finally, advancements in optical character recognition (OCR) software allow scanners to accurately read typewritten pages and churn out text files that you can edit with a word processor.

(continues)

Sales on Target

All the elements in the slide shown here, including the graph, were designed using Cricket Presents' built-in tools.



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Education

Video Production

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TV Producer™ board

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cial effects open a new dimension to color painting on the Macintosh II. For example, 'Wet canvas' lets you mix and 'smudge' colors on screen as you would do with a palette, making it possible to achieve effects a la Van Gogh or Turner. We pack each unit with 5 disks of color art for direct use, inspiration and instruction. Modern Artist includes ColorSep™, a professional color separation utility for the Laserwriter™ or Linotronics™

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Circle 68 on reader service card

DEST's PC Scan 2020 illustrates just how far things have progressed. This 300-dots-per-inch (dpi) scanner boasts impressive gray-scale features, and its OCR features let it turn typed pages into text files with impressive speed and accuracy.

The PC Scan 2020 also furthers the welcome trend toward scanners equipped with SCSI interfaces instead of serial ones. SCSI's far faster transmission speed lets the scanner beam its bytes to the Mac more quickly—a significant plus with gray-scale scanning, which often involves moving megabytes of data. And the PC Scan 2020's interface is built in; by contrast, some scanners, such as Abaton's 300/FB, still use a bulky external box to translate signals into SCSI data.

Sheet-Fed versus Flatbed

The PC Scan 2020 is a sheet-fed scanner, and as such, it has advantages and disadvantages when compared to a flatbed unit. (Sheet-fed scanners draw the originals through a front-panel slot and roll them past the scanning optics. With flatbed units, originals lie face-down on a piece of glass and remain stationary as the scanning optics move underneath.) On the plus side, the PC Scan 2020's sheet-fed mechanism makes it faster than flatbed units. On the negative side, the PC Scan 2020 can't scan anything that won't fit and curve through

its transport. And it's hard to position originals so that they feed perfectly straight. Users who prefer flatbed scanners may want to investigate DEST's PC Scan 1000 series.

The sheet-fed versus flatbed debate may rage on, but you can't argue with the PC Scan 2020's impressive gray-scale features. Many gray-scale scanners—including Hewlett-Packard's ScanJet, DEST's PC Scan 1000 series, and Abaton's Scan 300/FB—detect and transmit only 16 levels of gray-scale information. Others, including DataCopy's Model 830 and Microtek Lab's MS-300A, support 64 levels. The PC Scan 2020 is one of the few that recognizes 256 gray levels, enabling it to render continuous-tone images far more accurately (see "Levels of Gray").

Mac Pac

Your link to the PC Scan 2020 is an application called Publish Pac, which you use to perform common setup chores, such as defining the area to be scanned and the scanning resolution (200, 240, or 300 dpi), and specifying whether you're scanning line art or continuous-tone originals. You can scan the image at actual size, reduce it to as small as 50 percent, or enlarge it as much as 200 percent of actual size. You can also lighten or darken the image in seven increments. That isn't as flexible as the con-

tinuously variable brightness "sliders" that scanning software such as Abaton's C-Scan provides, but I found it adequate. Publish Pac lacks a contrast adjustment, but my results with low-contrast originals were excellent nonetheless. You can save scanned images as TIFF files (the preferred choice for gray-scale images), or in MacPaint, encapsulated PostScript (EPS), or SuperPaint formats.

Publish Pac provides several MacPaint-style drawing and editing tools, but none are very effective for working with gray-scale images. DEST also includes Silicon Beach's SuperPaint with Publish Pac, but for advanced gray-scale work, you'll want ImageStudio or Digital Darkroom.

The PC Scan 2020 fared well in the OCR department, too. Publish Pac's Scan Text command turns the PC Scan 2020 into an electronic typist that reads typewritten documents and creates text files of their contents. The PC Scan 2020 accurately scanned documents printed in the IBM Selectric Courier font, and the Publish Pac manual claims it can also read Elite, Letter Gothic, OCR-B, Pica, Prestige Elite, Prestige Pica, Madeleine, Title, and 10-point Times Roman fonts, as well as monospaced dot-matrix output from Epson, Okidata, IBM, and Hewlett-Packard Printers. You can scan a page containing graphics and text as a graphic, and then draw a marquee around the text and convert it using the Convert to Text command. At \$850, the OCR option isn't cheap, but if you have reams of typed text that you want to get on disk, it could quickly pay for itself (\$695 more buys an automatic document feeder that eliminates the need to hand-feed the scanner).

My only complaint about the PC Scan 2020 is that my review model's page sensor—which causes the rollers to turn when you insert an original—was out of adjustment, forcing me to trip it manually with a folded business card to begin each scan. I'm sure that was an isolated flaw, however; the PC Scan 2020 performed perfectly otherwise.

Scanners aren't for everyone (for more information about using halftones, see "A Halftone Handbook," in this issue). You can buy quite a few top-quality photographic halftones for \$2345, and you won't have to give up gobs of hard disk space or fuss with file formats. But if you are committed to electronic image processing and you need an OCR device, the PC Scan 2020 is an excellent choice.—*Jim Heid*

See *Where to Buy* for contact information.



Levels of Gray

This Linotronic 100 output shows the difference in quality between a scanner that saves 16 gray levels and one that saves 256. At left, output from a 16-level Abaton 300/FB. At right, the identical image scanned on the 256-level DEST PC Scan 2020. The 16-level scanner lost most of the background detail, and its image lacks the wide range of grays in the DEST image.

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Circle 102 on reader service card

Low-Volume Color Printing

Tektronix Color Image Printer Model 4693D

Thermal-wax color printer. **Pros:** Prints nearly 16 million colors; flexible control settings; easy maintenance; fast off-load of images from Mac. **Cons:** Expensive; poor color matching; not networkable. **Company:** Tektronix. **List price:** \$8495; Mac interface \$495; 4MB upgrade \$2500; 8MB upgrade \$5000. **Requires:** 2MB; Mac II.



The Tektronix Color Image Printer 4693D offers Mac II users a cost-efficient way to produce small runs of color fliers and brochures, presentation materials, and storyboards. This thermal-wax printer produces images at 72, 150, or 300 dots per inch (dpi). Although it does not support PostScript applications, such as Adobe Illustrator, it performs well with QuickDraw graphics, such as those produced by Cricket Presents. The printer also supports most of the colors the Mac II displays, but like most output devices does not do a good job of matching screen colors with final colors.

A sturdy beast, the 4693D weighs in at 99 pounds and measures approximately 12 inches high, 22 inches wide (35 inches with the paper cassette), and 21 inches deep. The printer attaches to a NuBus controller card, which you install in any empty Mac II slot. Unfortunately, this means that the 4693D does not run on a network. You can, however, attach up to four Mac IIs to the printer via an optional 4-Channel Multiplexer from Tektronix.

The amount of memory in the Mac and in the printer affects performance. You need a minimum of 64K free memory in the Mac to print, but the more memory you have free, the less time it takes to send an image to the printer. For instance, an image that took 12 seconds to send to the printer using the minimum memory took 7 seconds using 5 megabytes. Given the cost of memory, however, you may want to weigh the inconvenience of waiting the extra seconds against the amount of money you'll need to invest in more memory.

The Tektronix printer contains a 16-MHz 68020 processor for processing images. Although it seems that processing and printing time would depend on the size of the image, the 4693D took 50 seconds to process a 45K color PixelPaint file and 50 seconds for a 152K PixelPaint file. Only the transfer speed from Mac to printer varied—50 seconds for the smaller file and 60 seconds for the larger one. Also surprisingly, the images took 1 minute and 5 seconds each to print—even additional copies took 1 minute and 5 seconds.

The 4693D comes with 4MB of its own memory, and you can upgrade it to 8MB or 12MB. The additional memory serves as a print buffer, allowing you to store more than one image for printing, thus freeing up the Macintosh faster. You should upgrade if you have several Macs competing regularly for access to the Tektronix, since the additional memory will reduce print request conflicts by buffering jobs.

Color Matching

The Tektronix's four-color thermal-wax transfer roll contains cyan, magenta, yellow, and black, which yield 7 fundamen-

tal colors plus the background color of the paper. The 4693D uses dithering to simulate the Mac's 16 million colors, and it prints with a 256-color palette (which toggles to 256 shades of gray, plus black and white). Although this gives you almost the full range of colors you see on the Mac II, dithering causes some colors to look more "solid" than others (see "Presentation Pie").

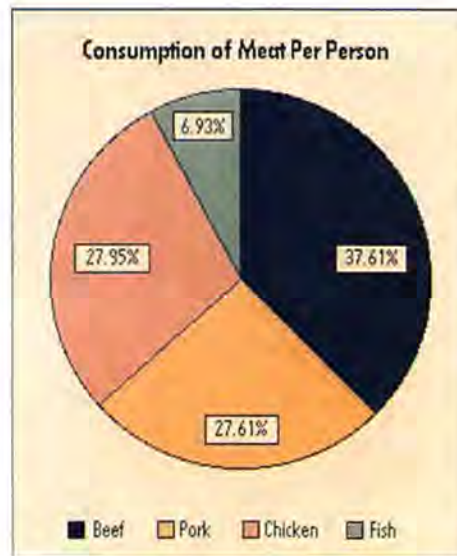
The 4693D doesn't support PostScript, but we had no problem printing documents from the applications we tried, including PixelPaint, Digital Darkroom, Colorizer, PageMaker, Cricket Presents, and FreeHand. The quality of type is similar to that of the ImageWriter, but because the 4693D directly supports gray scale, gray-scale images look better than those printed on a LaserWriter. The Tektronix printer also comes with software for printing color screen dumps.

Page Setup and Print dialog boxes control printer options. The Page Setup dialog offers numerous print choices including media type and size, minimum or maximum speed, page orientation, resolution, and imaging. Imaging options (Standard, Expert, and Front Panel) enable you to program the printer.

Front Panel mode lets you control the printer via options on the front of the printer itself. These options are really only for applications that don't support Print dialog boxes. Standard mode makes it easy for a casual user to select appropriate options. It uses a basic color palette and only lets you select such items as type of image (for instance, chart, bitmap, or text), color or gray-scale palettes, and invert black and white.

The Expert mode is by far the most interesting and is the one that allows the most control over output. For instance, you can choose from five color palettes, lighten colors by degrees, adjust the pixel aspect ratio to condense or stretch images, exchange one color for another throughout an image, choose color adjustment and correction, and control the printing size of the image either through replication (increasing the image size proportionally) or by interpolation (randomly adding pixels

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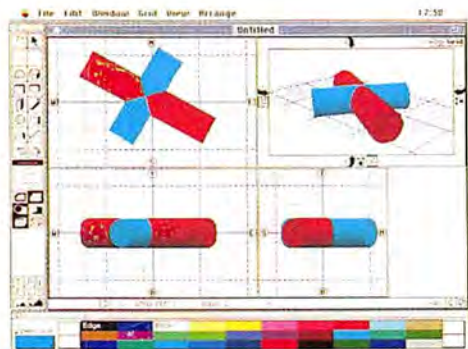


Presentation Pie

A typical use for the Tektronix 4693D is to print out color graphs for inclusion in reports. This graph was printed using the printer's defaults—playing with the controls can produce effects such as lighter or darker colors. Through the use of dithering, the printer offers a wide range of colors. Note, however, that dithering makes the pinkish color look as if it was printed at a lower resolution than the dark blue.

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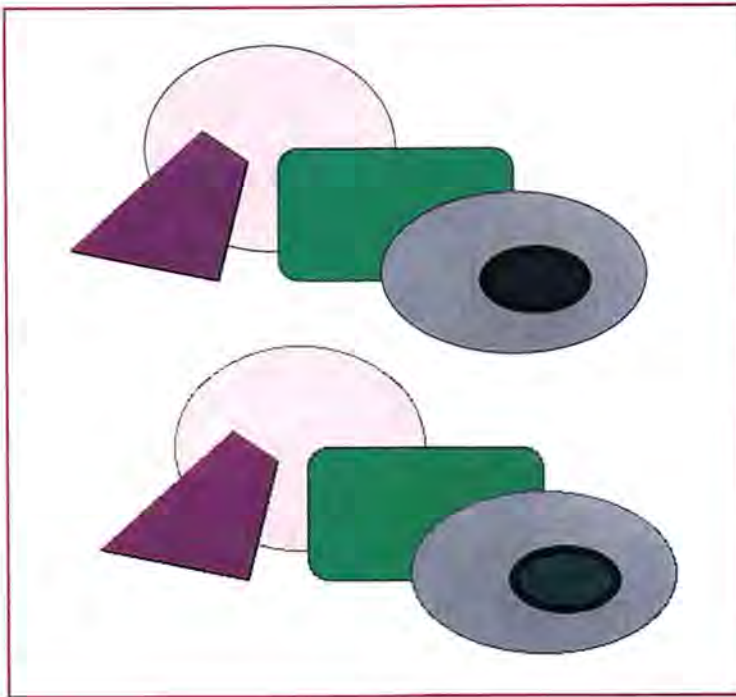
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Contours and Colors

Printing a PICT file in high resolution (top) produces smoother contour lines on curves than does printing in low resolution (bottom). Colors are also darker in high resolution because there are more pixels. In both resolutions, slim, straight lines look equally nice.



to enlarge the print area). Interpolation produces the largest printable area, but can also cause distortion in line width. Still, even with all these controls, we found it nearly impossible to get output that matched the colors on the screen.

To print a full-page image, you need to use legal-size instead of letter-size paper. Because of the way the Tektronix grasps the paper, it requires 1-inch margins at the top and the bottom, which reduce the printable surface area. Although the manual indicates that you can print an 8.1-by-8.3-inch area on letter size, we found we could only print in a 7.5-by-8.25-inch area.

The 4693D ships with four fonts—Times Roman, Helvetica, Courier, and Symbol, in point sizes from 9-point to 96-point. It can also use the same fonts as the LaserWriter IISC and handles text similarly, by scaling larger fonts to one-fourth the original size. The printer comes with a program called PICT Ripper that lets you print documents from various applications without the application software, as well as add high-resolution text to PICT files—a particularly useful feature for producing slides.

The 4693D is very easy to maintain. Procedures for fixing paper jams, swapping out the wax transfer roll, loading the paper, and cleaning the heads are all easier

to deal with, and more forgiving, than with most copiers. At one point, we got a transparency stuck in the machine and accidentally crumpled the wax transfer paper. The paper didn't tear; it smoothed out easily and slid back into place.

Each roll of color wax film produces up to 275 prints on thermal paper or transparency material. You can't use standard bond; you must purchase the paper (38 cents per sheet) or transparencies (\$1.43 each) from Tektronix. The thermal paper is slick, but the color doesn't smear. Given the cost of supplies and the time it takes to print each copy, it is unlikely that anyone will use the Tektronix printer for high-volume runs.

Like many printers, the 4693D incorporates a number of compromises that make it exceptional for some jobs, adequate for most, and poor for a few. Its flexibility and convenience make it suitable for most low-volume print jobs. The print quality, while not as high-definition as that of a laser printer, is very good in gray-scale and mixed-color graphics. The 4693D's acceptable (but not great) speed and buffering abilities make it appropriate for use by individuals and small groups. The 4693D does most of the things Mac II users will demand of it. —Janet McCandless and Cheryl Spencer

See *Where to Buy* for contact information.

Golf as a Matter of Pixels

MacGolf Classic 3.0

Interactive golf game. **Pros:** Challenging; entertaining for golfers; looks good in color; supports large monitors. **Cons:** Primitive scorecard; not enough courses; pre- and postplay control windows are amateurish; expensive; copy protected. **Company:** Practical Computer Applications. **List price:** \$94.90. **Requires:** 512KE.



Any Macintosh user who is also a golfer will want to give MacGolf a try. But be prepared to rack up some high scores when starting out; this game requires thought and practice. In my first ten games, I had a couple of rounds over 200 and no rounds under 100. Yet with practice, you should be able to garner scores closer to par.

MacGolf is played in one window; there is little animation or variation, but the graphics are attractive. You control a golfer who addresses the ball and aims directly at a pin in the distance. To plan a shot, you study a bird's-eye view of the hole in a separate area on the right side of the screen. You adjust the golfer's club selection and stance, the golfer swings, and you hear a reassuring *swack* as the club head meets the ball. The ball disappears from the screen and reappears a moment later, dropping onto the fairway or green—that is, unless you hit out-of-bounds or into sand or water, signaled when you hear the appropriate sound effect.

No Slices, Hooks, Chili Dips, or Whiffs

The game is much more complex and interesting than this, however. On every shot, the golfer begins precisely aimed at the pin and makes every swing computer-perfect—no slices, hooks, chili dips, or whiffs. To counterbalance these advantages and keep scores in a realistic range, MacGolf's six courses tempt overly optimistic players into trying shots that add penalty strokes to their score—out-of-bounds

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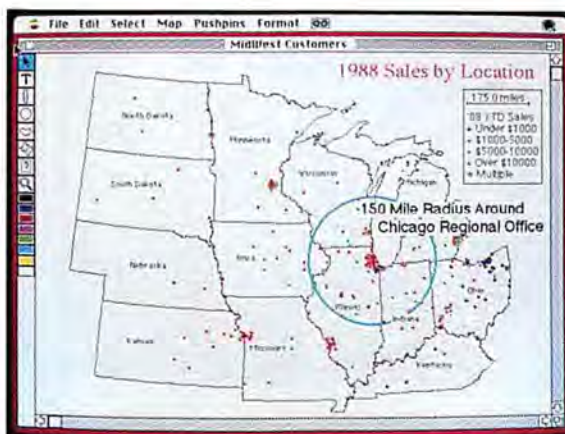
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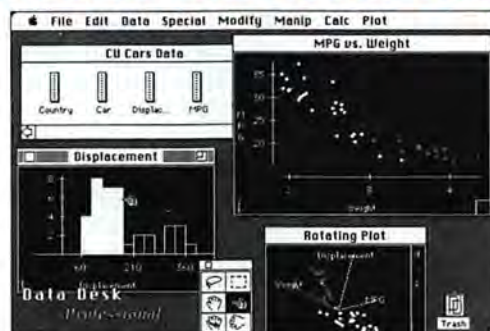
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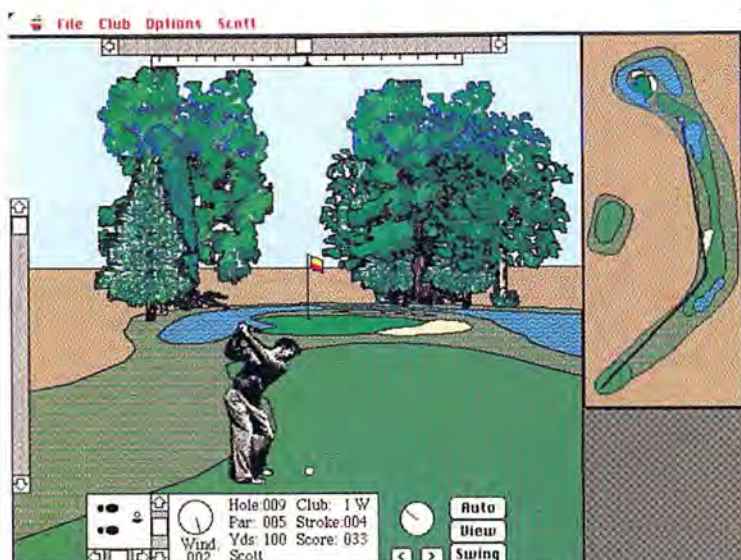
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A Golfer's Dream

MacGolf Classic offers nice color graphics, good shot controls, and challenging courses. Here the MacGolfer is swinging on the approach shot for the par-5 ninth hole at Cedar Creek. Note the heavy black line on the bird's-eye view of the hole, indicating the path of the first two shots.



shots and water traps are especially prevalent. In addition, a wind factor presents different problems every time the golfer plays a hole.

Six controls help you plan shots just like golfers do in real life. I found club selection easy since the golfer hits the ball close to the same distance I would on a real golf course using the same numbered club. You can adjust the strength of the swing, direction of the shot, and placement of the ball between the golfer's feet. You can also open or close the golfer's stance to curve the ball left or right.

Putting is less interesting than making fairway shots. If the green is flat, you need only adjust the strength of your stroke correctly for the ball to roll into the hole. You can check the influences on each putt by reading the wind indicator and by looking at a line that extends out from the cup to show the direction and severity of the green's slope.

On a color Mac II, the course appears in 16 colors, and on a large monitor the program expands to fill the space. Not only does color make MacGolf more attractive, it also adds detail to what you can discern on the course. The golfer, however, remains adamantly in black and white, in contrast to most golfers, who wear colorful costumes.

The trees lining the fairways add a three-dimensional look to the flat golf courses and make the game more difficult by obscuring the view of the green. Because the trees are redrawn last with each screen refresh, there is plenty of time to spot a feature on the horizon with which to

align the shot before they obscure the view. Yet MacGolf's trees are phantoms; they have no effect on the flight of the ball. Just go about making your shot as if they weren't there.

Handicapping

Although the core of the program is solid, MacGolf has rough edges. The manual is weak, the copy protection is frustrating, and the controls for beginning and ending play are amateurish. Fine-tuning the direction of a swing is difficult since there is no discernible relationship between the amount you move the scroll bar and the amount of change in the direction. In addition, the scorecard is unacceptably Spartan and confusing; it lacks statistics, such as the total number of birdies, pars, and bogeys, and the stroke average for each hole. A true handicap system would increase the fun for multiple players.

Should users with an earlier version of MacGolf upgrade? I'd say yes, since MacGolf now includes the four courses that originally came on the separate Mac-Courses disk, supports color on the Mac II, and includes a practice course and the greens-slope indicator.

Though MacGolf cannot provide my favorite part of a round of golf—a walk in the countryside—the game continues to challenge me. Just remember, take your time and get it right. MacGolf is a game of pixels. —*Scott Beamer*

See *Where to Buy* for contact information.

Attack of the Giant Monitor

Mitsubishi XC-3710SS

37-inch color monitor for the Mac II. Pros: Enormous display; wide variety of inputs (analog RGB, TTL RGB, composite video); stereo sound. **Cons:** Weighs over 300 pounds; no built-in degausser. **Company:** Mitsubishi Electronics America. **List price:** \$7599, plus \$54 for Mac II cable; custom stand \$995. **Requires:** Apple Macintosh II Video Card or compatible video card.



You know you're getting a big monitor when a box that is 3 feet wide, 2½ feet deep, and over 3 feet high arrives—and all it holds is the monitor's stand. Or when it takes four grown men to carry the monitor itself (in an even larger box) up the stairs. Or when the guys get the monitor out of its box and up on its stand, where it sits looking like a prop out of *The Incredible Shrinking Man*. But the real proof is when you hook up your VCR, slip in *Return of the Jedi*, and suddenly feel as though you're in a movie theater.

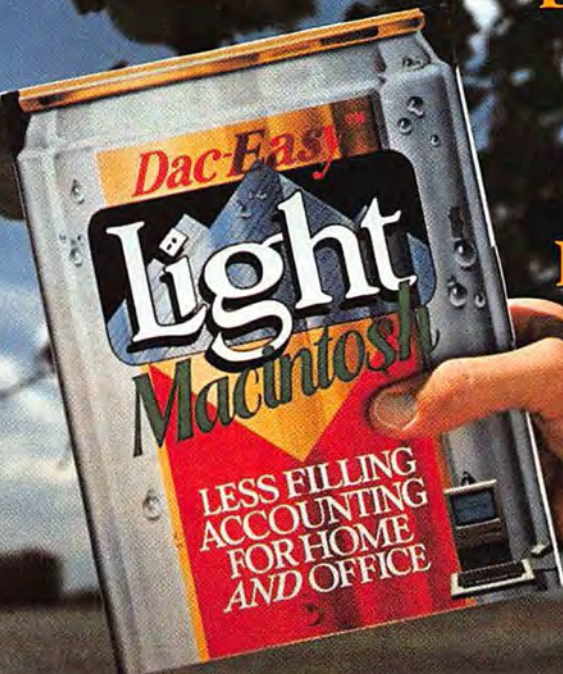
Yes, this is a big monitor: the visible portion of the screen is 28 inches wide by 21 inches high. By contrast, the AppleColor High-Resolution RGB Monitor screen is 10½ inches wide by 8 inches high. And this is an honest-to-goodness CRT, not a rear- or front-projection system.

The monitor is extremely versatile. It accepts three types of video input: analog RGB (such as from the Mac II); TTL RGB (such as from IBM PC systems); and composite (such as from a VCR, or even an Apple II). It also accepts stereo sound (separate left and right channels); it has built-in stereo speakers, as well as standard hook-ups in back for external speakers. The controls in front (discreetly hidden under a panel) allow you to adjust video brightness and contrast; sharpness, color, and tint for composite video input; horizontal and vertical size and positioning for RGB input; and audio balance and volume. And, of course, you can turn the monitor on or off.

But wait—there's more. You can have one RGB video source and two composite video sources coming in at the same time, each with separate audio input. You can then select from among the three from the front panel. For that matter, you can have

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CODE 301



both analog and TTL RGB input coming in, and choose between the two using a switch in back. There are provisions for remote control (though a remote control unit didn't come with the monitor). And there's a second (in this model, empty) control panel for additional controls.

How does the monitor stack up visually? Using the Mac II Video Card, the general image was clear, though text was somewhat fuzzy, mostly because it is enlarged so much. On the other hand, it is easy to read 12-point New York font from 17

test image became normal (and, incidentally, showed good convergence).

It's easy to hook up an IBM PC compatible to the monitor; in this case it was a laptop, which looked like some kind of spare part. The image was large, clear, and about as sharp as CGA text gets. I also tested the monitor with composite video input and stereo sound from a VCR. The resulting picture was very sharp, and the sound was good; a bass/treble control would have been nice, but not necessary.

The optional stand for the monitor is attractive and functional, with smoked plastic doors opening to a set of adjustable shelves and a power strip (four outlets controlled by a single switch). The stand costs \$995, but is worth it, unless you've got somewhere to set the monitor (its footprint is 40 inches wide by 32 inches deep). Also, the monitor has two eyebolts on top, so it can be suspended from the ceiling; make sure, though, that the cables and mounts are strong and well attached.

The monitor/stand combination would work very well in a business setting, at an exhibition, or in an educational environment; the multiple video and audio inputs make it very versatile. As for use in the home... well, it's not exactly stylish, it's expensive, and it's a bit of overkill. But for any situation where you need to hook up your Mac II and your VCR to the same 37-inch CRT, this monitor is what you need.

—Bruce F. Webster

See *Where to Buy* for contact information.

Evolution in Action

The Blind Watchmaker 1.0

Evolution simulation. **Pros:** Visual representation of evolution augments book; users can alter program's parameters and experiment.

Cons: Instructions occasionally vague; can't print from program. **Company:** W. W. Norton.

List price: Book \$7.95, book and program \$17.90. **Requires:** 512K.



Although the latest computer buzzword is *hypermedia*, the time has not yet come when one can curl up with a good interactive compact disk. We still rely on books for much of our information. But books and software aren't mutually exclusive: a Mac program



is being used to illustrate some of the fundamental concepts of a highly acclaimed book on evolution. *The Blind Watchmaker*, by Oxford zoology professor Richard Dawkins, spends a chapter describing a program Dawkins wrote to demonstrate the basic principles of natural selection. Rather than simply reading about the program, Mac owners have the option of purchasing the program and running it themselves. While viewing the program isn't essential to understanding the book, watching simulated evolution in action certainly drives Dawkins's point home. And at \$7.95 for the paperback and \$9.95 for the program, it's an affordable multimedia presentation.

The Book

For us to understand the program's goal, a summary of the book is in order. In *The Blind Watchmaker*, Dawkins sets out to refute an assertion held by many who misunderstand Darwinism: that living organisms are far too complex and specialized to have come about by random processes. The book's title comes from a treatise by 18th-century theologian William Paley, who argues that if he were walking along and found a watch, he must assume that such an intricate instrument was made by someone. From this he concludes that living things, which are far more complex than watches, must have had a designer as well—a divine watchmaker.

Dawkins agrees that living organisms didn't come about by mere chance. But he asserts that the force that produced marvels such as bats' sonar, insects that look like plants, and plants that look like insects,

(continues)

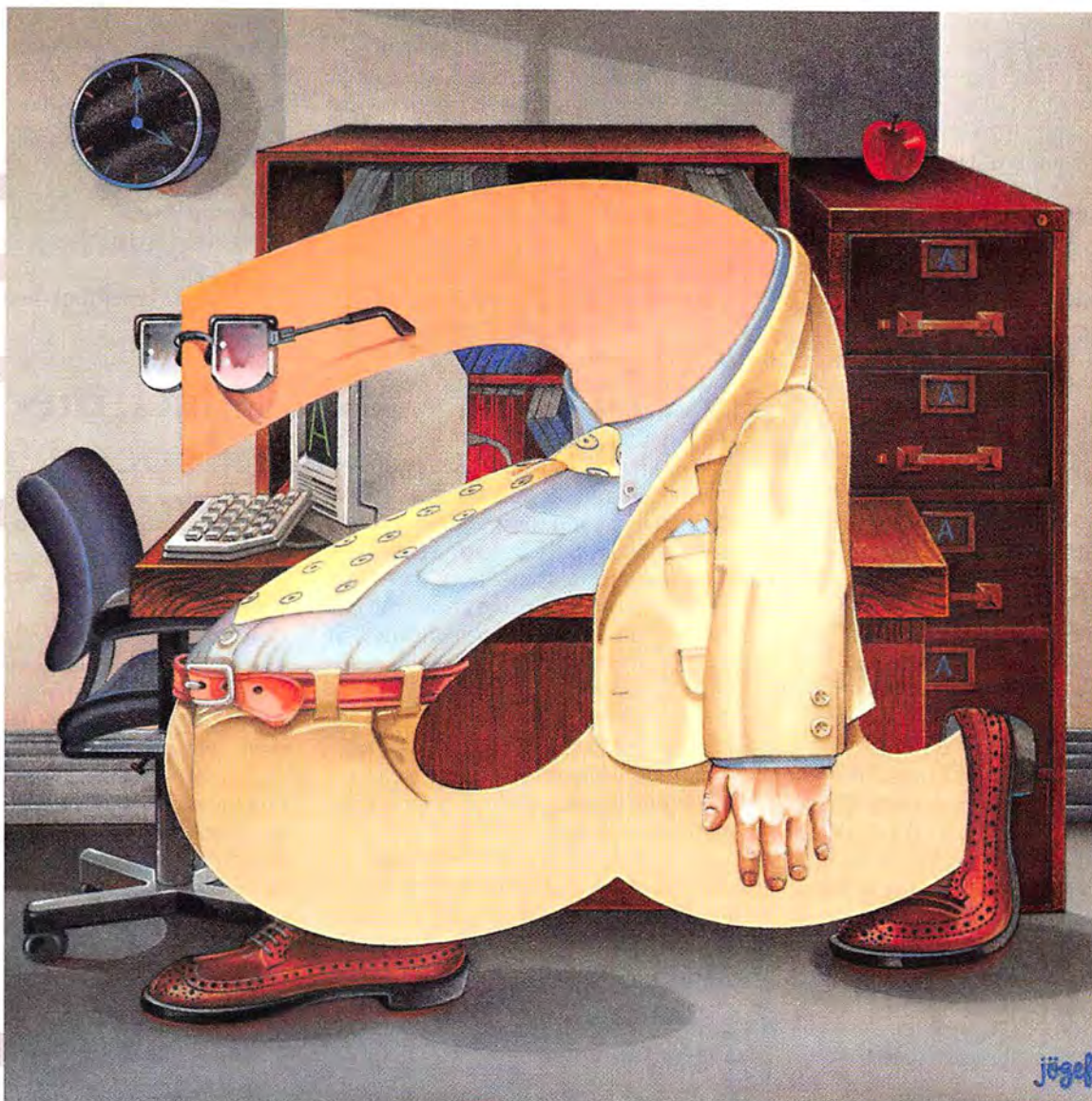


Mitsubishi XC-37100SS—a 37-inch monitor

feet away. There was some bowing across the top of the screen, and there were some very slight distortions along the side. The lower-left and upper-right corners of the monitor were darkened, and a video "beat" was visible, especially at a distance (this was in a room with indirect sunlight as the only lighting). The screen could use a degaussing to eliminate magnetized areas on the screen that cause the electron beams to be distorted; lack of a built-in degausser is one of the monitor's few deficiencies.

I found one interesting effect: when I ran the convergence test, all the white areas in the image flowed to the right. This was true only for the image produced by the convergence test, which shows how tightly the red, green, and blue electron guns are aligned; when the regular display was brought up, everything looked fine. The distortion occurred apparently because the contrast was turned all the way up; once turned down, the convergence-

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is not Divine Will but rather natural selection, the true blind watchmaker.

The book eloquently explains how natural selection takes place over a time scale so vast that minuscule mutations that make an organism better suited for survival are imperceptible to us—bats didn't suddenly develop sonar one weekend. Although mutations are random, a mutated gene is passed on only if it makes an organism more likely to survive. The plants and animals we see today are the result of *cumulative* changes that have accrued over perhaps millions of years.

The Program

Dawkins's program, also called The Blind Watchmaker, compresses the evolutionary time line so we can see natural selection at work. It also illustrates the concept of cumulative change by altering one "gene" of each generation of a life form, or *biomorph*, that evolves on the screen.

To start the process of evolution, you select a command that pops random shapes onto the screen. When you see a likely-looking "Hopeful Monster," you select Breed. Your original biomorph appears in the middle of the screen and is quickly surrounded by 14 offspring, each of which varies from the original by one gene (see "Multiple Mutations"). The Blind Watchmaker draws biomorphs by means of a recursive tree-branching procedure; each gene affects a drawing factor such as angle of branching, number of branches, branch length, symmetry, or number of segments. The program is capable of drawing very complex shapes, which often resemble plants or animals.

Choose your own criteria for survival (this can be anything from "resemblance to a moth" to shapes that you find aesthet-

ically pleasing) and click on the appropriate offspring. The chosen offspring becomes the new parent, and is in turn surrounded by new offspring. Keep choosing in this manner until a biomorph evolves that suits your requirements.

Scientific purists will have already noted some flaws in this model. For one thing, The Blind Watchmaker's biomorphs reproduce asexually. For another, the user—not environmental forces—determines which offspring survive, making the process more like breeding prize roses than watching a life-form evolve. Dawkins himself admits to these limitations, but stresses that the program is intended to teach fundamental concepts, not to be a literal reconstruction of evolution.

As you watch a line of creatures evolve, you may see some that interest you but don't fit your criteria for selection. Fear not; the program lets you save biomorphs at any time and put them in an album for viewing later or even for breeding. You can also save and play back a "fossil record" that shows the development of a particular line of biomorphs. If you amass a large collection, a special feature automatically converts a biomorph's shape into a miniature icon that appears on the desktop (these icons aren't for everyone, however; they can't be moved from one disk to another without their associated System file, and they continue to take up disk space even when thrown away).

If you're an armchair genetic engineer, you'll enjoy The Blind Watchmaker's Engineering function, which lets you select a biomorph and alter one or more genes to change its appearance. This feature gives you some insight into how each gene affects the drawing procedure, helping you tailor creatures to your specifications.

The Blind Watchmaker is a highly readable book written for the general public. The book-program combination might well prove a valuable teaching aid at the high-school or college level (bearing in mind that this is one theory only); even elementary-school students could create their own creatures with a little guidance. Or, if you're like me, you might find yourself staying up until all hours creating "life" on your computer for the sheer enjoyment of it—watching evolution happen provides a pleasant diversion from the smaller concerns of everyday life. —*Erfert Fenton*

See *Where to Buy* for contact information.

A Machine-Independent BASIC

TrueBASIC 2.01

Programming language. **Pros:** Highly structured BASIC; supports color and math coprocessor on Macintosh II; fast interpreter; supports all screen sizes; script files automate repetitive actions; machine-independent graphics (also available for IBM PC, Amiga, Atari ST).

Cons: Some violations of Macintosh interface standards; not well suited for developing Macintosh-style programs. **Company:** TrueBASIC. **List price:** \$99.95. **Requires** 512K; 800K drive.

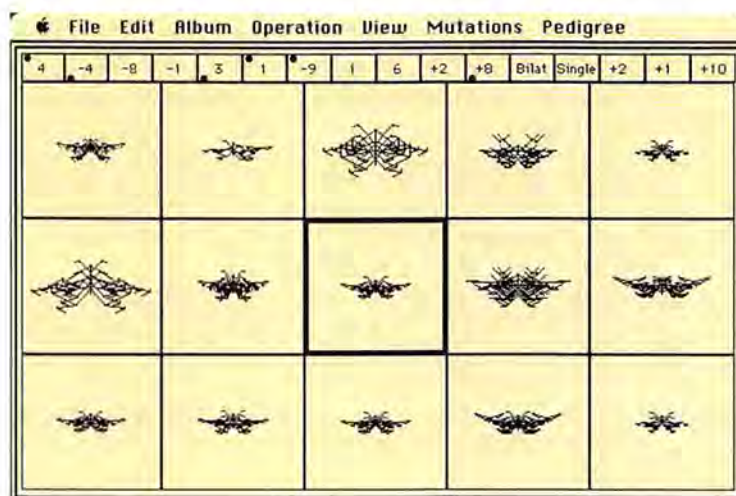
Developing software is a laborious and expensive business. Wouldn't it be wonderful if the software you developed on a Macintosh could run on other computers, such as IBM PCs and Commodore Amigas? TrueBASIC is a development environment designed to permit such machine-independent programming.

TrueBASIC 2.01 for the Macintosh is a structured BASIC interpreter that runs on all Macs with 512K or more memory. On Mac IIs, it can take advantage of color and the Motorola 68881 math coprocessor. The BASIC dialect is a highly structured one; it provides a SELECT CASE mechanism as well as other desirable structured language features, such as multiline IF statements, advanced loop control, and a reasonable approach to libraries. This language's greatest strength, however, is that most

(continues)

Multiple Mutations

The "moth" in the center of *The Blind Watchmaker* screen is the parent biomorph; the surrounding shapes are offspring that exhibit various mutations. Choose an offspring and it will produce mutated progeny of its own, providing a graphic display of evolution.



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programs written in TrueBASIC on one machine will run essentially the same way in TrueBASIC on other kinds of computers.

Developers claim machine independence for many languages and programming language implementations, but it's a claim usually limited to nongraphical applications. For most language implementations, a set of line-drawing commands will have quite different results when executed on different machines. For one thing, different computers have different graphic aspect ratios—the ratio of height to width of a pixel. On the Macintosh, the ratio is 1:1; on conventional PCs, pixels are taller than they are wide. Consequently, the same set of line-drawing commands results in shapes of different proportions on different machines. Even if there is no aspect ratio conflict, one screen may not have enough pixels to display a whole drawing, while on another, larger, screen, the drawing occupies only a corner of the display.

TrueBASIC solves these problems. Drawing locations are expressed as por-

portions of the height and width of the display window. This ensures that any TrueBASIC drawing will be completely displayed, even on very small screens. Unfortunately, if the window is very small, some of the details of the drawing may be lost. Similarly, some pictures don't turn out exactly as one might expect, just because the programmer is not controlling exact pixel positions.

TrueBASIC has three standard windows—a source window, which contains the BASIC program text; a command window; and an output window (see "Scientific Graphics"). All are resizable, but only the output and command windows have close boxes. Only one window of each type can be open at a time, so you can't look at two program listings side by side.

Macintosh Interface Violations

A language implementation that encourages completely machine-independent programs also discourages features that exploit the strengths of particular computers, and unfortunately, TrueBASIC's environment violates some of the Macintosh interface standards. For example, horizontal scrolling in the source window is not done with a scroll bar, but by dragging through a line of text past the edge of the window. Nor is there an Undo or Show Clipboard command on the Edit menu.

You can select text in the command window, but you can't clear it with a backspace. To clear you must issue a Forget command. In addition, the Typeover command doesn't work for multiline selections in the source window, although it does work for one line or a portion of a line, and the Tab key is nonstandard.

When used with MultiFinder, TrueBASIC sometimes fails to refresh one or

more of its windows. It also interferes with some desk accessories.

Extending TrueBASIC

Although machine-independent development is TrueBASIC's greatest strength, it also gives the programmer easy access to some of the most desirable Mac features. For example, a library is included that makes it easy for TrueBASIC programs to copy PICT files to the Clipboard or to print them.

Version 1.2 of TrueBASIC came with examples of Macintosh-style programs. TrueBASIC 2.01 does not, although there is still a library of toolbox interface routines. Programming full Macintosh-style applications in TrueBASIC is about as complex as using a compiled language such as Pascal; however, it should be easier when a new optional library package, The Developer's Toolkit, is released. The toolkit will more fully support Macintosh Toolbox programming and will also provide TrueWindows, a generic user interface package that supports windows, menus, and dialog boxes. Other library packages are already available, including Advanced Toolkit, Business Graphics, Scientific Graphics, 3-D Graphics, Mathematician's Toolkit, and Sorting and Searching (sold separately for \$69.95 each).

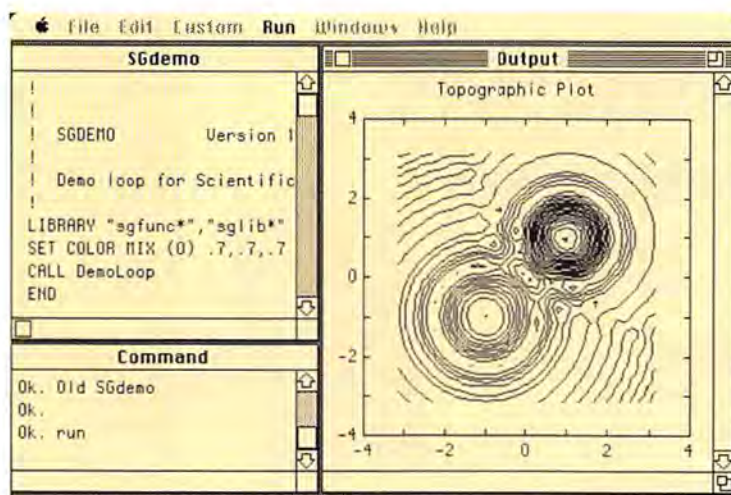
TrueBASIC is an interpreter, not a compiler. Don't be confused by the Compile menu option, which improves a program's link time, but does not improve its execution speed. Like the original TrueBASIC, version 2.01 is a fairly fast interpreter. The classic Sieve of Eratosthenes benchmark runs in 118 seconds on a Mac Plus and in just over 30 seconds on a Mac II. This is faster than Microsoft's interpreter, but slower than BASIC programs compiled with the Microsoft BASIC compiler or the ZBasic compiler. (Basic compilers are reviewed in "BASIC Choices," *Macworld*, May 1987.)

Is TrueBASIC right for you? If your primary interest is in writing programs that look like full Macintosh applications, probably not. TrueBASIC is appropriate for application prototyping and for learning about BASIC programming. If you want to write programs that don't make extensive use of Mac interface features and that must also run on IBM PCs, Atari STs, or Amigas, TrueBASIC should meet your needs.

—Allen Munro

See *Where to Buy* for contact information.

Scientific Graphics
The TrueBASIC optional Scientific Graphics package was used to generate this topographic map.





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PCBs from A to Z

Douglas CAD/CAM Professional System 5.99

CAD/CAM software for printed circuit board design and manufacture. Pros: Easy to learn and use; autoroutes boards; extensive output capabilities; tie-in with Douglas's board fabrication facility produces prototypes in a hurry. **Cons:** Major functions in separate programs; presently uses only eight colors.

Company: Douglas Electronics. **List price:** Douglas CAD/CAM Basic (layout only, no output) \$95; Douglas CAD/CAM Layout & Print \$395; Douglas Layout, Print & Plot \$525; Douglas Professional Layout \$1500; Douglas Schematic Designer \$700; Douglas AutoRouter \$700; Complete Douglas CAD/CAM Professional System \$2900. **Requires:** 512KE; two 800K drives or a hard disk recommended.



The Douglas CAD/CAM Professional System is aimed at professional printed circuit board (PCB) designers. It is a fully integrated computer-aided design (CAD) and computer-aided manufacturing (CAM) system that, after four years of evolution, has overcome all the shortcomings of the original version.

The latest version is a complete package. With it you can capture an electronic schematic diagram, perform digital logic analysis on the circuit, and lay out the PCB manually, or, using autorouting, plot the output and have prototype boards fabricated by Douglas.

You perform each operation in Douglas CAD/CAM Professional with a separate application program. You can buy all of the modules separately or all as a set. The company offers full credit on the lower-priced modules when you upgrade.

There are three primary CAD/CAM Professional programs: Schematic Designer, AutoRouter, and Professional Layout. Professional Layout contains two output programs: Professional Print and Professional Pen (for plotters). These are augmented by Douglas CAM Exchange, a communications program that allows you to send design layouts by modem to Douglas for manufacturing. With it you can receive price quotes and place orders for circuit boards.

You can design single-sided, double-sided, or multilayer PCBs up to 32 inches by 32 inches, using conventional assembly procedures or surface-mounted tech-

niques. You can also design silk screens for markings and solder masks.

Schematics and Layout

Schematic Designer is an adaption of Capilano Computing Systems' Design-Works. Using Schematic Librarian, a user-expandable library of electronic components, you first draw the schematic on the screen in a MacDraw-like fashion. You can then request a gate-level digital simulation of the circuit. Schematic Designer's Report Functions include producing net lists, component lists, and material lists as text documents, which are fully editable using a word processor such as MacWrite.

Professional Layout is a printed circuit layout program that is very easy to learn. It is faster and far more comprehensive than the original version. Professional Layout supports color (albeit only eight colors), has 0.001-inch positional control, and allows you to use part footprints stored in standard and custom libraries. You can also customize pads and holes to nearly any size or shape.

For small or simple jobs, boards can be laid out manually. You draw a board outline; choose pads, integrated circuit (IC) footprints, and trace widths from menus; and then place them one-by-one on the layout. You can effortlessly go from one layer to any other layer by clicking on a layer-ID box. You can also move and copy from one layer to another. Interestingly, paired layers are stored in separate documents. The program is as easy to use as MacDraw and follows Mac conventions closely. For zooming in and out, there are 50 view sizes to choose from, giving you a 50-to-1 zoom-range. Panning is fast and easy. You can

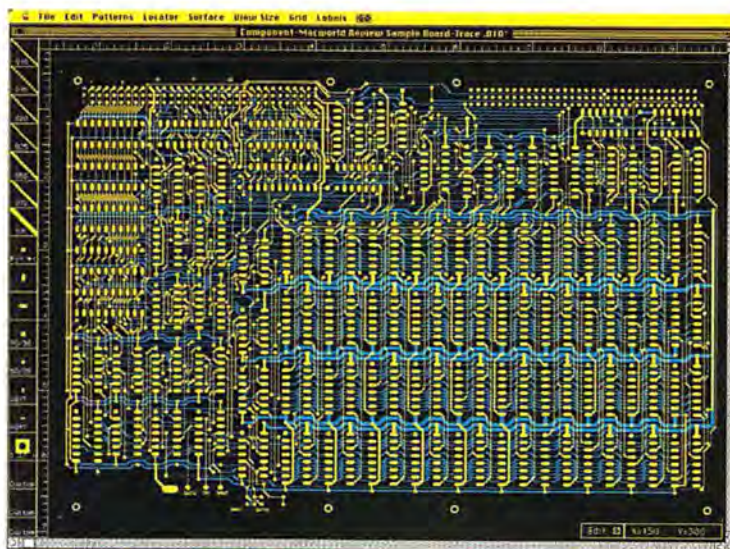


color-code each layer in any of the eight colors, which should suffice for most designs.

In addition to the layout's geometry, the design database keeps track of the number of holes, trace length, and other information that is used by Douglas for estimating costs and manufacturing. You can also get a summary report on the screen.

Alternatively, the boards can be autorouted. The AutoRouter program accepts the net list generated by Schematic Designer or imported text files in the correct format from other programs. First you draw the board outline, then (somewhat tediously) lay out and label the component footprints and locations using MacDraw-like facilities, and then describe your needs and specifications using an easy-to-learn scripting facility; finally, the program

(continues)



Douglas Sample Board

On a 19-inch Super-Mac monitor, Douglas CAD/CAM Professional fully displays even very large and complex PCB designs in up to eight colors. Graphic icons make it easy to select pads, traces, and component footprints. Most menus are almost self-explanatory.

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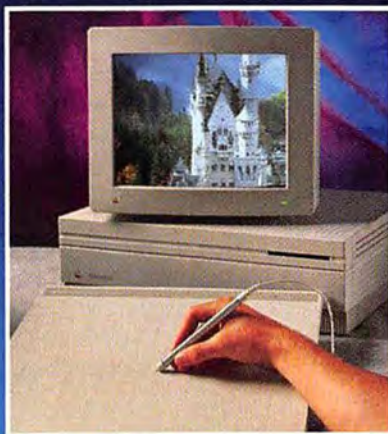
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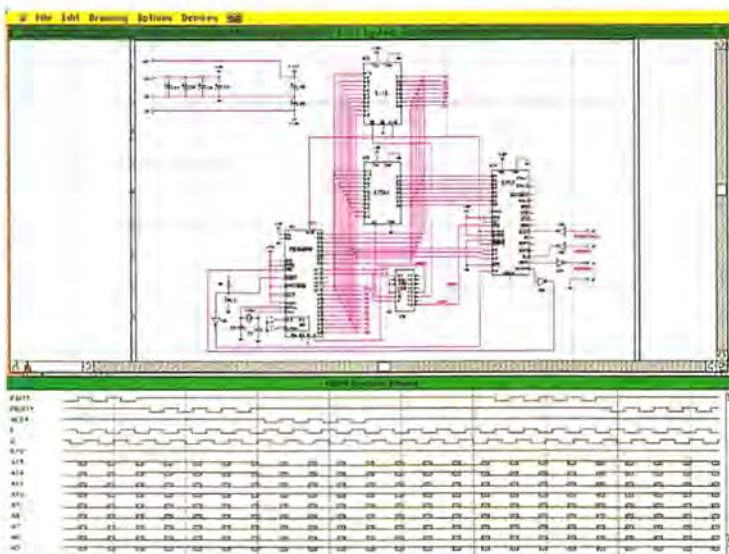
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Schematic and Logic Simulation

Capturing a schematic diagram and performing gate-level logic simulations on it has never been easier. The Mac's multi-windowing capabilities simultaneously show the results of both tasks.



automatically makes the connections using a multipass Lee algorithm maze router to do the job. AutoRouter is reentrant, so you can pick up a task after you've left it without losing your earlier work; it allows manual editing between passes, and it can handle up to 16 layers. While the input is tedious and time-consuming, the auto-routing speed appears at least comparable to that of MS-DOS-based systems.

Output

Traditionally, pen plotters have been used by PCB designers to produce check prints, and the final artwork has been produced on photo plotters such as those from Gerber Scientific. At best, the traditional photo plotting process is slow. What the Mac and Douglas bring to PCB design is a wealth of additional output capability. I took a two-sided, 6-by-9-inch board design with 78 ICs and two 96-pin connectors and plotted a 1-by-1 check print on a fast HP 7550 pen plotter. It took 2 hours and 7 minutes. On an ImageWriter LQ, it took nearly 46 minutes, and on an ImageWriter II at lower resolution, it took 28 minutes. When I did it again on my new LaserWriter II NTX, I obtained a beautiful 300 dpi check print in just 5 minutes and 16 seconds. The Mac's laser printing capability would save me over 2 hours on this one operation alone. You lose color on LaserWriters, as opposed to pen plotters, but for the more common single- and double-sided designs, it isn't a problem.

You have an extensive choice of check print and artwork output types that produce different forms of output, each at varying levels of detail; for example, you can get trace outlines only or filled traces.

Most artwork is generally produced at 2 to 1 or 4 to 1, but you can request any range you want, between 10 percent and 1000 percent of the actual size. Numerical control drill tapes, used in manufacturing the boards, are also available.

For final artwork output, you can use a Gerber-compatible file, or you can modem your files up to Douglas and they'll plot them on their 2000-dpi laser plotter and return the film to you for \$100 (or \$125 for overnight service). The 20-by-24-inch film can contain as many views of the board as you specify.

Is It Worth the Price?

At up to \$2900, it may seem expensive, especially since the original 1984 version cost only \$10. But I think it's worth every cent. Douglas CAD/CAM Professional can easily stand up against any of the MS-DOS electronic CAD packages and goes further than some. It's the only package I know of with a direct tie to a board fabricator. Each main function is in a different application but if you use MultiFinder, switching between applications is not a problem.

Although you can run the program on a Mac with a small screen, for most design tasks you're far better off using a large-screen monitor. And, on a large Mac II color monitor, this software turns the Mac II into a truly viable electronic design workstation. The final proof is that thousands of boards have been successfully designed with it, many of which are found inside Macintosh-related hardware products.

—David L. Peltz

See *Where to Buy* for contact information.

Long-Distance Control

Timbuktu 2.0

Network communications/electronic-conferencing software. **Pros:** Allows interactive, collaborative work; well-planned security restrictions. **Cons:** No color support; no cut and paste. **Company:** WOS Data Systems. **List price:** \$99.95 for one Mac, \$189.50 for two Macs, \$495 for six Macs. **Requires:** 512KE; AppleTalk network.



Timbuktu is one of the first Mac applications to increase work-group productivity by allowing one Mac user, or a group of users, to see—or even control—what's happening on any other Mac on the AppleTalk network.

To connect to another Mac, you activate a link by selecting a *host* from a list in Timbuktu's desk accessory (see "Party Line"). If the host permits you (the *guest*) to connect, your Mac's screen displays the same contents as the host's and updates as the host screen changes. With the host's permission, you can use your own keyboard and mouse to operate the host.

All for One, One for All

Installation is painless, but check your Mac's System/Finder version first; WOS recommends using the System 4.2/Finder 6.0 combo with Timbuktu. Other compatible System/Finder versions are 3.2/5.3 and 4.1/5.5. The only System/Finder pair that Timbuktu doesn't work with is 4.0/5.4.

Timbuktu requires that each Mac on the network have a unique serial number, so you must type in your program disk's serial number the first time you use Timbuktu. You can make multiple start-up disks with Timbuktu on them, but you have to input the serial number the first time you use each disk.

As a host, you can restrict access to your Mac in three ways: by selecting No guests, by requiring a password, or by choosing Observers only access. A host can check guest status by looking at mini-icons located in the screen's upper-right corner, or by checking a list in the DA (see "What's Going On").

The host always controls guests' access privileges. You can disconnect or change their access privileges at any time; more—

(continues)



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over, if host and guest both try to move the mouse at the same time, the host will win the tug of war.

I See You See Me

Using Timbuktu is a strange experience. The pointer moves without your touching the mouse, and words appear "magically" in your documents. Things get even stranger when you use Timbuktu with Macs that have monitors of various sizes. For example, when a Mac II controls a Plus or an SE, a replica of the 9-inch screen appears on the large monitor; the rest of the Mac II screen is blacked out. When you use an SE to observe/control a Mac II, Timbuktu lets you see the Mac II's entire large screen by scrolling around the smaller screen à la Stepping Out.

There are a couple of caveats in using Timbuktu with a Mac II. First, Timbuktu doesn't scroll across multiple Mac II monitors, so you can view only the main screen. Second, Timbuktu does not support color. Be sure to change the display to 2 Colors, Black & White/Grays, before anyone connects.

Timbuktu's performance depends on how fast a Mac can send out or receive screen information. The more Mac power you have (say, a Mac II guest and Mac II host), the better the performance. I tested Timbuktu with PhoneNet. Running Timbuktu over EtherTalk would result in better performance, because Ethernet cable enables higher network speed. All in all, Timbuktu's performance is acceptable, espe-



cially considering the productivity you get out of the setup.

The system slows down most noticeably when you open and close windows. You have to be careful not to move the mouse around too fast; with my itchy trigger finger, I kept highlighting several icons, rather than just one. You get the best results with programs that don't rely on fast screen updates—in other words, don't try playing a conference game of Apache Strike. QuickDraw-based applications cooperate nicely, and performance is decent with non-QuickDraw programs such as MacPaint.

I had no problem running Timbuktu along with AppleShare and Microsoft Mail. Since Timbuktu uses AppleTalk broadcasts, there is no difference between performance with one guest and performance with several. You can disable the broadcast feature with WOS's configure utility. The same utility lets you choose new AppleTalk sockets for Timbuktu, if the preassigned sockets interfere with a network application. Timbuktu also works with some dial-in AppleTalk CDEVs. But don't even try running Timbuktu over a dial-in network at 1200 baud.

Communications Breakthrough

I'd like to see more interaction between connected Macs—for example, cut and paste between a host and a guest. Ideally you would be able to keep working on a guest, even while linked to a host, but that won't be possible until MultiFinder is truly multitasking. And sure, I wish the performance were a little better—but that's true of almost any network application.

Altogether Timbuktu is a breakthrough in network communications. It really does allow Mac users to work cooperatively at a higher level than E-mail. Timbuktu won't replace E-mail; you don't need

to see what someone's working on to send him or her a message. But if you've ever wanted to see what was happening on someone else's Mac (or wished another person could see what was happening on yours) without resorting to printouts and "sneaker-net," definitely consider Timbuktu.—Brita Meng

See *Where to Buy* for contact information.

Fast Financial Feedback

Simply Accounting 1.01

Accounting program for small businesses.

Pros: Easy to use; good basic reports; excellent documentation. **Cons:** Demands lots of memory; does not provide batch processing for paying bills and employees; expensive support program.

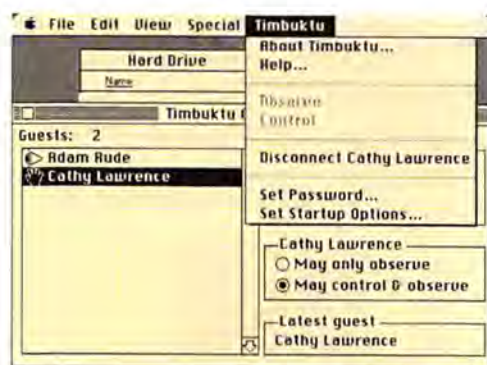
Company: Bedford Software Corporation. **List price:** Version 1.03 \$349. **Requires:** 1MB; hard disk recommended.



Simply Accounting is geared to small-business owners or managers who are more interested in ease of use and obtaining fast results than in following detailed accounting procedures. Therefore, data entry, tracking, and reporting functions have been simplified. And in spite of its MS-DOS heritage, the program makes excellent use of the Macintosh interface.

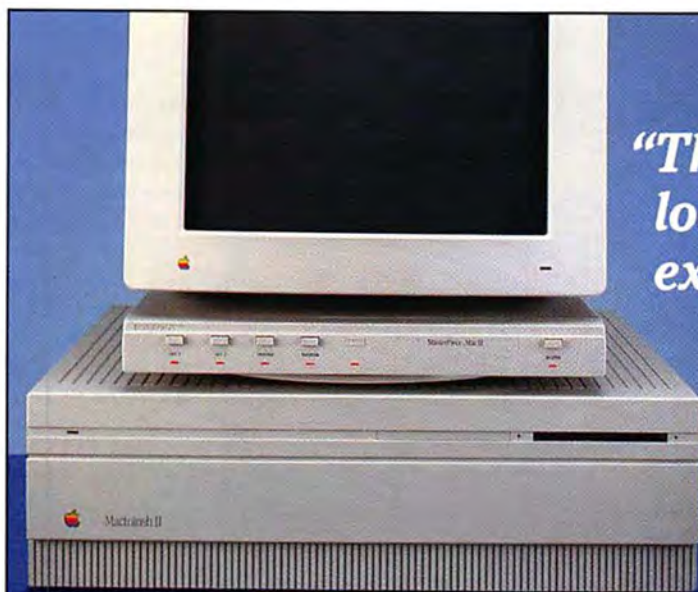
An all-in-one program, Simply Accounting provides six ledgers—General, Payable, Receivable, Payroll, Inventory, and Project—on one 800K disk. In spite of their small disk size, the ledgers all have sufficient capacity for small businesses. For instance, you can have 5000 ledger accounts, 2000 customers, and 10,000 inventory items. Simply Accounting works in an on-line mode, so that when you close a window or post a transaction, the program immediately updates all the books related to that transaction. In contrast, programs that use independent modules (such as Insight Accounting Series from Layered) generally proof, post, and track entries by batches of transactions, a traditional accounting practice. Unlike high-end programs, Simply Accounting is a single-user program (al-

(continues)



What's Going On

The DA tells me I'm hosting two guests. Since Adam is an observer (the eye icon), he can't control my Mac, but he can see everything that happens. Cathy's connection (the band icon) lets her observe and control my Mac. I can change Cathy's or Adam's privileges at any time.



"This baby is loaded with extras..."

Kristi Coale,
MacUser magazine

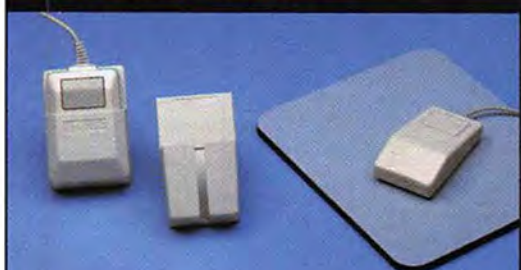
Master Piece® Mac II, \$159.95



System Saver® SE, \$79.95



Apple® Security System, \$49.95



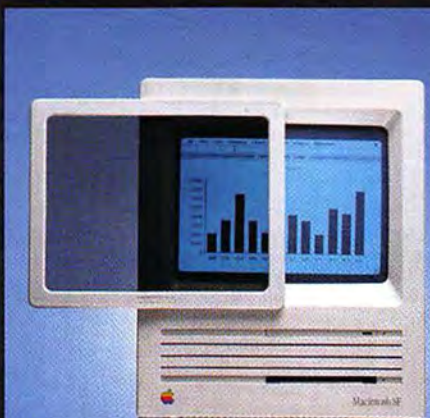
Mouseway, \$9.95 Mouse Pockets, \$4.95 ea.



Macaccessories SuperBase™, \$49.95



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Macaccessories® Anti-Glare Filter, \$49.95



Universal Printer Stand, \$24.95



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Reviews

though it supports AppleShare). And the program allows only a 12-month fiscal year.

Simply Accounting most closely resembles Monogram's Business Sense; both programs present a main menu with icons that represent the ledgers and journals. Business Sense does not include an inventory section, but it does offer many additional features, such as batch processing of payroll and bill payments, recurring individual or batch entries, and the ability to pull data from prior periods in the fiscal year, such as printing the inventory as of March 31, in June. Of course, Business Sense costs about \$150 more than Simply Accounting at list price. Simply Accounting's other competitor is Softsync's Accountant, Inc. That program, however, does not yet offer a payroll section.

Setting Up the Company Books

To set up Simply Accounting, enter the first day of your fiscal year, and then define your six ledgers. The General ledger contains a Chart of Accounts, and Simply Accounting provides sample sets to help you get started. You establish the Payable ledger, Receivable ledger, Payroll ledger, and Inventory ledger. You can also define projects, such as different construction jobs or business departments, in a Project ledger. Simply Accounting can then charge entries in the journals to various projects.

The program's eight journals include General, Purchase (for vendor purchases), Sale (for invoices and statements), Payroll, Transfer (for inventory), Payment (for paying vendors), Receipt (for customer payments), and Adjustment (for correcting entries). All data entry screens resemble standard paper forms. One of Simply Accounting's outstanding features is that it al-

Payroll Journal

UNIVERSAL CONSTRUCTION No. 2011

PAY One Thousand Fourteen ----- 98/100

TO THE ORDER OF Ashcroft, Howard L. Date 06-15-87 Amount 1014.98
123 Main Street
Redmond, Washington
98991

Pay Period Ending	06-15-87	FIT	94.90	Gross Pay	1200.00
Regular	40.00	200.00	SIT	0.00	Withheld -185.02
Overtime		FICA	90.12	Benefits	0.00
Salary	1000.00	SUTA	0.00	Tips	0.00
Tips		SDI	0.00	Advance	
Commission		Local		Net Pay	1014.98
Benefits		Union			
Vacation		Medical			
		Dental			

Distribute Post

Payroll Screen

The Payroll screen looks much like a conventional paycheck and stub. After filling in the appropriate data, you print each employee's check individually. You then post the data by clicking on the button in the lower-right corner of the screen.

Sale Journal

SOLD TO Telecom West Inc. SHIP TO Telecom West Inc. Invoice 100
432-5435 Broadway 432-5435 Broadway
Seattle, Washington Seattle, Washington
93264-8488 93264-8488 Date 06-15-87

Item	Quantity	Unit	Description	SST	Unit Price	Amount	Acct	Project
D1010	5	Each	Doors: Exterior	6.100	66.000	330.00	4600	
H1030	14	Each	Handles: Passage	6.100	4.550	63.70	4540	
Comments Rush Order						Sales Tax	24.02	
						Freight	16.45	
						Total	\$434.17	

Post

The Sales Journal

Simply Accounting's forms closely resemble the ones that most people are used to working with in a paper-and-pencil environment. The screens are uncluttered and easy to read.

lows you to define aging periods for payables and receivables, so you aren't limited to only 30-, 60-, and 90-day aging, but can designate custom periods, like 7 or 12 days.

Although many accounting programs allow you to print checks and invoices in batches, Simply Accounting prints them one at a time. So, to print each payroll check, you must call up the record for the employee to be paid, enter data, and then print the check—this process becomes extremely frustrating if you have a large number of checks to write.

The good news, however, is that should you discover an error or have problems printing a check, you can repeat the check-writing procedure—at least until you click on Post to record the entry in the appropriate journal. In contrast, Business Sense gives you just one chance to print checks. If you run into a printer jam, you have to resort to a backup file and repeat the whole process.

Simply Accounting supplies basic reports, such as a balance sheet, income statement, and aged reports on receivables and payables. In addition, the program

prints customer statements and the required government reports (940, 941, SUTA) and W-2 forms.

Simply Accounting's excellent manual is clearly written and well illustrated. It explains each feature in detail and includes a section that explains some basic bookkeeping principles. Bedford also offers a strong support program, although you'll have to pay for it. The company sells support in one-hour blocks, at a prepaid cost of \$60 per block, and you pay for the call. Also, since the payroll's federal and state tables are not editable, you have to subscribe to Bedford's Update Service for \$89 a year.

Simply Accounting is one of the best all-in-one programs, and its price-to-performance ratio makes it a good value. While a professional bookkeeper or accountant would prefer the features and traditional accounting procedures of modular programs, small-business owners who simply want quick, easy data entry with immediate feedback will find that Simply Accounting fills the bill.—Alan L. Slay

See *Where to Buy* for contact information.



How to Buy the *Right* Monitor.



When you're looking at monitors for desktop publishing, CAD, financial or multi-tasking window applications, you'll probably find yourself looking at *confusion*! So let's cut through the hype and get down to understanding what makes a monitor tick!

Compatibility

Make sure your monitor comes with a *matching* controller board and can work with a variety of computers and software. Viking monitors can be interchanged with Viking controllers, so one monitor can work with the IBM PC family, IBM PS/2 series, Apple Mac SE and Macintosh II. IBM versions are bundled with Bitstream® Fontware™—free—for matching screen and printer fonts. Mac versions are available in 91 or 72 DPI. Viking driver software is included for programs such as Aldus PageMaker, Ventura Publisher, Microsoft Windows/386, Lotus 1-2-3 and most WP and CAD programs. That's compatibility!



Size

A 15- or 17-inch monitor displays only part of a page. You'll quickly get frustrated scrolling around and never seeing your whole page at once. Viking 19-inch monitors are perfect for double page layout and drawing. And the Viking 24-inch monitor displays two full *actual size* pages with margin icons and menus. The 19-inch Viking color and gray-scale



monitors are available for IBM PC and Mac II for clear photorealistic imaging.

Ergonomics

Optimum publishing resolution is featured on Viking products with *square pixels* at 1280 X 960 for monochrome and 1024 X 768 for gray-scale and color. Refresh rates range from 60 to 66 Hz to eliminate "flicker and smearing"

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☐ Apple User
☐ No. of micro-computers
☐ Apple Reseller
☐ IBM Reseller

Math Whiz

Radius Accelerator 25

25-MHz accelerator card for the SE. **Pros:** Fastest SE accelerator for numeric-intensive applications; high-speed 32K RAM cache. **Cons:** Uses SE's own 8-MHz RAM. **Company:** Radius. **List price:** \$1695; \$2195 with 25-MHz 68881. **Requires:** Macintosh SE.

radius The Radius Accelerator 25 gives you three times the processor clock speed of a stock SE, and as an option, a 68881 math coprocessor that also operates at 25-MHz. In applications involving lots of calculation, this combination is shockingly fast. In applications that repeatedly fetch large chunks of data from memory, however, the board doesn't get a decent chance to show its stuff.

That makes a decision on the Accelerator 25 simple. If you work mostly with programs like StatView II, Systat, or Excel, the board enables you to slay dragons. If you work mostly with word processing, page-layout, or database programs, it only lets you slay baby alligators. The Accelerator 25 makes an SE outperform a Mac II in most scientific applications, but it offers less than its suggested "factor of six" speedup with more pedestrian programs.

The Bag of Tricks

The simplest way to speed up an SE is to replace its 8-MHz 68000 with a faster 68000. Two less expensive boards—the

Aox DoubleTime-16 and SuperMac Speed-Card—take this approach. Another option is to replace the 68000 with a 68020, the true 32-bit processor found in the Mac II. In addition to these two methods, you can add a 68881 math coprocessor with a clock speed that matches the main processor's.

At this point, however, high-end accelerator boards show some design divergence. The Radius 25 offers a 25-MHz, 32K static RAM cache, similar to the setup used for mainframes and workstations. This means that for many applications the board loads the most frequently used data and code segments (the 68020 also has a code cache) into high-speed RAM, boosting throughput. But the Radius system relies on the SE itself for main RAM, so applications involving frequent swapping of large chunks of data can be bottlenecked, at least on a 1-megabyte SE. In contrast, the SuperMac Prodigy SE offers only a 16-MHz 020/881 combination, but provides its own high-speed RAM (2MB and 4MB are the most popular options), so the SE's RAM can be used as a RAM disk.

One last area for speed enhancement is an upgrade of SANE, the Standard Apple Numerics Environment. Radius has written its own version of SANE, in which numeric precision is matched to the intrinsic numeric precision of the 68881, and function calls (trigonometric functions, logarithms, and exponentials) have been reprogrammed. The Radius version was faster than Apple SANE when tested with standard programs, and there was no degradation of numerical accuracy. Either there was clear room for improvement in the

original SANE function handling, or Radius has found a way to get something for nothing.

Zippering Along

As benchmarks show, the Radius 25 provides a factor-of-6 speed improvement over a stock SE on Excel recalculation (Excel has its own routines for 68881 access) and a factor of nearly 25 on a function-intensive operation. It is possible to concoct atypical computational benchmarks that exhibit speedups of 60 to 80 times. In an animated ChemLab display of a DNA fragment floating in space, an accelerated SE simulation of a gentle rotation showed a molecule spinning like a Porsche crankshaft on the autobahn. The board's raw speed enables it to nose out the Prodigy SE even on simple word processing tasks.

In other applications, though, the advantages of loading megabytes into a 16-MHz memory appear to outweigh the benefits of a 25-MHz, 32K cache. The Prodigy SE comes with 2MB of its own memory; this gives it an edge over the Radius 25 on some tasks. For instance, on a suite of database benchmarks, the Prodigy SE beat the Accelerator 25 on six of seven tasks. In order to make the benchmarks more fair, I added more memory to the SE running the Accelerator 25—the Prodigy's advantage then disappeared. Keep these memory considerations in mind when you compare accelerator prices—if you want optimal performance from an accelerator on data-intensive applications, you'll need more memory than you get on a stock SE.

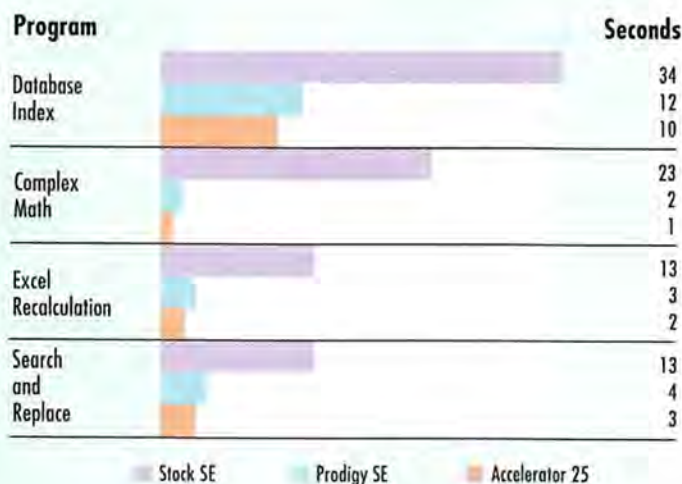
All Together

The Accelerator 25 is well designed, easy to install, and almost free from extra radio frequency emission (no mean feat at 25-MHz in the SE's feebly shielded case). It includes superior documentation, and features the Radius Magic Bus connector for use with Radius's large monitors. Radius's support team knows as much as anyone about the speed impact of various coprocessor schemes on applications software. If you have a science or engineering application that you would like to run at faster-than-Mac-II speeds, the Accelerator 25 merits a test drive. —Charles Seiter

See *Where to Buy* for contact information.

Speed Tests

Both the Radius Accelerator 25 and the Prodigy SE use a 68881 coprocessor. The Complex Math benchmark tests the board's performance on complex functions, such as logarithms. The Excel Recalculation benchmark tests performance on simple math, such as addition and subtraction.





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Man the Battle Stations!

PT-109 1.0

PT-boat combat simulator. **Pros:** Realistic feel; uses Mac interface well; digitized sound effects; MultiFinder compatible. **Cons:** Lacks diversity; can bog down during combat at advanced levels; game is slow on 68000 Macs.

Company: Spectrum HoloByte. **List price:** \$49.95. **Requires:** 1MB.

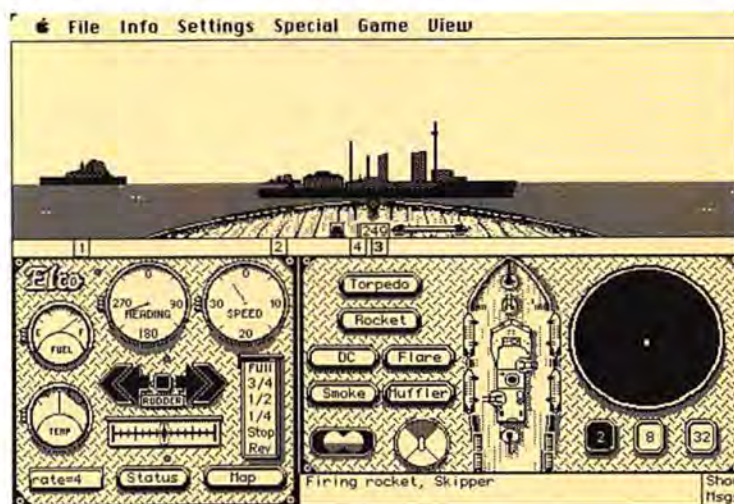


Spectrum HoloByte is well known for its realistic Gato (a submarine) and Falcon (a fighter plane) combat simulators. Fans of these intricate games will also enjoy PT-109, a World War II PT-boat combat simulator.

On the Campaign Trail

PT-109 puts you in the cockpit of an Elco 80 Patrol Torpedo Boat. Your mission is to run a series of patrols (known as a tour of duty). In each patrol, which recreates a famous battle, you cover an assigned area of the ocean and must engage any enemy craft you encounter. In addition to the assigned patrol route, you may have special orders, such as dropping off a shore party and waiting for it to return, or rescuing downed pilots.

A campaign is a series of four tours of duty. You progress through the tours in the order the battles occurred in history. Despite the fact that each tour is in a different locale and offers different opponents and patrols, all you really do is combat the enemy. After a while, this wears a little thin.



View from the Bridge

The view window (top half of screen) can look in any of four directions. The main control panel (lower left) contains the navigational controls. The radar screen and weapon controls appear on the tactical control panel (lower right).

In World War II the PT boat was the most heavily armed ship in the navy—on a firepower-per-pound basis. In the game you can equip your PT boat with the full array of armament you need to fulfill your missions and return to port safely. The weapon controls are simple to operate, either in automatic mode (your crew fires at targets you designate) or in manual mode (position the cursor over the target and click).

Your opponents have the same weapons—and then some. Fortunately, you have two defensive systems—a smoke generator and an engine muffler—to augment your arsenal.

PT-109's documentation includes strategy and instruction manuals that gave me a complete sense of what I could and couldn't do.

Sittin' at the Wheel

The PT-109 simulator is outfitted with all the controls you need to manipulate the ship with the mouse or keyboard (see "View from the Bridge"). One nice feature is the desired heading control, which eliminates the need to use buttons to move the rudder left and right in steps. The desired heading control (the box with 249 in it) always displays the current heading. Click in the box and drag it like a scroll bar until the desired heading appears. Release the mouse button and the ship turns to the new heading.

In addition to the standard navigational controls, the ship has a simulated radar display, viewable in 2-, 8-, or 32-mile diameters. One final navigational and tactical aid is Binocular View, which allows you to see in any direction at 2-times magnification.

Unlike Falcon or Gato, PT-109 is actually easy to navigate. After about 15 minutes of playing with the controls, you'll be the master of the ship.

Levelheadedness

The game has four skill levels, plus a special practice level that allows the neophyte PT-boat captain to make his or her ship invulnerable. At higher skill levels, the game becomes more realistic: enemy gunfire does more damage, repairs take longer, torpedoes and rockets are less accurate and duds are more common, enemy accuracy increases, and so forth. I found the game to be consistently challenging at levels three and four.

Overall, PT-109 played well. It was enjoyable and challenging. The patrols lack variety but trying to get my score onto the Top Skippers roster kept me going through my tours of duty. The game is a bit slow on a Mac Plus or SE—frustrating but not enough to make me want to stop playing.

PT-109 is probably the easiest to use of Spectrum HoloByte's combat simulators. The controls, though complete, are simple to operate. A PT boat is easier to navigate than a submarine or a fighter plane—you don't have to be a rocket scientist to enjoy it. For those people who love simulations that require both strategy and quick reflexes, PT-109 is a winner. —Jeffrey Sullivan

See *Where to Buy* for contact information.

Simply Accounting is simply magnificent

InfoWorld, March 14, 1988...

"Simply Accounting lists for \$349, which gets you all six accounting functions. Other popular entry-level

accounting systems for the Mac include Plains & Simple, priced at \$395, and Back to Basics at \$199.

Of course, these competitors provide only three accounting functions, compared to the six functions of Simply Accounting. You can get these other accounting functions with higher level systems from Great Plains and Layered Inc., but they hit your wallet for \$600 or so a module.

Not every company will want to automate the additional functions of inventory, job costing, and payroll. But if you do, Simply Accounting delivers the goods in a cost-effective package.

Simply Accounting is one of the top choices for small businesses who want to start Maccounting."

INFO THE PC NEWS WEEKLY					
REPORT CARD					
SOFTWARE SIMPLY ACCOUNTING					
7.9	Unacceptable	Poor	Satisfactory	Very Good	Excellent
Performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Documentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Ease of Learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Ease of Use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Error Handling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Support	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Value	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

General Ledger

- entire fiscal year available for reports
- user definable chart of accounts
- prior period posting
- produces full audit trail

Payables/Receivables

- uses open invoice method
- prints checks, invoices and statements
- user defined aging periods

Payroll

- uses built-in payroll formulas; no user-maintained tables
- automatic federal and state deductions
- accumulates QTD, YTD, W-2, 940 and 941 information

Inventory

- fully integrated with payables and receivables
- uses average weighted cost method
- handles adjustments and transfers

Jobcost

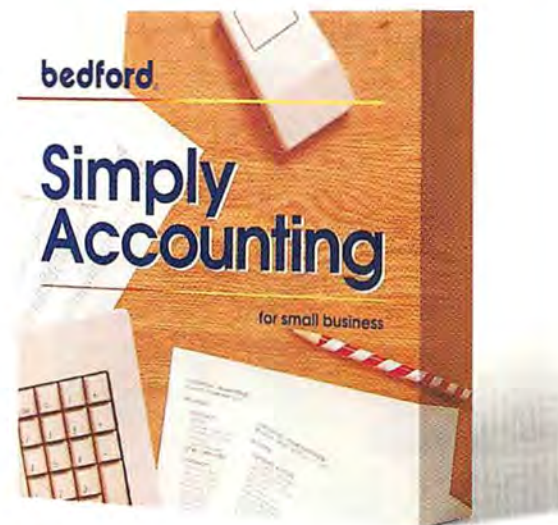
- distributes revenue or expense to projects or profit centers
- paycheck distribution includes the company's portion of FICA, SUTA and Disability Insurance

Requirements

- Apple® Macintosh™ computer with one megabyte of memory, 1 800K disk drive and 128K ROM

Standard Features

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Macintosh, AppleShare and MultiFinder are trademarks of Apple Computer, Inc. • ® indicates manufacturer's registered trademark • Simply Accounting is a trademark of Bedford Software Corp

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Say It with Numbers

Data Desk Professional 2.0

Statistical data-handling system. **Pros:** Superior interface, tutorial, and help; 3-D rotatable data views; cluster and principal component analysis. **Cons:** No color support; few non-parametric tests. **Company:** Odesta. **List price:** \$495. **Requires:** Macintosh Plus, two 800K drives or hard disk.

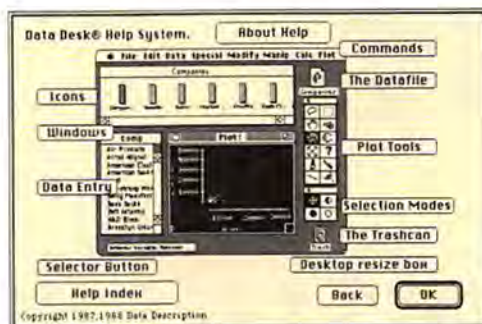


On the average, 50,000 babies are born every day, give or take a couple of hundred. These babies are born entirely unaware of the applications of statistics, and many maintain this state, even into gainful adult employment. This suggests that a good statistics program should be unobtrusively useful to the platoons of data-workers whose mathematical skills are less than impeccable.

Data Desk should be the first choice of analysts who are not professional statisticians. The program easily handles the statistical tasks of a sophisticated business. While it lacks the encyclopedic range of tests found in Systat, and falls short of StatView II's capabilities in presentation graphics, Data Desk offers a solid statistics package, most of the features of MacSpin, easy data manipulation, and a HyperView mode that identifies other useful types of analysis after your first selections.

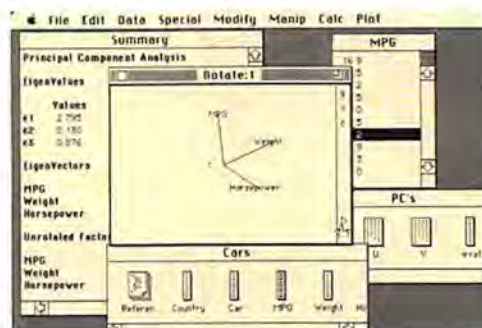
Out of School

Data Desk's university origins influence every aspect of the package—it improves your statistics knowledge as you use it (see "New Look in Help"). Its three man-



New Look in Help

This flashy (but thoughtfully designed) Help screen guides you not just to program instructions but also to explanations of technique.



Taking It for a Spin

You can insert a band icon into the center of the 3-D plot and rotate it (MacSpin style) until you intuit a pattern in your data. The pointing-band icon shown at the corner of the Plot window is poised to call up HyperView, a Data Desk option that suggests choices for further data analysis.

uals—*Quickstart*, *Handbook*, and *Statistics Guide*—are exemplary. They explain, in detail, how to operate the program and how to select appropriate tests. No other package is as useful to nonspecialists.

For the record, available tests in Data Desk include: standard summary statistics (mean, standard deviation, percentiles, and 18 others); the usual t-test, z-test, and chi-square test; a regression suite through polynomial regression with full manipulation of residuals; correlation (Pearson, Kendall tau, Spearman rank, and covariance); a complete ANOVA set; cluster analysis (which is otherwise found on only a few high-end Mac programs); and principal component analysis. The program uses direct 68881 access rather than SANE calls, and its speed is comparable to the other fast professional statistics systems on large data sets.

Every Picture Tells a Story

Flexible data manipulation and plotting are Data Desk's special strengths. The program supports the theory (originally advanced most strongly by Professor John Tukey of Princeton) that it's easier and more informative to see important correlations by viewing appropriate types of graphs than it is to inspect numerical tables or ANOVA data. Thus, rather than offer a huge list of tests, Data Desk offers a variety of plotting techniques, including 3-D plots that can be rotated, sliced, brushed, and regrouped. Often an apparently meaningless cloud of data points shows a clear pattern when the data axes are rotated, or the axis variables are transformed mathematically (see "Taking It for a Spin").

Data is stored in *work bundles*, which display icons for individual sets of data variables, transformed variables (functions of data variables that update automatically when data is changed), and stored plots. Selecting data by icon rather than by list-box item is fast and convenient. For instance, to call up a scatterplot of two variables, you select the icons for the variables from the work bundle and choose Scatterplot from the menu. Other types of charts include histograms, boxplots, dotplots, lineplots, bars and pies, and rotatable 3-D surface. Data Desk also offers a variety of grouping tools for editing a plot.

Data Desk automatically calculates correlation and regression statistics for your plot. The plot can also generate additional plots in which suspect data patterns are highlighted. After you have finished the plots and calculations, you can have Data Desk automatically store the results in your work bundle. Data Desk performs data import and export by translating files to and from text-only format, retaining all common delimiters (tabs, semicolons, and so on). I imported files from Excel, Microsoft Works, and dBase Mac with no glitches. Files from Odesta's Double Helix database program can be exchanged transparently with Data Desk.

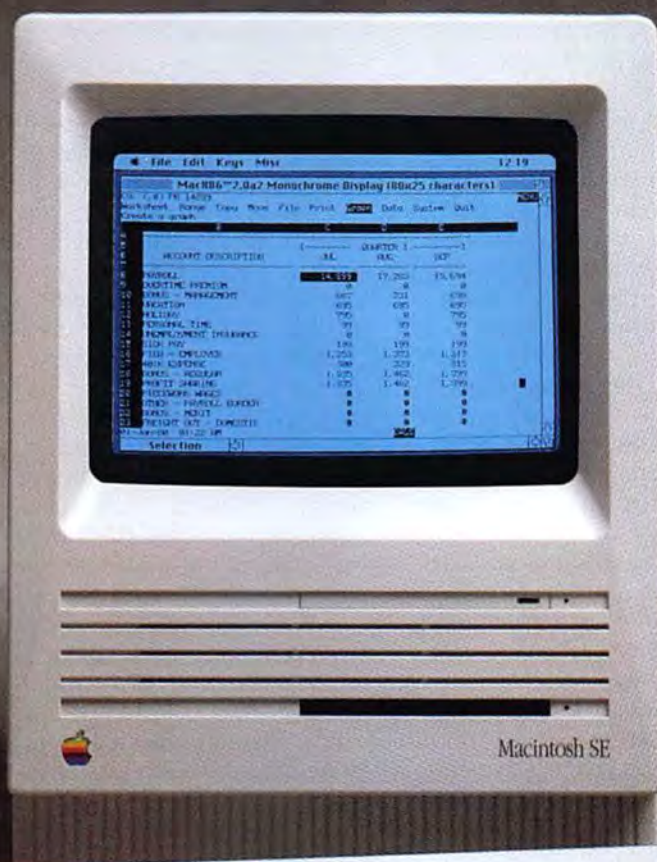
Summing It Up

If your training in statistics amounts to something like a one-year college class, Data Desk is the statistics program for you. Because the program fully supports visual data analysis and offers the most useful documentation/help system of any serious statistical software, you will enjoy using it to analyze any type of numerical data.

—Charles Seiter

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Circle 462 on reader service card

Window Shopping



by Lawrence Stevens

timer when you stop working on the project is to turn on your Mac again. So if you work away from your Mac, you'll later have to manually enter the time spent on the project.

The timer window lists three user-definable categories of information, such as attorney, client, and case; or contractor, equipment, and work site. On another screen, you list the hourly rate, if applicable, for each category. At the end of a work session the timer window appears; you simply specify which category should be used to determine the billable rate (or you can specify a flat rate), and the program calculates the billable amount for the project.

For billing purposes, all information in the timer window is also stored in the client section. In this section, you specify tax percentage, annual interest rate on overdue bills, when to begin to apply interest, and other billing information. Timeslips III then prints out bills in a batch or one at a time.

The program generates a wide range of reports. For instance, you can track the amount of activity for each employee in your organization, for each client, and for each type of job. You can generate reports on overdue bills and on clients' payment history. Much of this data can also be displayed in graph form.

Timeslips III is flexible enough to work well with many different kinds of organizations and with many different methods of billing. It's easy to use and has an extensive help file. I recommend this program highly.

Two for HyperCard

Out of the glut of HyperCard utilities come two stacks that work very well together: HyperAtlas version 1.0 (MicroMaps Software, \$99), a combination atlas and almanac, and HyperBook Maker version 1.1a (Ideafarm, \$59.95), which enables you to

create a book out of all the information found in HyperAtlas (or in any HyperCard stack, for that matter).

I don't know if it's a kind of voyeurism or a fascination with extremes, but I love to scan the almanac. Where else can you discover that the per capita annual income of Afghanistan is \$273 compared with \$7400 in the Soviet Union and \$14,461 in the United States, or that New Jersey has an average of 959 people per square mile?

Those facts, however, I learned from HyperAtlas, a product that transposes a book atlas into HyperCard stacks the way it should be done—by making extensive use of graphics. The first card in the stack contains a map, either of the world or the United States. Click on a section of the map, and the program zooms in on it. Click again, and you zoom in further to see country or state names. Click on a name, and you are given a choice of index cards: population or political information for each state, population and economic information for each country.

While the information in these stacks is interesting, each card offers only about five data items, all of which can be found just as easily and less expensively in an almanac. The most useful part of this program is the user information cards, into which you can import information from a spreadsheet, database, or word processor. HyperAtlas guides you through the process and even helps you add buttons to access the new information.

The biggest disadvantage of HyperAtlas is that it can handle only a small number of files and records. Each of the user information cards can have only ten data items, and if you add too many user information cards you just clutter up the state or country card with buttons. Another disadvantage

(continues)

One of the nice things about looking at a bunch of programs each month is that I can hunt for new ways to manage my life with my Mac. Unfortunately, while many programs are fascinating, only a few really make my work easier or better. I hope that you, too, will hit the jackpot with one or more of the programs I found interesting this month.

Time Is Money, but How Much?

Busy professionals often have trouble tracking their billable time. Clients are undercharged or overcharged, activities are not documented, and bills are sent out late or forgotten entirely. Timeslips III version 1.06 (North Edge Software, \$199.95) integrates time and expense tracking with billing, accounts receivable, and productivity reporting in a package that affords a level of control almost equal to having a secretary follow you around with a stopwatch and a notepad.

The heart of the program is TStimer, a desk accessory that tracks the amount of time spent on a project. It even works when the Mac is turned off; but if you use that option, the only way to shut off the

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Meet the New Lisa with MacWorks™ Plus

We thought it looked like a perfect match: the highly efficient Lisa and the myriad of Macintosh software solutions. On the one hand, there was the Lisa, a professional business computer with an extra-large 12"



screen, Macintosh graphic interface, familiar mouse, easy-to-reach internal components, space for an internal hard disk drive, three expansion slots, and a numeric keypad on the keyboard. Then there was the popularity of the Macintosh Plus, with its amazing capabilities, functionality and software applications.

What we did to bring the two together was develop a software program called MacWorks Plus. MacWorks Plus brings Macintosh functionality to the Lisa, plus compatibility with every application that runs on the Macintosh Plus. With MacWorks Plus, the Lisa can run HyperCard, MultiFinder, AppleShare, WordPerfect, Adobe Illustrator and Cricket Draw. (To name a few.)



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Reviews

vantage is that you can't manipulate data to compute, say, the average annual per capita income of northern Africa.

On the other hand, the program is easy to set up and learn. Personally, I think that time spent learning a file manager or spreadsheet is repaid by the power you get, but there are situations where people need to get up to speed on a database quickly. HyperAtlas is for them: the point-and-click set.

Making a Book on HyperCard

HyperBook Maker prints HyperCard stacks as double-sided, collated, ready-to-staple booklets. You can't do this by using HyperCard's Print Stack command, because if you fold and staple the book, the cards will not be in the right order. And unless you're a lot smarter than I am, you can't do this by printing one card at a time. Just try folding three or four pages together and figuring out what goes on the top, bottom, and back of each page, and you'll see what I mean.

HyperBook Maker offers a solid range of print options. You can print in stapled book or notebook format. The cards can be full page, half page, or quarter page. You can choose any card to be the cover, even one from another stack. And if you make a change to one card, you can have the program print only the page that the altered card appears on.

HyperBook Maker can even create a new stack. Simply go through cards from any stack and hit Enter when you see a card you want to put in the new stack. When you're finished, you can get a listing of the cards in your new stack or flip through them. HyperBook Maker is easy to use and has clear on-screen instructions (it even includes a detailed picture showing how to reinsert paper for printing on the reverse side).

President for Half a Day

Business Advantage version 1.1 (Reality Technologies, \$69.95) is a simulation program that puts you in charge of a corporation. Your task is to make the marketing, operational, production, and financial decisions that will allow the company to reach its goals. This isn't a Walter Mitty-type, Sunday afternoon game where you imagine the power, prestige, and wealth of CEO-ship. Rather, you learn by rolling up your

sleeves and calculating, forecasting, and speculating. This is for the serious student who doesn't mind spending about six hours punching keys on a calculator, reckoning with charts, and performing spreadsheet-type "what if" operations. Business school knowledge or business experience is helpful, but the program provides enough online assistance to make it valuable for anyone who wants to learn about running a large corporation.

The program comes with two case studies (you can buy more) based on real *Business Week* articles, which are also supplied. Your mission is to take the reins of the corporation and fulfill a specific goal, for example, increasing return on investment by 30 percent. To prepare, you study on-screen news items: economic analysis,



industry statistics, stock reports. And you can peruse corporate reports, such as the annual report, income statement, balance sheet, and performance summary.

Next you make decisions on such items as short- and long-term loans, number of products to produce, and amount to spend on research and development. For each item, you can access the Consultant, which explains the issues at hand. After you've made all your decisions, the program computes the consequences of your actions. You can then access Expert's Insight, for a detailed opinion of what you did right and where you went wrong.

I worked on a case based on a 1987 article entitled "Who's Afraid of IBM?" My job was to replace Rod Canion, Compaq's president, and increase the company's return on equity from the present 22 percent to 30 percent. Frankly, I would rather be in

Canion's shoes while he's spending his salary than while he's managing Compaq, so I decided to make some quick-and-easy decisions that I felt were sure to increase sales and thus revenue. I lowered prices, raised margins to dealers, increased production and advertising, and borrowed to the hilt with long-term debt, hoping that by the time the company felt the pinch, Canion would be back in the driver's seat.

The result? Return on equity dropped to 12 percent. I have no plans to approach Compaq for a job, but just in case, I'd appreciate it if you wouldn't mention this to anyone there.

Cute but Dumb

When it replaced MacProject with MacProject II, Claris deprived Macintosh users of a low-end project manager. MacSchedule version 1.1a (Mainstay, \$195) fills this gap to some extent, but the program's lack of intelligence severely limits its usefulness.

The MacSchedule screen looks much like a paper calendar, with dates along the top and boxes down the left side for entering the names of tasks. The calendar line displays annual, monthly, weekly, or daily dates. The duration of the tasks is represented by lines drawn under the appropriate date line. For example, if a five-day task begins on January 5, you drag a line from that date to January 10. A symbol, connected by a double line, appears on both dates. As the project progresses, to represent percent completed you fill in the double line by clicking on any part of it. If a task takes longer than expected, you use the Banana (as in slipped) tool to drag the task from the original expected completion date to the new completion date, and a dotted double line appears. If you must reschedule a task, drag it to the new date and a dotted symbol appears.

Although MacSchedule creates an attractive display, it provides no assistance in scheduling. It doesn't calculate a project's completion date, it doesn't reschedule projects when tasks fall behind, and it doesn't flag conflicts. If displaying a project in an easily readable form is all you need, MacSchedule works fine. But for managing projects, this program is only slightly more convenient than working with paper and pencil. □

See *Where to Buy* for contact information.

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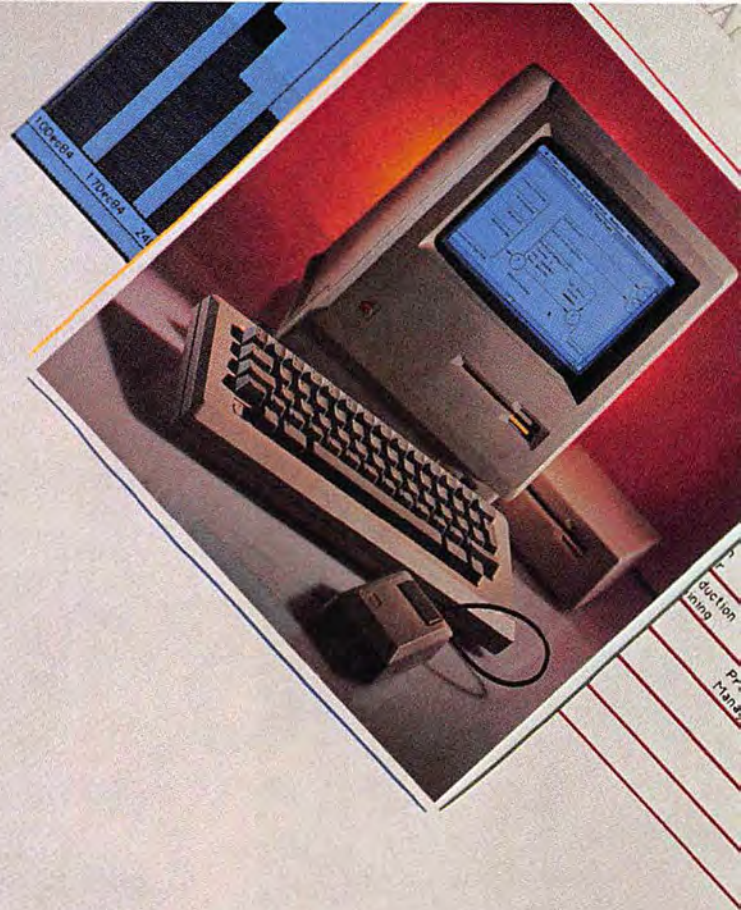
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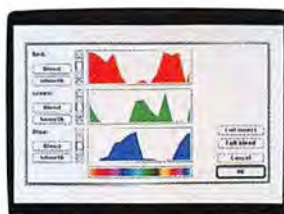
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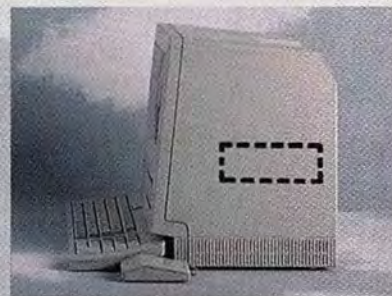
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New Products

Information on the Mac's latest software, hardware, and accessories

Edited by Suzanne Stefanac

This section covers Macintosh products formally announced but not yet evaluated by *Macworld*. All prices are suggested retail. Please call vendors for information on availability.

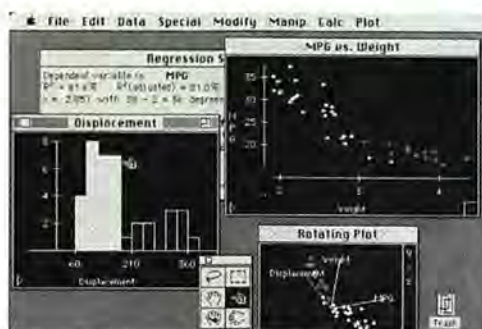
SOFTWARE

Architects Office HyperCard desktop management system with drafting board, technical library, transmittal forms. Among other features, the stack manages correspondence, communications, job costing, building codes, job site reports, and consultant files. Management by Checklist stacks will supplement Core stack. 1MB min. memory. Core stack \$49; stack plus two free upgrades \$98. Guidelines, 415/254-9393.

ArtRoom CD ROM contains more than 1000 PostScript images and 100 laser fonts that can be placed into documents directly from the compact disk. CD ROM player required. \$999. Image Club, 403/250-1969.

Client HyperCard stack that provides customizable client- and prospect-management system. Maintains sales, financial, and business interests for clients or prospects. 1MB min. memory. \$195. Softworks, 203/926-1116.

Cliptures (Volume 1, Business Series) Four 800K disks with over 150 high-resolution business-oriented graphics. Images saved as EPS files can be used as is or can be edited using Adobe Illustrator. 1MB min. memory. \$129.95. Dream Maker, 213/221-6436.



Data Desk Professional

Colony As regional space marshals, players investigate alien invasion. Players explore labs, computer rooms, halls, offices, and homes through six play levels of real-time, hidden-surface, 3-D animation, and digitized sound effects. 512K min. memory. \$49.95. Mindscape, 312/480-7667.

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Crystal Ball Forecasting and risk management software. Interfaces with Excel and other Microsoft spreadsheets. Forecasts various possible results for a given situa-

tion by generating sequences of random numbers using them as variables. 512K min. memory. \$395. Market Engineering Corporation, 303/893-0100.

Data Desk Professional Features advanced statistical procedures, interactive graphics, and built-in expert guidance for data analyses. Analyzes data from Double Helix II databases as well as data imported from spreadsheets, other databases, and main-frame-originated ASCII files. Can analyze VAX-based data brought to the Mac from Helix VMX. Takes advantage of the Mac II's 68881 chip. 1MB min. memory. \$495. Odesta, 312/498-5615.

Extend Simulation application in which user builds block diagrams composed of icons, forms them into models, and runs simulations. Currently shipping with electronic engineering library and models from a variety of other disciplines. Has functions for math, plotting, finance, signal processing, queueing, and statistics. Exports and imports plots and tabular data. MultiFinder compatible. 1MB min. memory. \$495. Imagine That, 408/365-0305.

HyperBible: The Computerized Chain-Reference Tool HyperCard stack based on Thompson Chain-Reference Bible. Topical indexing of Bible verses into 7000 topics. Word searches accomplished through marginal notes or scripture references. Includes maps. 1MB min. memory; 20MB hard disk required. \$229.95. Beacon Technology, 408/296-4884.

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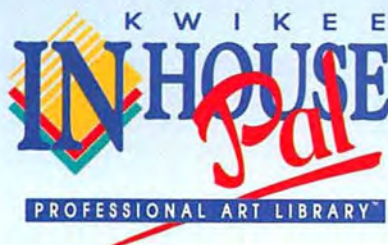
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BROWSE.

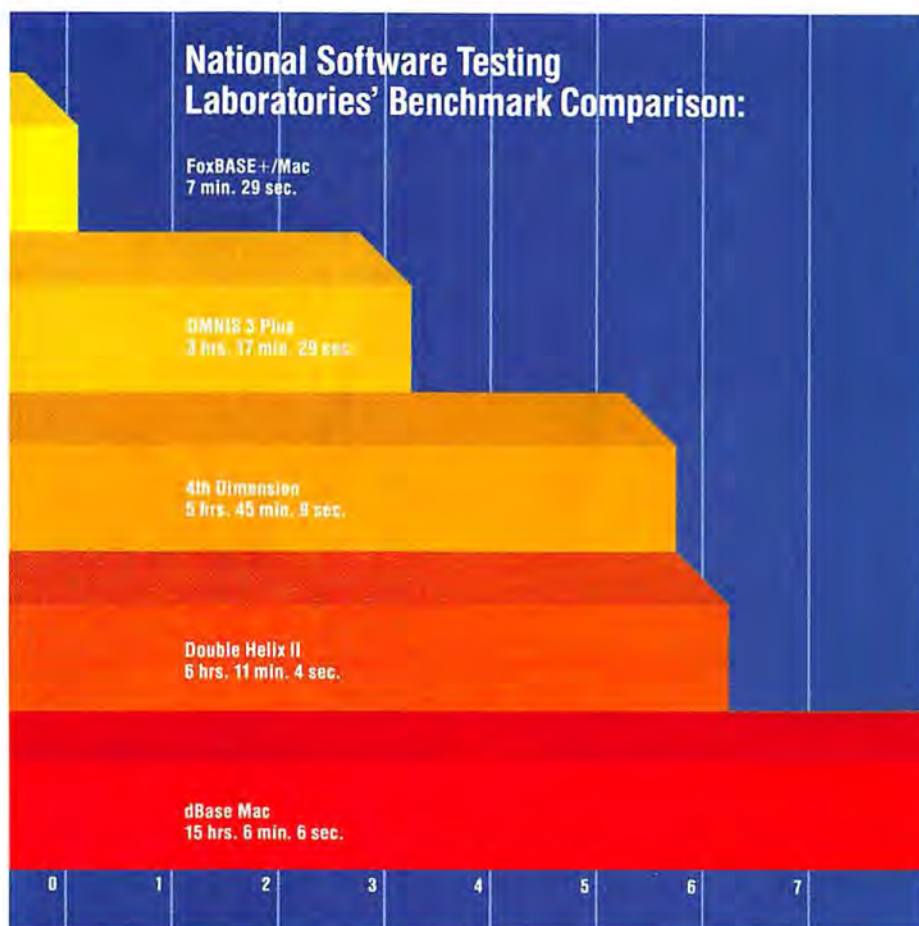
FoxBASE+/Mac's BROWSE feature brings new convenience and power to database display and editing! You're in complete control—BROWSE lets you dynamically adjust the size and order of fields displayed, add or delete records, and split the window to show different database sections side-by-side. Together, BROWSE and View Windows *eliminate* the need to write programs for common database operations!

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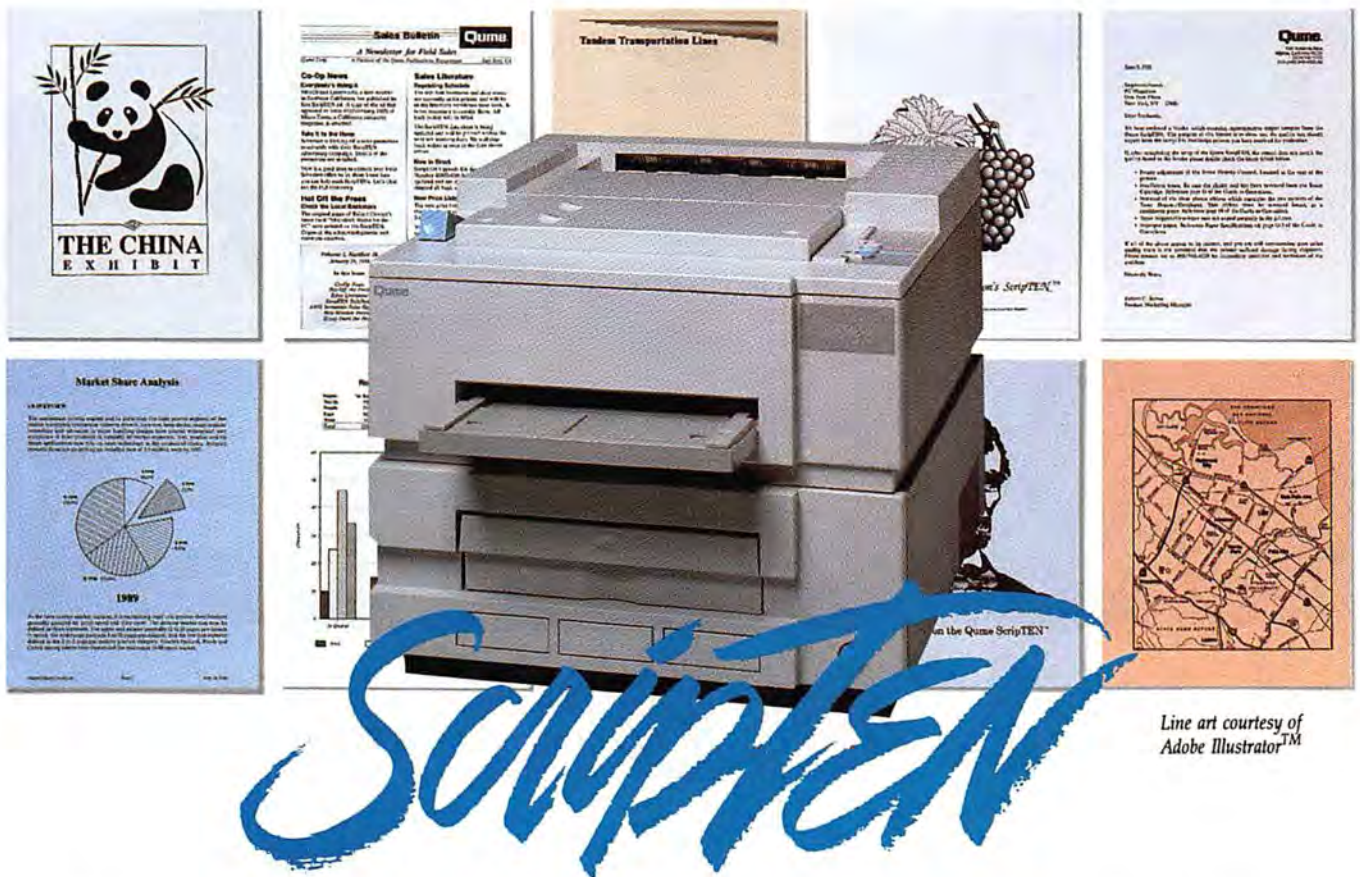
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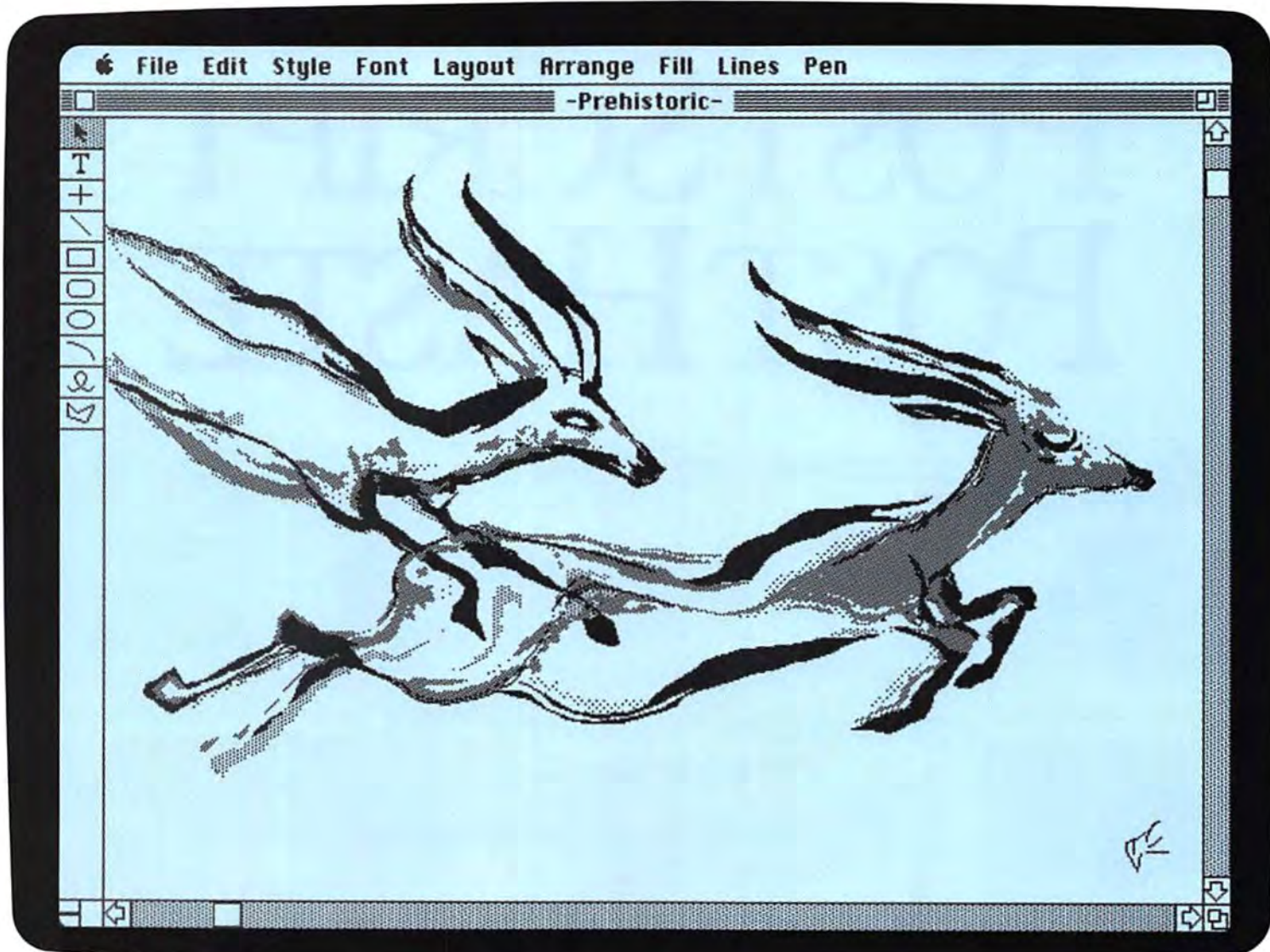
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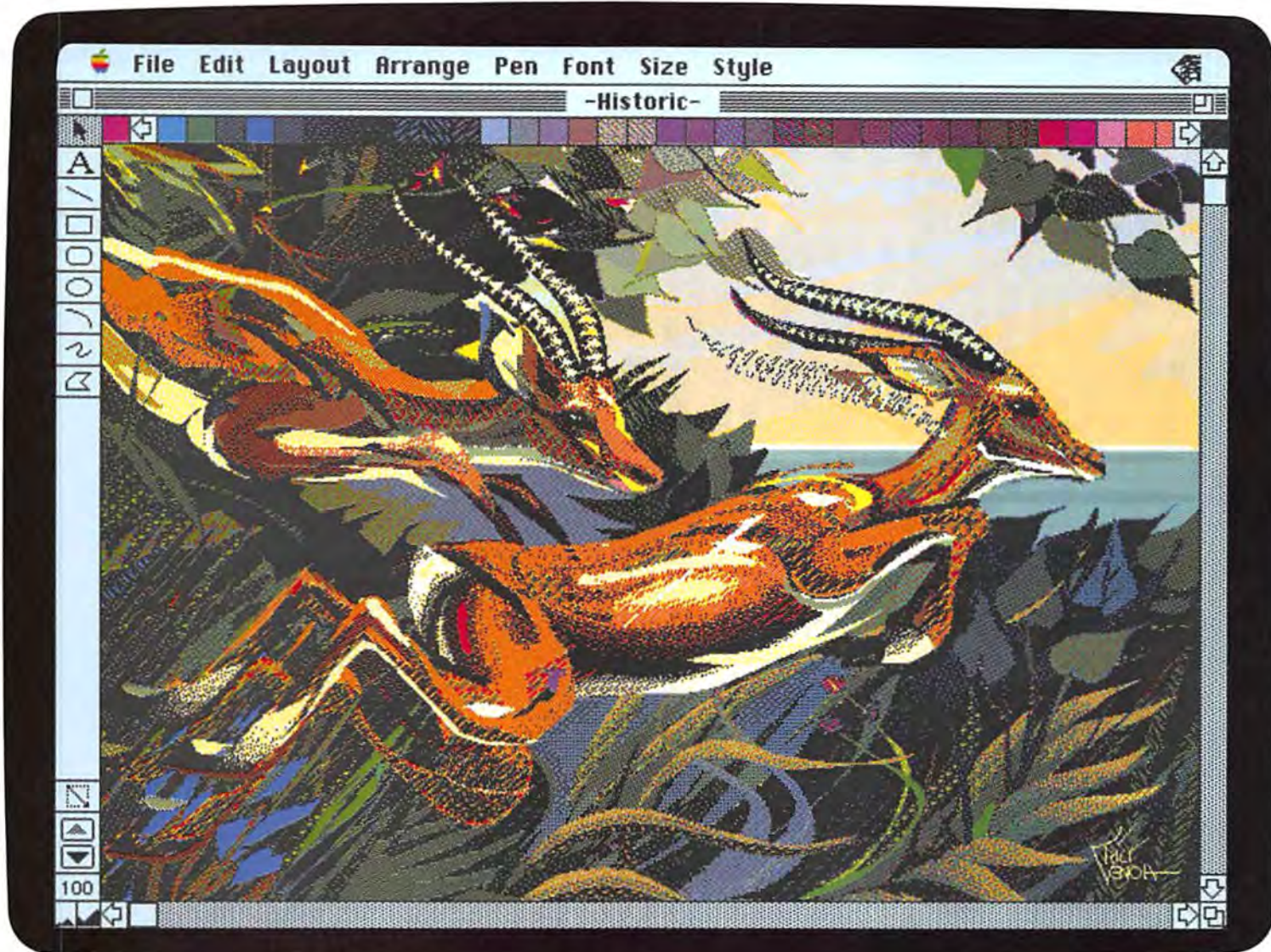
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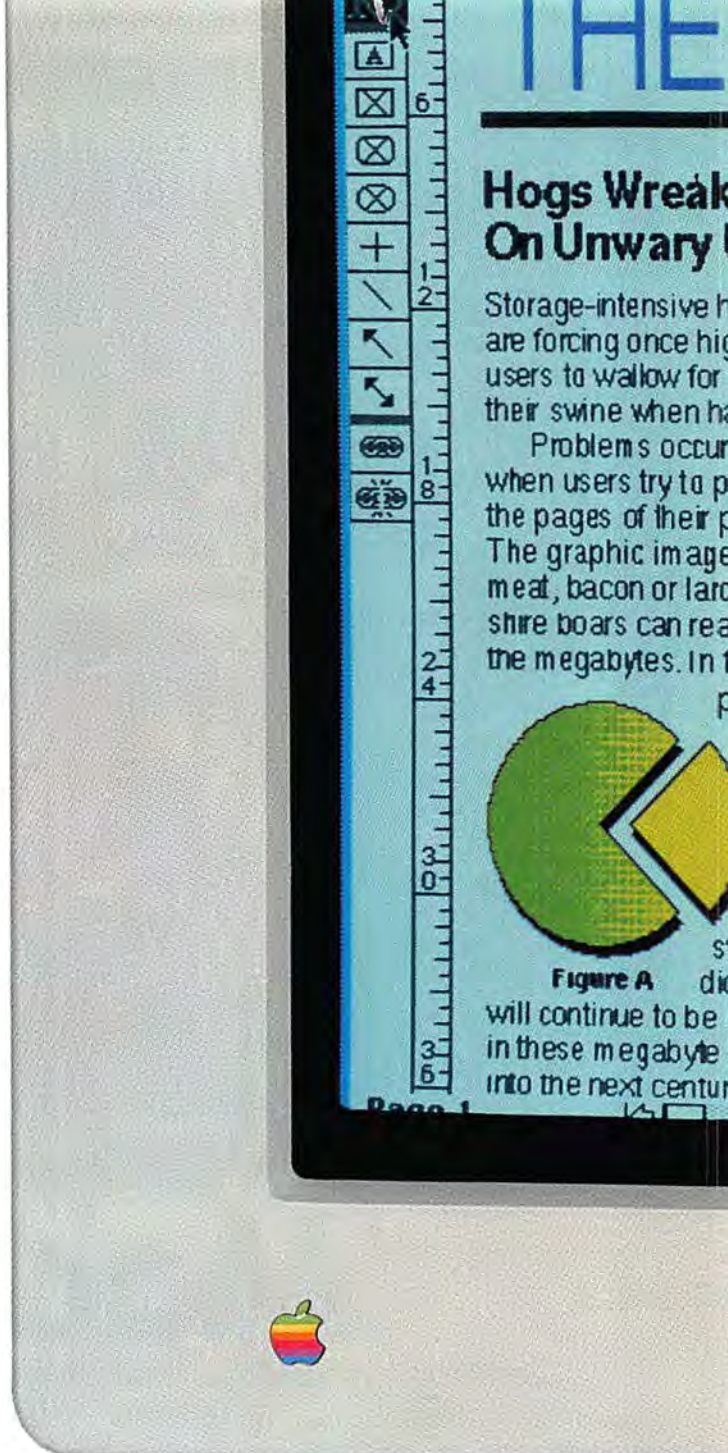
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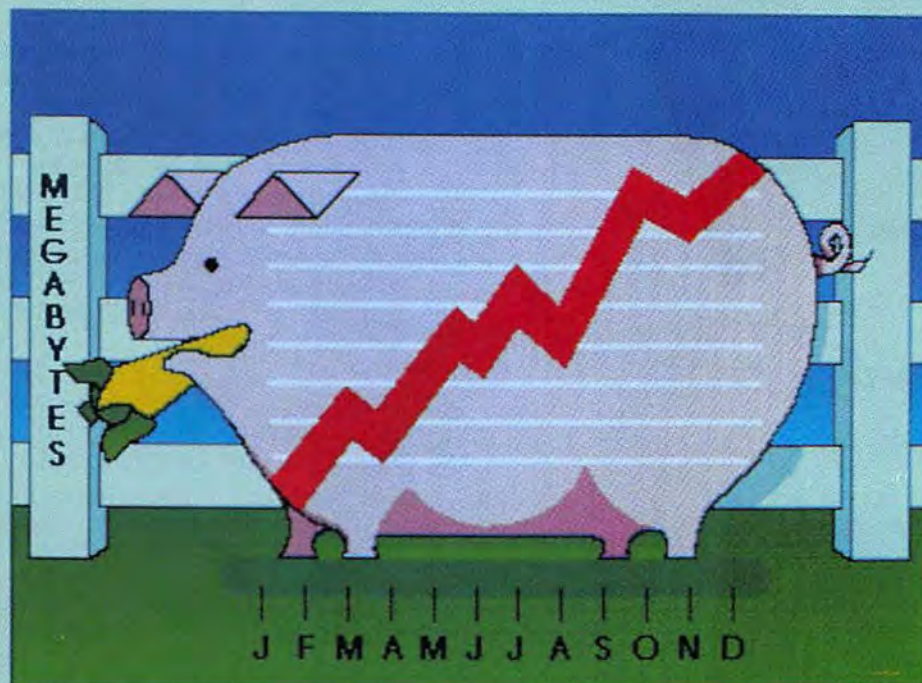
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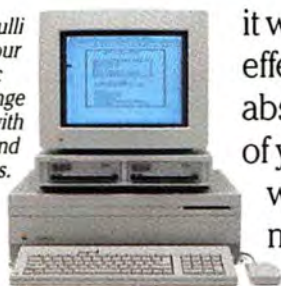
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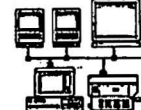
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NKrypto File encryption desk accessory. Unique encryption pattern for each copy. Encrypts data fork, will not allow accidental encryption of applications. 128K min. memory. \$20. Plus2 Software, 818/248-3315.

PROpsForms Over 90 ready-to-use business forms stored as SuperPaint draw documents that can be customized. Digitized company logos and graphics can be added in paint or draw layers. Forms print in Times typeface. 1MB min. memory. \$79. JLA Computer Services, 215/855-5159.

Pyro Screen saver utility that automatically darkens the screen when computer is left unattended for user-specified amount of time; displays realistic fireworks in monochrome or color. (Formerly bundled with Suitcase.) 1MB min. memory. \$24.95. Fifth Generation Systems, 800/225-2775.

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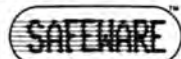
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SoftPC Software emulation of IBM PC allowing Mac SE and II to run MS-DOS-based software in a window alongside other Mac applications. Pastes text and graphics from DOS to Mac; supports external floppy drives and networking. 2MB min. memory; 4MB recommended. 68020 or 68030 accelerator required for SE. \$595. Insignia Solutions, 408/446-4992.

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ADB Extended Keyboard Features 15 function keys, 6 page-control keys, inverted T-style cursor keypad, and 18-key numeric keypad. Option, ⌘ , and Control keys on both sides of the board. Escape and power-on keys for the Mac II also provided. Bundled with QuickKeys (keyboard macro software from CE Software). \$199. Ehman Engineering, 307/789-3830.

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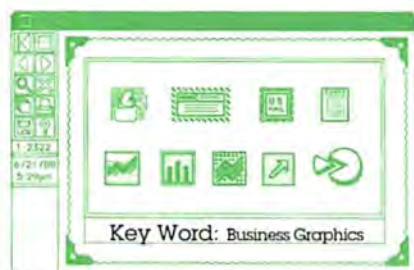
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Quick Tips

Answers to your questions

by Lon Poole

Getting the bomb (a system error alert box) or having your Mac freeze can ruin your day, especially if you're using MultiFinder. You lose all the work you did since last saving documents. And if you have a hard disk, it takes a long time to restart by switching the Mac off and back on or by pressing the Reset button on the programmer's switch, because the Mac rebuilds the hard disk's directory. *Macworld* contributing editor Rob Hahn picked up some tips from CompuServe's MAUG (MicroNet Apple User's Group) that may save the day if you're using System 4.2 or higher.

This one comes from Brad Ferguson (76354,2733). Next time your Mac suddenly stops working, try pressing the Interrupt button just behind the Reset button on the programmer's switch (if your Mac has one, you'll find it on the lower-left side toward the back). With luck, you'll get a dialog box containing a greater-than symbol (>) in the upper-left corner. Typing **G Finder** and pressing Return should take you back to the Finder without restarting. If you're using MultiFinder, you can then save all open documents and restart properly by using the Finder's Restart command. (If not, you'll have to use the Reset button or the power switch.)

Here's a tip from Russ Whetmore (76703,2010). Instead of going to the Finder, you can restart the Mac using the built-in ShutDown Manager. It properly unmounts volumes so that restarting doesn't require extra time to reconstruct the volume directories. Press the Interrupt button and in the empty dialog box type **SM 0 3F3C 0002 A895** and press Return. Then type **G 0** and press Return.

Lon Poole answers readers' questions and offers advice in his monthly Macworld column. Many of the tips he's compiled can be found in his book Mac Insights (Microsoft Press, 1987).

Get in the habit of saving whenever you pause momentarily. I also recommend saving before switching applications with MultiFinder. With most applications, pressing **⌘-S** is all it takes.

Stylistic Font Variations

Many LaserWriter fonts come with separate screen fonts for stylistic variations such as bold, italic, and bold italic. For example, you can get B Times Bold, BI Times BoldItalic, and I Times Italic screen fonts in addition to plain Times from Adobe (P.O. Box 7900, Mountain View, CA 94039-7900, 415/961-4400, 800/292-3623). These stylistic variations look better on screen and provide better spacing with some applications than do the styles that QuickDraw derives from the plain font (see "Fit to Print," *Macworld*, April 1988).

For best results, however, do not choose the stylistic variations directly from Font menus, Character Format dialogs, Type Specification dialogs, and so forth. Instead, choose the plain font and then apply the desired attributes to it. For example, first choose Times and then choose Bold style. The Mac will use the appropriate stylistic variation if one is available (if not, QuickDraw will derive the desired results from the plain font). Selecting the stylistic variation directly makes it harder to change fonts and styles later. And whatever you do, don't choose a stylized font and apply styles to it (for example, don't choose B Times Bold and then apply Bold to it), because it may freeze your LaserWriter.



ImageWriter Spooling

Because Apple's Print Spooler works only with the LaserWriter, I purchased SuperSpool version 4.0 from SuperMac. First problem: SuperSpool and MultiFinder are enemies. Second problem: While I do not always need to run SuperSpool, I do like to use a RAM disk. I often

have long documents and need the extra space to work more effectively and quickly—such are the disadvantages of not having a hard disk. How can I use the RAM disk without using SuperSpool? Will SuperSpool and MultiFinder ever become friends?

*Cheryl A. Furtak
Chicago, Illinois*

A SuperSpool 5.0 works fine with MultiFinder. It should also work with any MultiFinder-compatible RAM disk (you don't say which one you have). In fact, SuperSpool is faster than Apple's spooler and doesn't interfere with foreground work nearly as much. All this is also true of SuperLaserSpool 2.0, SuperMac's LaserWriter and AppleTalk ImageWriter spooler.

If you purchased SuperSpool 4.0 or SuperLaserSpool 1.11 after January 14, 1988, you can get a free upgrade to the latest version by sending the original disk and dated proof of purchase to SuperMac, 295 N. Bernardo Ave., Mountain View, CA 94043, Attn: Software Upgrades. Those who purchased before that date must pay a \$20 handling charge.



Imported Data

As an undergraduate mechanical engineering major, I deal with problems involving computer modeling nearly every day. I can easily solve most of the problems by compiling simple FORTRAN programs that write computed results to text files. However, I'm unable to format the FORTRAN data so that it can be read in columnar form by Cricket Graph. How can I use Cricket Graph to plot the contents of the FORTRAN text files?

*Scott A. Brooks
Milwaukee, Wisconsin*

(continues)

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A Cricket Graph, along with most spreadsheet and database applications, can import text files that use Tab characters to separate columns and Return characters to separate rows. Your program should write a Tab character (ASCII code 9) after every value except the last value on each row. At the end of each row, your program should write a Return character (ASCII code 13). To import the data in Cricket Graph, choose Open from Cricket Graph's File menu. In the Open dialog box, select the Show All Text Files option, find your data file, select it, and click the Open button. For more information on importing and exporting with Cricket Graph, plus some sample Pascal programs, see Appendix C of the Cricket Graph manual.

Q **ImageWriter II Commotion**
Why does the ImageWriter II roll the paper backward ½ inch and then instantly roll the paper forward to its original

position before printing begins? To successfully feed the paper under the rollers, I must waste the sheet of paper above the one on which printing begins.

*Robert Pace
Carmel, California*

A The ImageWriter II rolls the first sheet of pin-feed paper backward to reach the top of the printable area of the page, which starts ½ inch below the top of the paper. Then the ImageWriter II rolls forward to the printed image's starting point on the page.

The printable area starts ½ inch from the top of the paper on an ImageWriter II because that's where it starts on an ImageWriter I. But standard paper-loading practice, which puts the top of the paper just under the pinch rollers, leaves the print head an inch from the top of the paper on an ImageWriter II. Hence the reverse motion.

The back-and-forth motion only happens at the beginning of a print job when you're using pin-feed paper. Therefore, you can avoid the commotion by choosing Manual Feed in the Print dialog box or by using a sheet feeder.

Style Copy

Tip: I've discovered a convenient way to copy styles from one Word document's style sheet to another Word document without bringing in the entire style sheet. First, open the document that has the style you wish to copy. Select a paragraph that is formatted in the desired style and copy it to the Clipboard. To copy several styles at once, copy a series of paragraphs that contain all the desired styles (or you can create paragraphs just for this purpose and use Cut instead of Copy); next, open the document to which you want to copy the styles; then paste the paragraphs. The new styles will appear in the style sheet. You can now delete the text you pasted, and the styles will remain. This is much more efficient than bringing in an entire style sheet (by using Word's Open command in the Define Styles dialog box) and then cutting unwanted styles one at a time.

*Kirsten Robinson
Providence, Rhode Island*

This technique won't work if the style you're copying has the same name as a

(continues)

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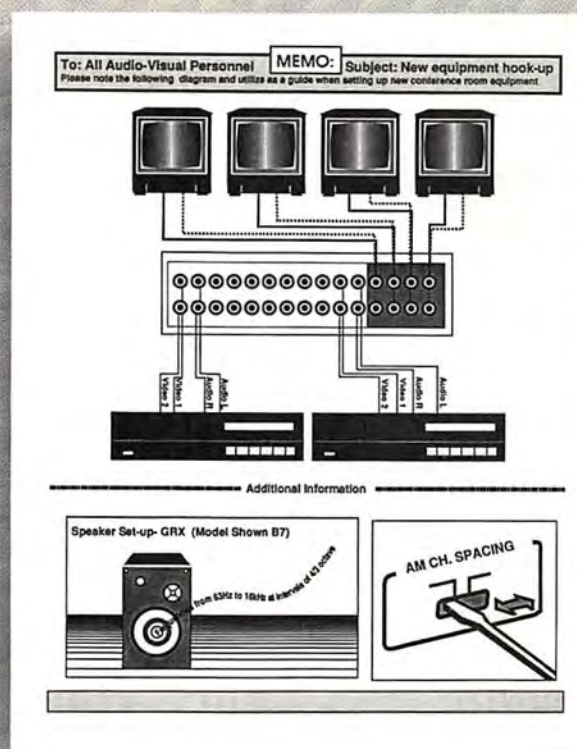
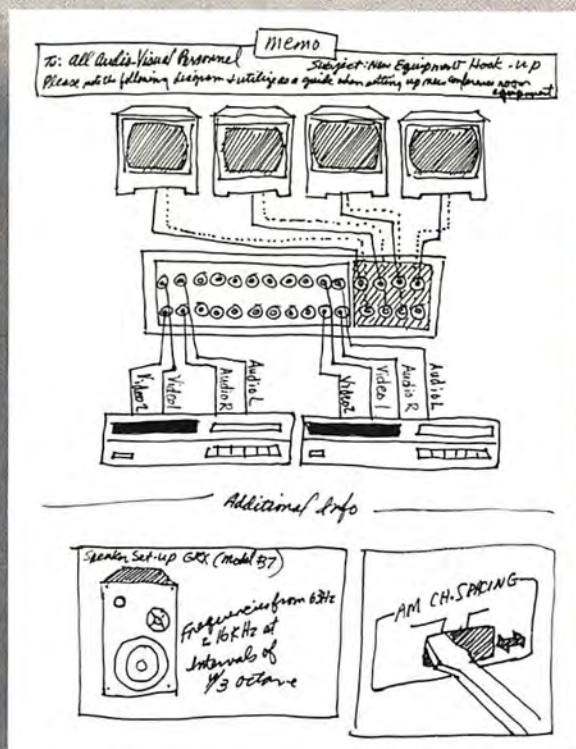
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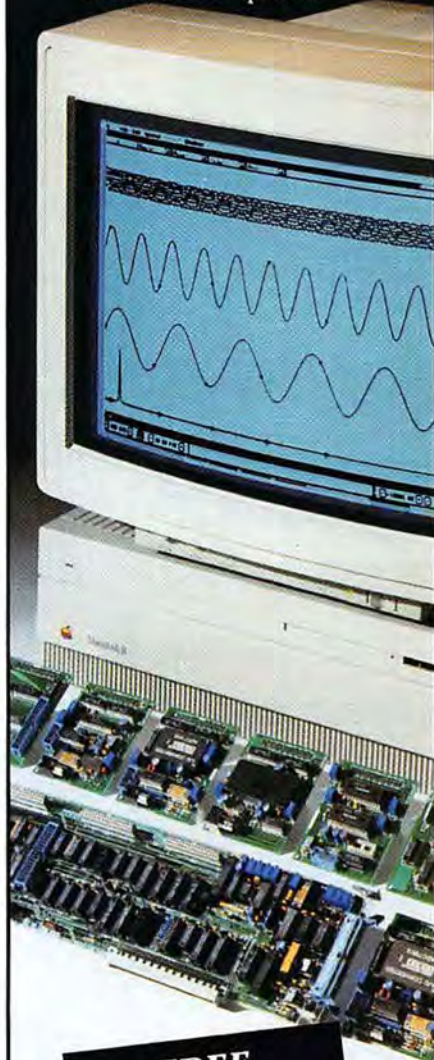
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How To/Quick Tips

style already in the destination document (such as Normal). That's because existing styles always take precedence over like-named incoming styles.

Composite Category Labels

Tip: You can't always find a chart format in Excel's Gallery menu (version 1.0x) that will show all the information you want to present. For instance, no standard pie chart shows both category names and percentages.

This problem is easily overcome in the worksheet on which the chart is based. There you can use Excel's Text function to convert numbers to text and you can use its concatenation operator to combine text from various sources. If, for example, col-

umn A contains category labels and column D contains percentages, the following formula combines them in column B:

=A2&" "&TEXT(D2,"0.00%")

You use column B instead of column A for the chart category labels. The worksheet and chart in "Name and Number" show how this technique works.

Charles Schrey

North Tonawanda, New York

Slanted Margins

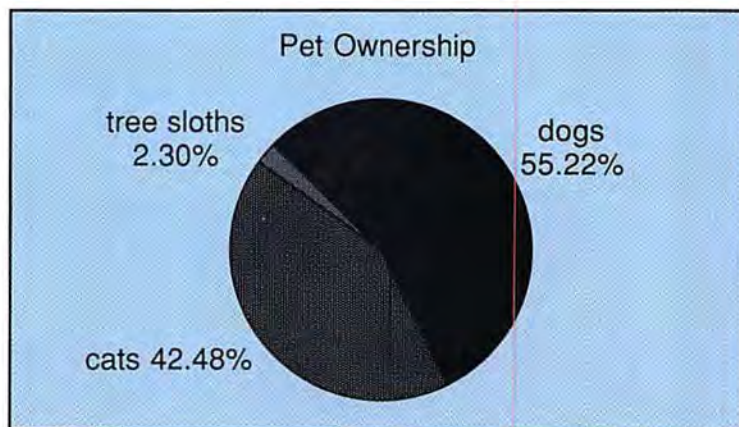
Tip: Quark XPress doesn't have a feature that generates slanted margins, but with version 2.0 it's easy to create them (see "Slanted Margin"). Use the line-draw-

(continues)

Name and Number

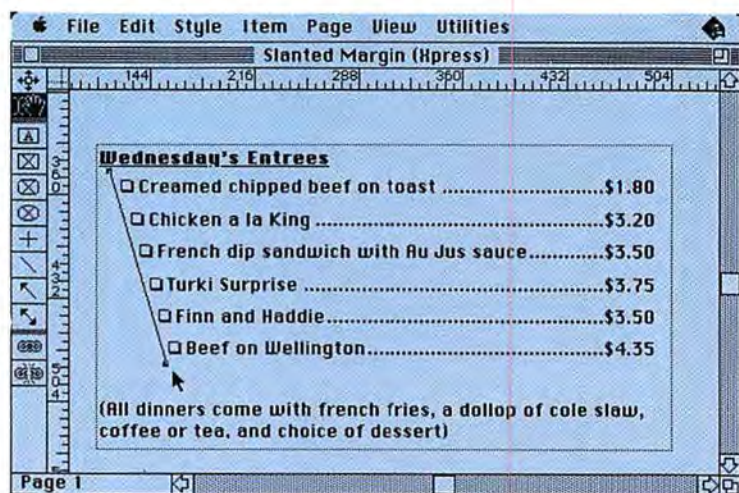
To combine values for use as a data point label in an Excel chart, use the concatenation operator (&) and the Text function in the linked worksheet. Here the formulas in column B combine the text in column A with the percentage in column D. The chart graphs all cells within the range B2:C4.

	A	B	C	D
1	Pet Type	Chart Category	Number	Percentage
2	dogs	=A2&" "&TEXT(D2,"0.00%")	312	=C2/TOTAL
3	cats	=A3&" "&TEXT(D3,"0.00%")	240	=C3/TOTAL
4	tree sloths	=A4&" "&TEXT(D4,"0.00%")	13	=C4/TOTAL
5				=C5/TOTAL
6	TOTAL		=SUM(C1:C5)	=C6/TOTAL
7				
8	dogs	312	312	
9	cats	240	240	
10	tree sloths	130	13	



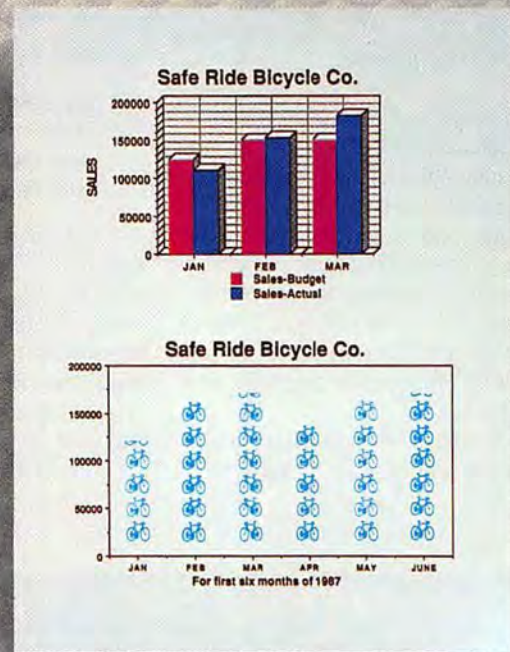
Slanted Margin

Quark XPress 2.0 (shown here) and other page-layout applications can align text along a diagonal line, creating the effect of a slanted margin.



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ing tool to draw a line at the angle you want for the margin slant. This line should be partly or completely within a text box so that type can later flow into the text box. While the line is still selected (the end points are showing), press **⌘-M** to modify it. Set the shade to 0 percent black (or to white) and make sure it's not transparent. Now any text that flows into the adjoining text box will slant along the invisible line. This method works for left and right margins providing you use the appropriate paragraph format option (left or right).

*J. D. Sharp
San Rafael, California*

A similar technique works in PageMaker 3.0 and in ReadySetGo 4. After drawing the slanted line in PageMaker, choose Text Wrap from the Options menu and select the middle wrap option. With the line still selected, drag the diamond-shaped handles of its graphic boundary to make a rhomboid boundary around the line. Then choose None from the Lines menu to make the line invisible. Finally, place or type text at the top of the line.

In ReadySetGo, draw the "margin" line on top of the text box. With the line

still selected, choose Specifications from the Edit menu and select the Runaround option in the Specifications dialog. Finally, choose None from the Pen menu to make the line invisible.

Childproofing HyperCard

Tip: I modified the script in my HyperCard Home stack so that when my nine-year-old son (or anyone else) uses HyperCard, he will not accidentally change any information. I replaced the line

```
set userLevel to card field "User Level"
```

with the following:

```
ask "Password?" with "----"
if it is "cyclops"
then set userLevel to card field "User Level"
else set userLevel to 1
```

Now on start-up the script asks for a password. Entering the right password selects the user level on the User Preferences card, whereas entering the wrong password selects the browse level. This keeps complete newcomers out of trouble. Of course, an experienced user can change the user level as desired.

*Ray Weisgerber
Edmonds, Washington*

Illustrator Type Styles

Tip: I routinely use Adobe Illustrator to create typographic variations by copying some type, pasting once or twice, and adjusting the fill and stroke of the original type and the copies. Illustrator lets you set the fill and stroke for type just as you would for any other object. First select the type and choose Paint from the Style menu (or press **⌘-I**). In the Paint dialog box, select a fill color, a stroke color, and a stroke weight. (Illustrator uses 100 percent color density for fill and stroke unless you specify otherwise.) If you set a stroke color other than None for some type, set the Miter Limit to 3 or lower to prevent strange spikes from appearing on some characters. "Affected Type" shows eight type variations I created in about ten minutes.

Line 1 shows the word *Bookman* set in 60-point Bookman Demi. The fill and stroke are Illustrator's standard for type, 100 percent black fill and no stroke.

Line 2 shows the same type still filled black, but with a black stroke of 1.5 points. To get the 3-D effect, copy the type, paste it in back, and change the paint specifica-

(continues)

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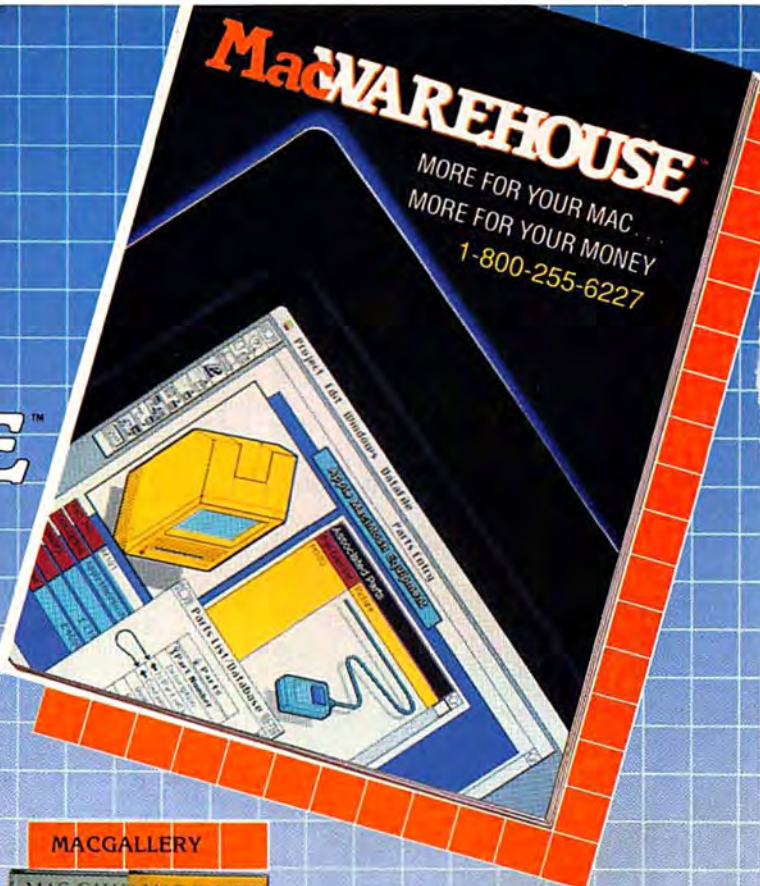
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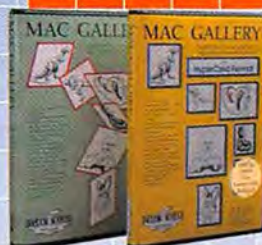
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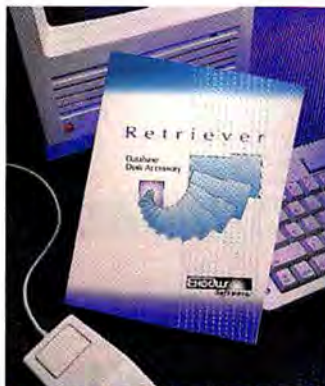
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tions to a white fill with a black stroke of 0.2 points. Then move the back copy 4 points to the right.

Line 3 has the same type filled white with a 1-point black stroke. Press ⌘-C, ⌘-B, and ⌘-I with the type selected to quickly copy the type, paste the copy behind the original, and open the Paint dialog. Set the rear type fill and stroke to 20 percent black to create the gray shadow.

Line 4 keeps the original black fill but adds a 6-point black stroke. Next copy the type, paste it to the front, and change that layer to a white fill with a 4-point white stroke. To create the bold inline effect, paste to the front again and give the top layer a black fill and no stroke.

Line 5 is a copy of line 4, with all three layers grouped and then scaled 130 percent horizontally.

Line 6 shows that a white stroke with a black fill can make characters thinner. Kern a copy of the original type 0.5 point by using the Type menu command to set the Spacing option to -0.5. Then set the

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Affected Type

With Adobe Illustrator, you can create a variety of typographic effects using the Copy, Paste In Front, Paste In Back, Paint, and Type commands.

Paint options to a black fill and a 0.5-point white stroke.

Line 7 uses three layers of type to get the shaded inline effect. The bottom layer has a black fill and an 8-point black stroke. The middle layer has a white fill and a 7-point white stroke. The top layer is filled 20 percent black with no stroke.

Line 8 has its top layer filled 20 percent black with a 1-point stroke in 100 percent black. The back layer is moved 4 points right and given a 100 percent black fill and stroke.

James P. Patterson
 Largo, Florida

We pay \$25 to \$100 for tips published here. Send tips or questions (include your address and phone number) to Quick Tips, Macworld, 501 Second St., San Francisco, CA 94107. Send electronic mail to CompuServe (7037,702), The Source (BCW440), or MCI Mail (addressed to Macworld). All published submissions become the property of Macworld. □

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*We'll send you a bibliography of our reviews and more information about MacMoney. Just call or write. Address written requests to 'Reviews', Survivor Software Ltd., Suite 450, 11222 La Cienega Blvd., Inglewood, CA 90304. Phone (213) 410-9527. List price \$119.95. Hardware: 512KE Macintosh, Macintosh XL, Plus, SE & II. Printer (recommended): ImageWriter or LaserWriter (or equivalents). MacMoney is a trademark of Survivor Software Ltd.; any other trademarks are for reference only.



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Getting Started with Word Processing

From paragraph indents to multicolumn pages, a hands-on tour of common word processing chores

by Jim Heid

If you're like most *Macworld* readers, you use a word processor more than any other program. Regardless of which word whacker you use, chances are your word processing life takes you through similar formatting terrain. This month, I'll show you how to conquer common formatting chores with today's programs. Perhaps you'll find an insight that your manual shrouded in fog. If you're still shopping, you can assess how each program handles each task. "Time Savers" shows how you can save time and keystrokes as you write.

Know Thy Rulers

Before you tackle any job, it's vital to understand your program's approach to storing such *formatting attributes* as line spacing, paragraph indents, margins, justification, and tabs. All Mac word processors have on-screen rulers for adjusting those settings, but they don't all use them in the same way. Two schemes predominate. With the *attached-to-paragraph* approach—taken by Microsoft's Word, Write, and Works, and by T/Maker's WriteNow—ruler changes apply only to the paragraph containing the blinking insertion point. If you've selected a range of text, the changes apply to the selected paragraphs. To change an entire document, select all its text. You can do this in Word by pressing **⌘A** and clicking in the selection bar along the win-

Jim Heid is a Macworld contributing editor who focuses each month on a different aspect of Mac fundamentals.



JONATHAN LEVINE

*With the Mac's 24-point bold type, journalist and author I. F. Stone was able to write *The Trial of Socrates* (Little, Brown, 1988) despite failing eyesight.*

dow's left edge. (The bar is invisible, but you'll know you're there when the pointer changes to a right-pointing arrow.) In Works and WriteNow, choose Select All from the Edit menu.

FullWrite and MacWrite follow the *ruler-to-ruler* method, in which the current format is governed by the last ruler setting in the document. When you need

to change formats—margin widths, for example—you insert a new ruler and alter it as needed.

Like Word and its ilk, WordPerfect has only one ruler. But instead of attaching formats to paragraphs, WordPerfect applies

(continues)

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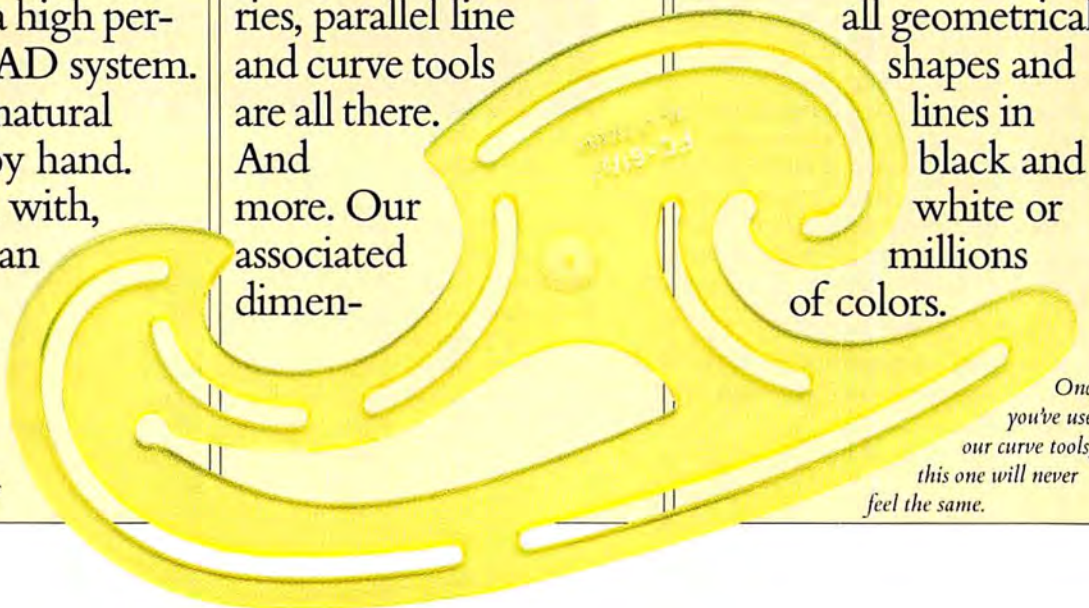
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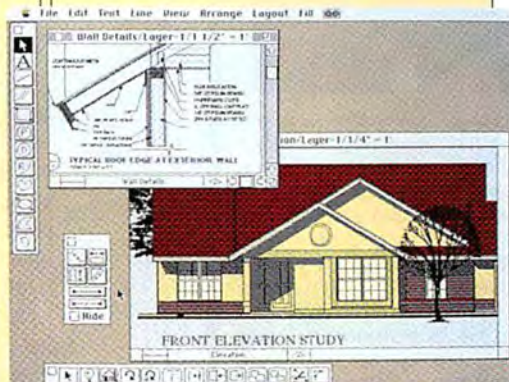
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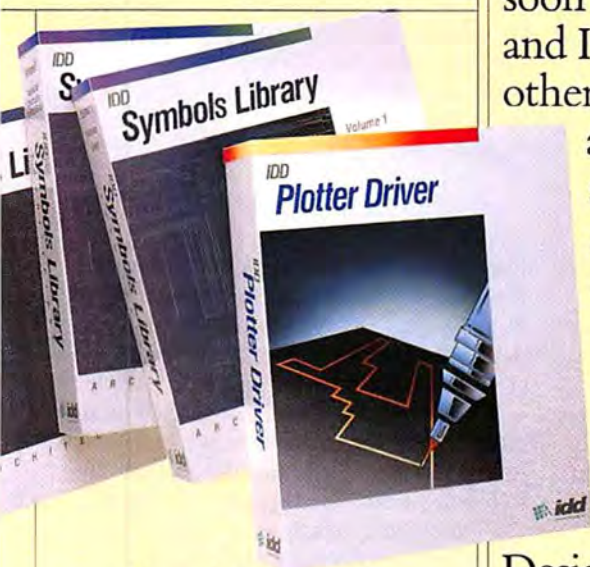


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How To/Getting Started

Time Savers

Here's a look at some helpful word processing features.

Glossaries let you store and name lengthy words or paragraphs that can then be inserted into a document with a couple of keystrokes. WordPerfect lets you create macros, which store and play back keystroke or command sequences.

A style sheet is a collection of formats to which you assign a name, and which allows you to change formats with a few keystrokes. Word and FullWrite provide style sheet features, and you can get the same results with WordPerfect macros.

Word and FullWrite provide keyboard shortcuts for every command and even let you access dialog box options. Word also has slick shortcuts for copying and moving text without replacing the Clipboard's contents. WordPerfect lets you

create macros to automate command sequences.

Many word processors provide useful built-in spelling checkers and thesauri, but these do have limitations.

Spelling checkers don't guarantee accurate spelling or word usage. For example, if you substitute the word *there* for *their*, a spelling checker won't catch the error. But it can still be valuable, especially if your writing contains brand names or industry-specific words. By adding such words to a *user dictionary*, you can tailor your silicon lexicon to your work.

Because a thesaurus typically offers numerous (and often quite different) synonyms for a given word, it's up to you to choose the one whose meaning fits your needs. When you find one you like, consult a dictionary to make sure it's appropriate.

ruler changes to all text following the cursor. For example, if the cursor is in the third line of a paragraph and you click on the justified-text icon, WordPerfect inserts a carriage return at the cursor's position and then justifies everything below that, leaving preceding lines unchanged. Variations of this scheme apply to many formatting options not on the ruler, such as line spacing. It's confusing at first, but with practice you will master it.

You can display most programs' rulers by choosing a Show Ruler command. "Rulers of the Road" shows the components of the rulers used by today's word processors.

The Lowly Paragraph Indent

Indents are indents, right? Wrong. There's more than one way to bump a paragraph's first line to the right. My favorite method is to press Tab. All programs offer preset tab settings, usually spaced at 1/2-inch intervals. So by pressing Tab at the beginning of a paragraph, you indent its first


line 1/2-inch. MacWrite is an exception to this rule; it provides one preset tab stop at its ruler's 5 1/2-inch mark. To use Tab to indent paragraphs in MacWrite, create a tab at the 1/2-inch mark.

Another method is to use the ruler to create a *first-line indent*, in which the first line of every paragraph—that is, each line following a carriage return—is indented.

To create a first-line indent in Microsoft Word or WriteNow, place the insertion point in the paragraph to be changed (or before the point where you'll begin typing), and then drag the ruler's indent marker to the right. In Word, you can also use the ⌘-Shift-F keyboard shortcut.

In FullWrite, insert a tab ruler (if none exists already) and then drag its indent marker to the right. You can also edit the default ruler by choosing Base Styles from the Style menu. In MacWrite, drag the ruler's indent marker to the right.

(continues)



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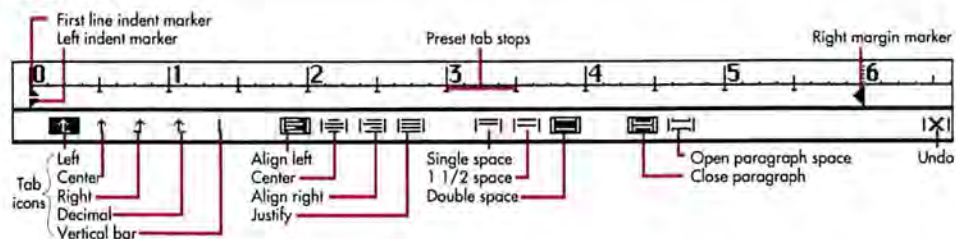
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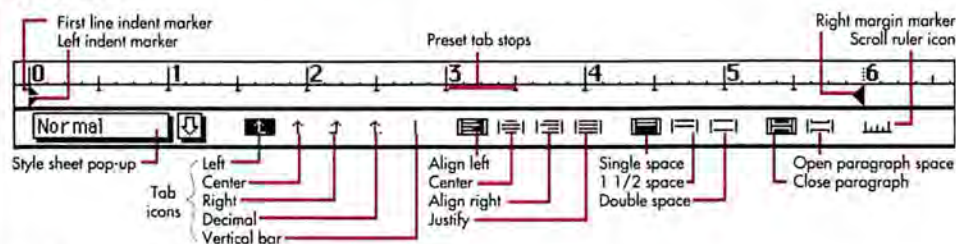
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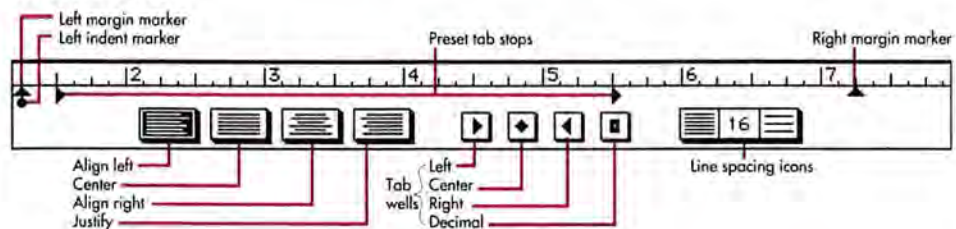
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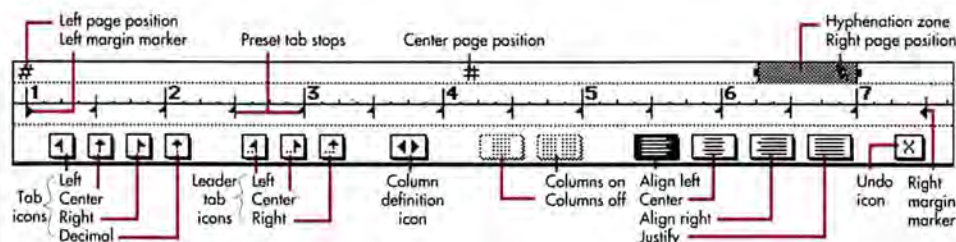
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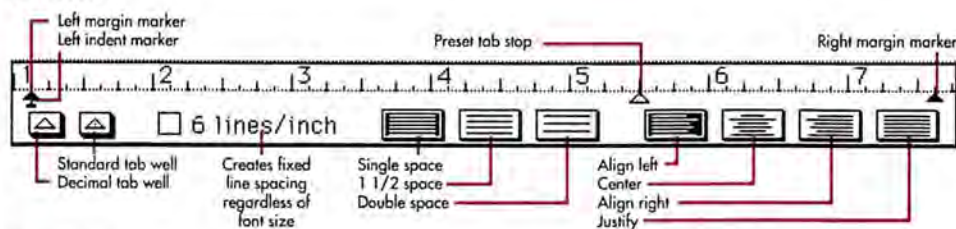
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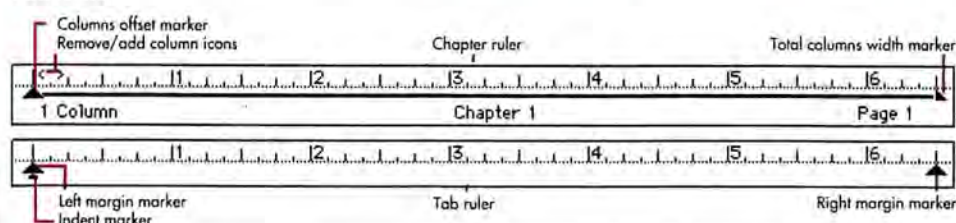
WordPerfect



MacWrite



FullWrite



Rulers of the Road

A word processor's ruler is the key to adjusting margins, tabs, justification, and line spacing. Here are the components of the rulers used by today's most popular word processors.

But because any line ending in a carriage return is considered a paragraph, first-line indents have a drawback: single-line paragraphs such as subheads will appear indented, too, unless you reformat each one to appear flush left.

Using Tab is essential if you need to save your document in text-only format for modem transmission or to import into a program that can't read your word processor's file format. Text-only files discard formatting information such as fonts and indents, but they *do* retain ASCII formatting codes such as tabs and carriage returns. (For more on ASCII files, see "Getting Started with Data Exchange," *Macworld*, September 1988.)

More Ins and Outs of Indents

A variation on the indenting theme is the *hanging indent*, in which the first line of a paragraph begins to the left of subsequent lines. These often appear in numbered or bulleted lists of items (see "Hanging Indents").

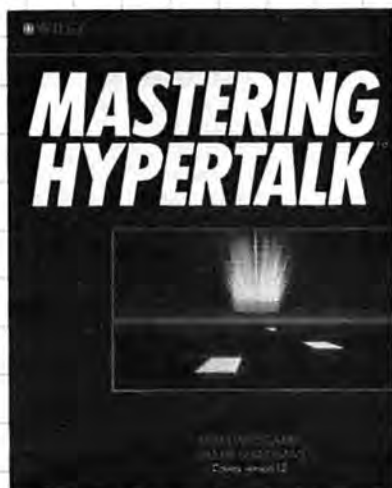
Creating a hanging indent is easier if you've typed at least one of the numbered or bulleted items, so do that first. (If you use bullets, put a space between the bullet and the first character of the item. If you want more space, press Tab.) Next, if you are using Word, place the insertion point within the item, or select all the items if you've already typed them. Now press Shift and drag the lower indent marker to the right about 1/4-inch, and all the lines except the first jump to the right. While still pressing Shift, fine-tune the marker's position until the margins align with the first character after the bullet or decimal point.

In FullWrite, position the insertion point before the first item and insert a tab ruler. Next, press Shift and drag the triangular left-margin indent marker to the right, and then fine-tune the marker's position. To restore the normal left margin, move the insertion point to the end of the item list, insert a new ruler, and drag its left-margin marker to the left. The steps are similar in MacWrite, except you don't press Shift to drag the left-margin marker. Just be sure to drag the triangular marker, not the taller left-indent marker.

In WordPerfect, first position the cursor before the list of items. Next, create a tab stop roughly 1/8-inch to the right of the left margin, and then choose Indent from the Paragraph submenu to create a hanging indent for the first item. To indent each re-

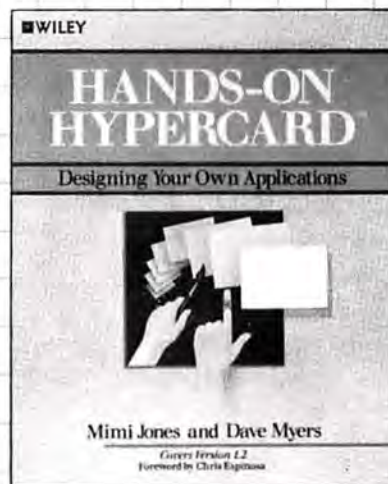
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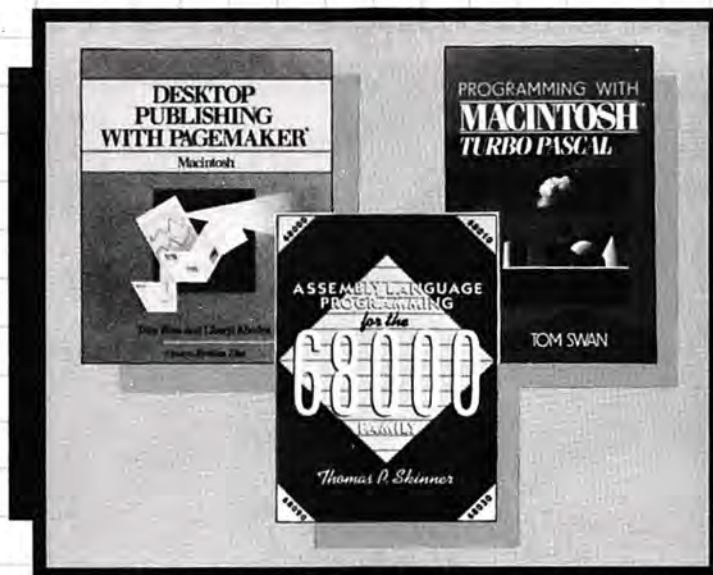
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Hanging Indents

Hanging indents are often used to align the left margins in a list of bulleted or numbered items. WriteNow lets you create a hanging indent by positioning the indentation marker to the left of the left margin marker.

maining item, move the cursor to the beginning of each and choose Indent (or press ⌘-Shift-T). To adjust the indent's size, position the cursor after the tab-set code and drag the tab stop to the left or the right. Working with formatting codes is easier if you choose Show Codes from the Edit menu.

Paragraphs in a legal document or lengthy quotes from another author's work are often indented from both margins. To

indent both margins in Word, Works, or WriteNow, first place the insertion point within the paragraph you're indenting (or select the paragraphs to be indented), and then drag the left and right indent markers toward each other by ½-inch or so. With FullWrite and MacWrite, insert a new ruler before and after the text to be indented, and then adjust the margins of the ruler that precedes the text. In WordPerfect, open the Format menu's Paragraph submenu and choose Left-Right Indent.

Hands-On the Table

Another common word processing job involves creating *columnar tables*, typically used for such items as tables of contents and financial statements. Tables often contain *leader characters*, usually lines of periods, which run across the column and guide the eye along the line to the next column.

Creating tables means mastering tab features. Most programs let you center text within tabs or align it against a tab's left or right edge. And all provide *decimal tabs*, which align the decimal points in columns of numbers.

Rulers are the gateways to tabs. With Word, Works, or WriteNow, first be sure the cursor is located where the table will begin before you create the tab stops. To create a tab in Word, click on the ruler at the tab's position. Word and most other programs are preset to create left-aligned tabs. To create a different kind, first select the ruler icon for that kind. In WriteNow and MacWrite, drag the desired tab out of its *tab well* and position it on the ruler.

In FullWrite, insert a tab ruler if necessary. Then, to create left-aligned tabs, click the ruler at each tab position. For a right-aligned tab, press ⌘ and click the ruler. For a centered tab, press Shift; for a decimal tab, ⌘-Shift. To change a tab's alignment setting or leader character, double-click the tab and make adjustments in the subsequent dialog box.

In WordPerfect, begin by clearing the preset tabs, which appear at ½-inch intervals: choose Tabs from the Line submenu, click the Delete button, then click OK. Next, select the tab icon for the type of tab you want, and then click the *tab pointer* on the ruler at each tab's location. To switch to a different type of tab, click that tab's ruler icon. To change an existing tab's alignment, click on the new alignment's icon, and then on the existing tab.

Took An Advanced Drawing Program To Create This Art



With all these programs, you adjust a tab's position by dragging it left or right on the ruler. Word, FullWrite, and WordPerfect also accept measurements in a dialog box for precise positioning. All programs except WordPerfect let you remove a tab by pointing to it and dragging away from the ruler. To expunge a WordPerfect tab, first click the tab icon that matches the style of the doomed tab, then click on the tab to remove it, then click the same tab-style icon to reset the pointer.

Remember, with attached-to-paragraph programs, the cursor must be in the line whose tabs you're refining. If you're refining the entire table, select all of it first. With WordPerfect you can mutilate a table by carelessly dragging tabs left and right. You'll get the best results by selecting the entire table and then fine-tuning.

Microsoft Word 4.0, still in development at this writing, boasts a labor-saving Insert Table command that creates a spreadsheetlike grid of rows and columns. You can type tables within the grid without fussing with tabs and rulers.

Take Me to Your Leader

Word, FullWrite, WriteNow, and WordPerfect let you include leader characters in tables (see "Fearless Leaders"). In most programs, you assign the leader character to the tab whose column the leaders will point to. For example, to create a leader between columns two and three, assign the leader to column three's tab.

To create leaders in Word 3.0, first create tabs for each column. Next, place the cursor where you'll begin typing the table (or select the table if you've already typed it), and choose Paragraph from the Format menu. Click on the appropriate column's tab icon in the ruler, and then choose the desired leader (periods, dashes, or solid underscores) in the Tab Leader area of the Paragraph dialog box. Click OK to apply the changes and close the dialog box, or click Apply to see the changes but leave the box open for more changes. (The steps differ in Word 4.0: double-click on an existing tab to display the Tabs box, click on the tab you want the leaders to point to, and then choose the kind of leader character you want.)

In FullWrite, double-click on an existing tab to summon the Tabs dialog box, and then choose the desired leader. (The

	Principal	Income	Total
Common Trust A	\$37,143	\$70,519	\$107,662
Common Trust B	30,480	41,148	71,628
Common Trust C	7,155	4,914	12,069
Common Trust D	47,995	11,923	59,918
Common Trust E	58,415	2,071	60,486
Common Trust F	67,195	9,813	77,008
Library Trust	298,275	29,624	327,899
Duncan C. Munk Trust	—	7,317	7,317
Bernard P. Kelly Trust	169,484	11,061	180,545
Total	\$716,342	\$188,890	\$905,232

Fearless Leaders

Leader characters guide your eye across a line to the next column in a table. In this Microsoft Word 3.0 table, the leader character has been assigned to the tab near the ruler's 2 1/2-inch mark.

second button gives the best dot leaders.) In WordPerfect, use the ruler's leader tab icons. If you prefer the Tabs dialog box, click the Dot Leader check box to assign a leader to a given tab.

WriteNow lets you create leaders, albeit in an odd way. To create a leader between columns one and two, type column one's information, then while holding down the Tab key type a period. Release

(continues)

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How To/Getting Started

Tab and type column two's information. Squirrely, no? The result isn't too attractive, either; WriteNow puts more space between each dot than a professional typographer would.

Change That Style

All programs offer *search-and-replace* features for finding and changing text, but only a few work with attributes such as tabs and font information. The ability to search for and replace tabs, fonts, and styles lets you quickly change a document's appearance.

Word lets you locate tab characters and carriage returns by typing ^t or ^p in the Find What text box. You can't search for font, size, or style information, but you can use Word's Change command to reformat paragraphs. First, copy the carriage return of the paragraph whose format you want to apply elsewhere (choose Show ¶ from the Edit menu to see carriage return codes). Then select the carriage return of the paragraph to be changed and choose Paste. To automate the process, type ^p in the Find What box, and ^c in the Replace With box. The latter tells Word to replace the text to be changed with the Clipboard's contents.

FullWrite can search for and replace nearly any formatting attribute. Specify the attributes by using the Font, Size, or Style menus while the blinking cursor is in the Find What or Change To box. For example, to change all 12-point Times text to 10-point Helvetica, first choose 12-point and Times from the Size and Font menus. Next, press Shift-Option-? to get the wildcard character ; (which means *any character*). Next, tab to the Change To box and choose 10-point and Helvetica from the Size and Font menus, respectively. Finally, type another ; and click Change All. (FullWrite can't undo a Change All, so consider saving the document first.)

Citizen Mac

One way in which Word, FullWrite, WriteNow, and WordPerfect infiltrate the desktop publishing camp is by letting you create multiple *columns* of text on a page. Multicolumn pages are common in newsletters, brochures, and menus.

In Word and WriteNow, creating multiple columns involves choosing a command and specifying the number of columns you want. In Word, use the Section command. In WriteNow, use Page Setup. In FullWrite,

(continues)

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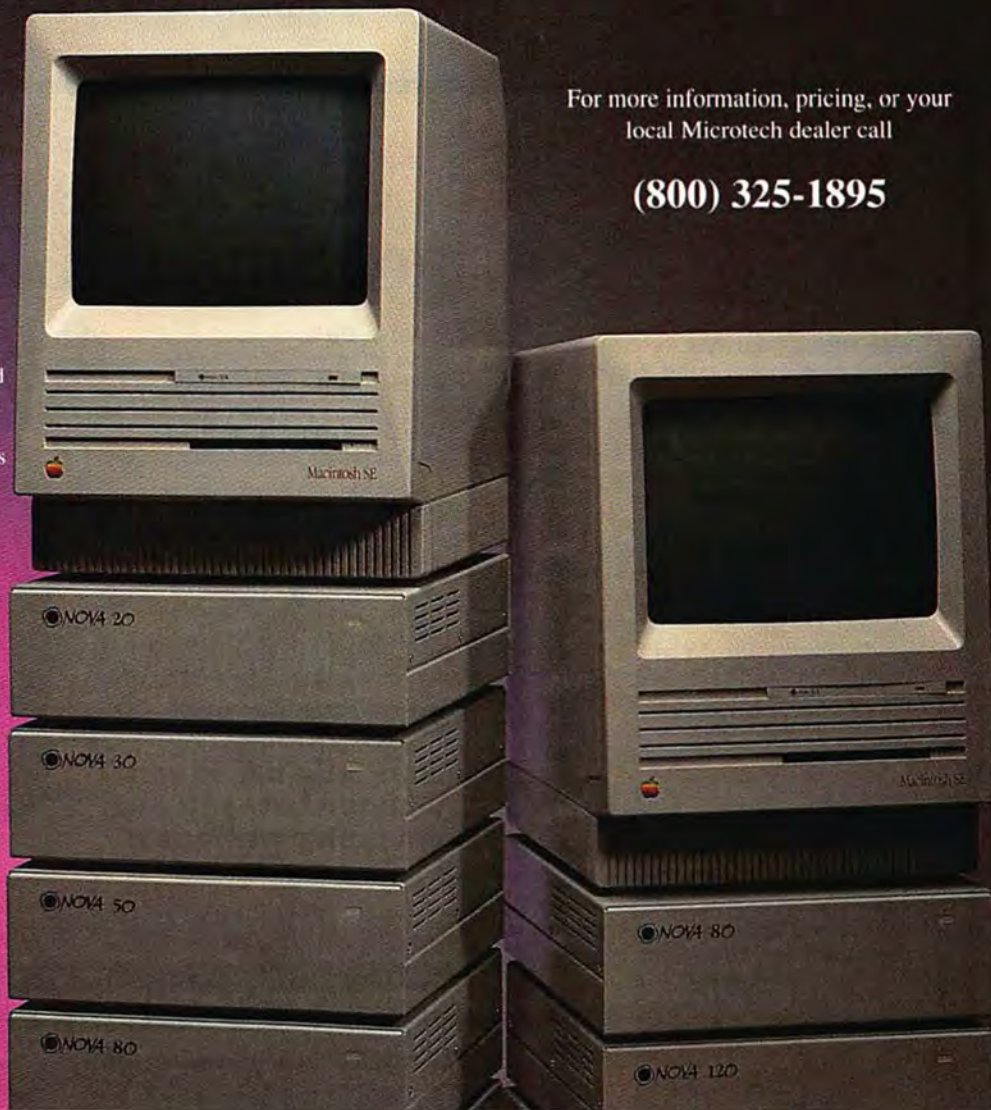
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click the column icons in the chapter ruler or use the Layout command's dialog box. In WordPerfect, use the Columns sub-menu's Column Options command to specify column characteristics.

It's a rare document whose every page contains nothing but multicolumn text. More often, some pages have headlines spanning both columns (see "Columns on the Menu"). Formatting such a page in Word means breaking it into *sections*. Type the headline, then press **⌘-Enter** to insert a section break. Next, with the cursor in the new section, choose the Section command, choose the No Break option, and specify the number of columns.

In FullWrite, mixing different column setups on the same page means using *sidebars*. With the cursor where the full-width headline will appear, choose New Sidebar from the Notes menu. Specify the sidebar's size, and then type and format the headline as desired. Finally, close the sidebar window, and create the multicolumn text.

In WordPerfect, you can switch between multiple columns and full-width text



Columns on the Menu

To mix various column widths on the same page with FullWrite, you must create multiple sidebars. Here, each section of the page is a separate sidebar.

by choosing the Columns On and Columns Off commands after you've specified column characteristics.

Where to Learn More

For more tips and insights, check the *How To* section in *Macworld* each month. Books are good sources for tidbits, too. *Working with Word*, by Chris Kinata and

Gordon McComb (Microsoft Press, 1988), is a guide to Word 3.0. *The Word Companion*, by Judy Mynhier and Gena B. Cobb (The Cobb Group, 1987), covers 3.0 and 3.01. For FullWrite users, there's *Working with FullWrite Professional*, by Macworld Contributing Editor Robert C. Eckhardt (forthcoming from Brady). And browse your program's manuals occasionally. The information you need might be buried where you hadn't seen it before.

If you're still shopping, test drive some programs to find one whose operating style you like. (Aside from those mentioned here, you might want to check out Access Technology's MindWrite 2.0, which had just been announced at press time.) And don't be wowed by endless lists of features, either. Gimmicky formatting features won't help you put your thoughts into words—indeed, they might tempt you to play with fancy formats instead of making another round of revisions. Word processors exist to make writing easier. That's a miraculous feat in itself. □

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Our architectural firm provides a top quality product, on time, and within our clients' budgets. We're also a company that firmly believes our responsibility does not end with the sale. Standing behind our finished product and servicing our clients' needs is what Livermore, Edwards and Associates is all about...and what we feel Microtech is all about.

We bought a Nova external hard disk drive from Microtech based upon a recommendation from a fellow architect. A number of employees use it for numerous applications: from accounting, to word processing, to graphics; and the one thing we know is...we can count on it!

Microtech has a superb product at a great price, and a top-rate service department to back it up. Whenever we have contacted Microtech, we have encountered enthusiastic, technically knowledgeable support personnel. Being a company that doesn't desert you once the sale is made, we appreciate when we run across a company with the same philosophy.

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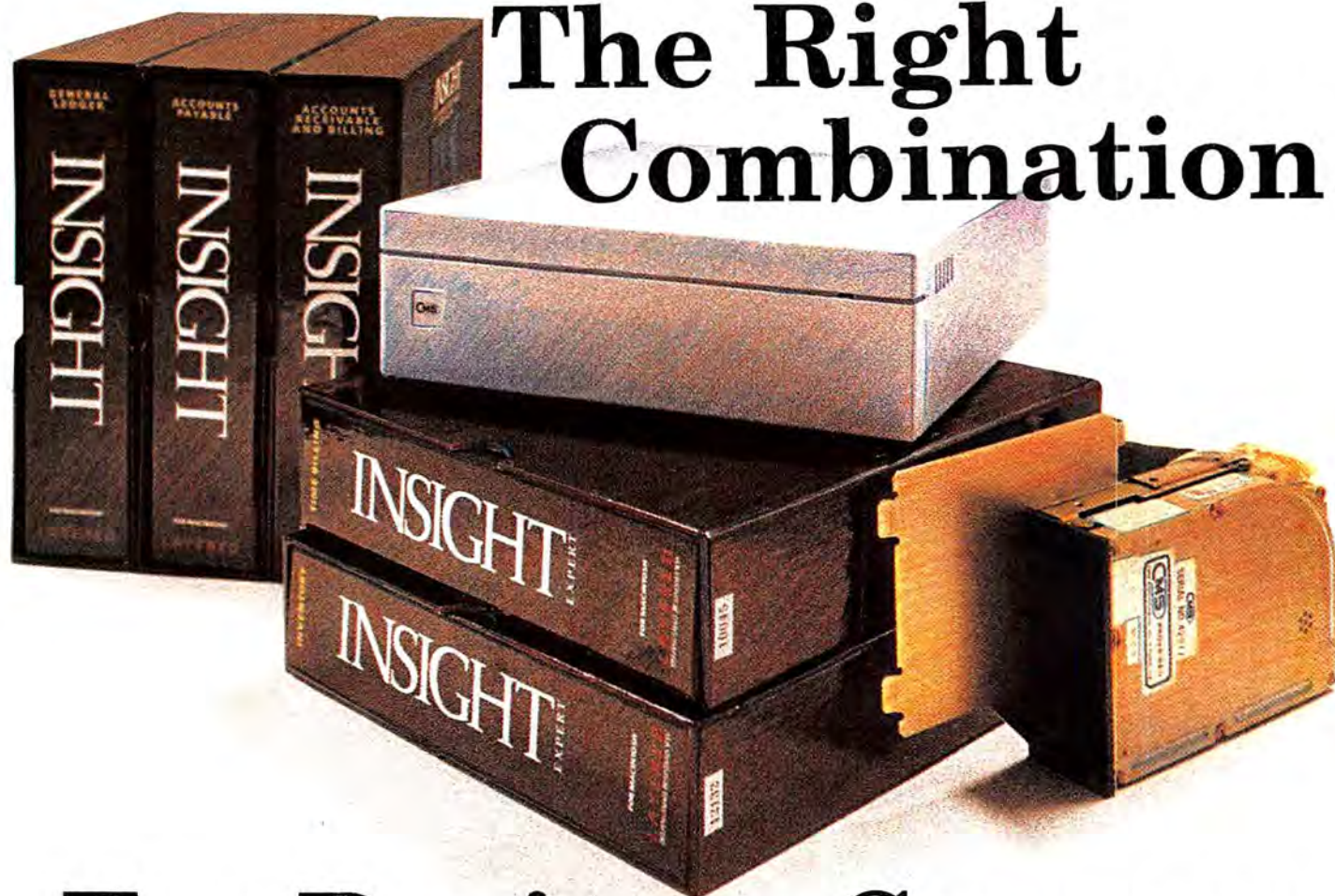
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The vendors and developers who advertise in the pages of **Macworld** share with us a common goal—to serve you, the consumer. And as a mail-order consumer, you have certain rights you should know and understand.

Mail-order sales must comply with the rules of the Federal Trade Commission (FTC) and various state laws. Here are some guidelines to alert you to your rights and help you shop by mail more effectively.

THE FTC MAIL ORDER RULES STATE:

1. The Seller must ship your order within 30 days of receiving it, unless clearly stated otherwise in the advertisement.
2. If the Seller cannot ship your order when promised, you must be notified in writing prior to the promised date. The notice must specify a new date if available, and must give you the opportunity to (a) cancel with a refund; (b) agree to a specified delayed shipping date; or (c) agree to an indefinite delay.
3. The Seller's notice must include a postage-paid reply envelope or card so that you may indicate your preference. If you do not respond, the Seller may assume you agree to the delay.
4. Even if you agree to an indefinite delay, you retain the right to cancel at any time before the merchandise has been shipped.
5. If you cancel an order that has been paid by check or money order, the Seller is obligated to mail your refund within seven business days. If you paid by credit card, the Seller must credit your account within one billing cycle following receipt of your cancellation. Store credits or vouchers are not acceptable in place of a refund.
6. If the item you order is unavailable, the Seller may not send you substitute merchandise without your consent.

DO'S AND DON'TS

By mail:

- Compare prices, including sales tax and shipping fees, before you order. Your purchase may be exempt from sales tax—check your state laws on collection regulations. Handling, packing, and shipping fees are legal and most states tax these services.
- State the precise specifications of the merchandise, such as model, make, size, component parts, etc.
- Confirm the price and expected delivery date as advertised.
- State on your order whether you will accept substitute merchandise if the item you specified is unavailable. If you won't accept a substitute, state that your payment should be returned.
- Record of payment is essential if a problem arises, so do not send cash.
- Keep copies of your order and all associated correspondence. Your records should include the company's name, address, and phone number; a description of the merchandise; your canceled check or money-order carbon; the date you mailed the order; and any sales slips and shipping receipts.
- Do not insure your order. It is the Seller's responsibility to make sure you receive your merchandise.

By phone:

- Note the name of the person who takes your order, and the time and date of your conversation.
- Make a record of your order, the price, promised availability, and the expected components.
- Save all correspondence, including your canceled check or money-order carbon and any written confirmation sent by the Seller.

Questions to ask:

- Does the advertised merchandise include all necessary parts and accessories? Are they made by the same manufacturer? Is the version number or model number the same? Is the product compatible with the hardware/software you intend to use it with?
- Can your order be shipped immediately? If not, when will it be available for shipping?
- Has the advertised price increased?
- What warranties does the merchandise carry? Who provides the service?
- What is the Seller's return policy? Exchange or repair? The refund policy?
- If a problem arises, with whom should you correspond?

PROBLEMS? SOLUTIONS:

1. If you do not receive your order as promised or if the merchandise is defective, write to the Seller immediately. Include a description of your order, the price, date, and account number or order number if available. Keep a copy of your letter.
2. If you register your complaint by phone, send a follow-up letter to confirm and keep a copy of it.
3. If you think the merchandise is defective, review your product instructions and warranty carefully. Make sure you expect only those features and abilities that the product is supposed to have. Then contact the Seller for procedures. Do not return the merchandise until you have been instructed to do so.
4. If you return the merchandise, keep the shipper's receipt or packing slip. Your right to reimbursement of postal costs is determined by store policy.
5. If you have discussed your problem thoroughly with the Seller and remain dissatisfied, write to the consumer complaint agency in the Seller's state. If you paid for the merchandise by credit card, you may have the right to withhold payment under the Federal Trade Commission's Fair Credit Billing Act.

Macworld believes that the customer has a right to product and service satisfaction. If you continue to experience problems with mail-order purchasing, the President of Macworld Communications and the Editor-in-Chief of Macworld want to know about it. Please take a moment to write to: Jim Martin, President, Macworld Communications, or Letters to the Editor, Macworld, 501 Second Street, San Francisco, CA 94107. You may also phone the President at 415-243-0505 to discuss your situation. Our goal is to help you become a satisfied mail-order consumer.

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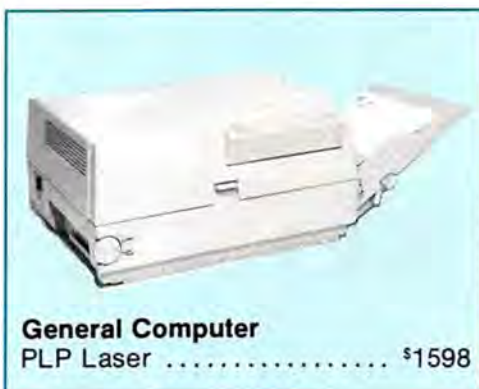
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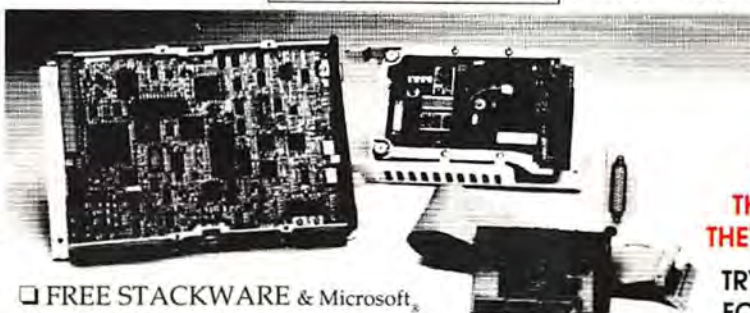
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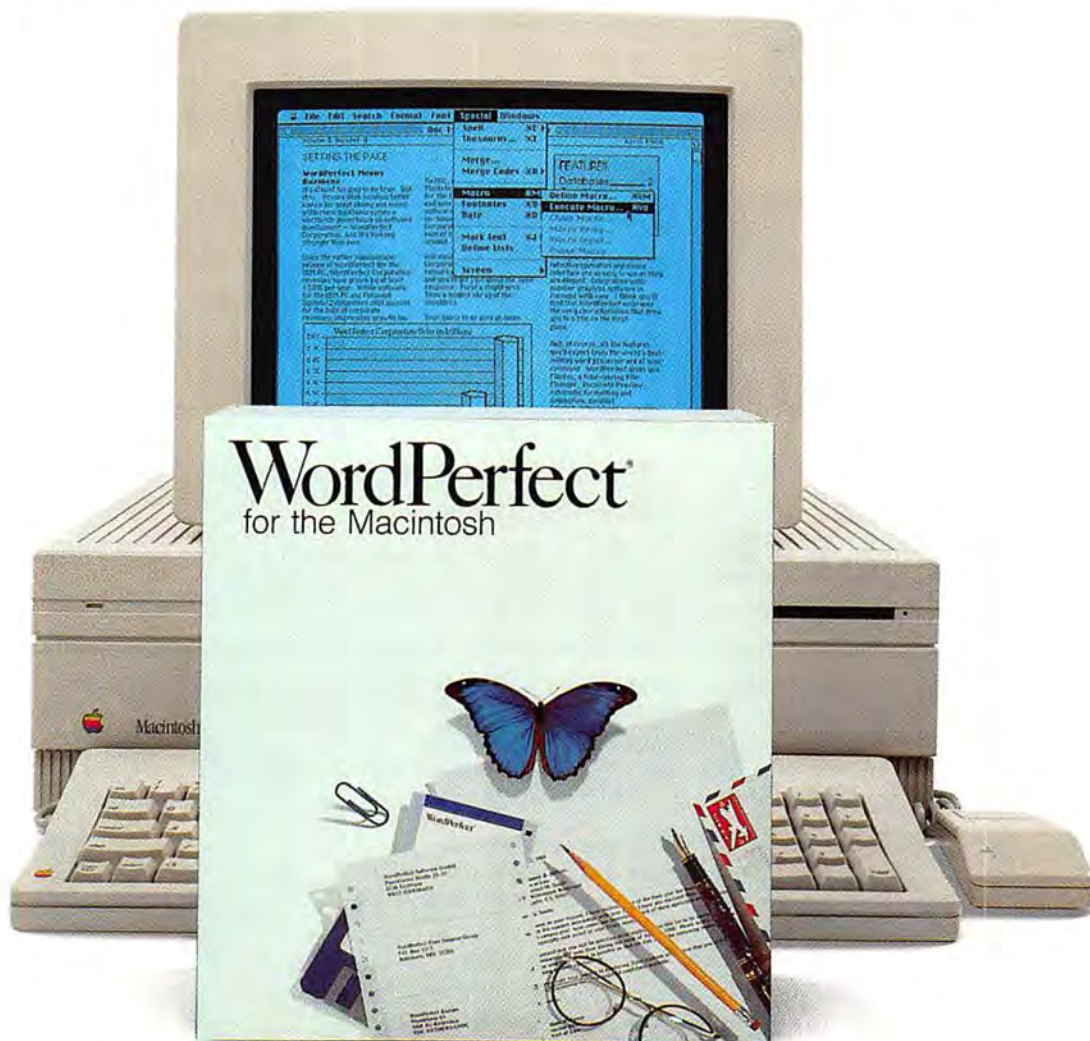
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Insights on Excel

How to get the most out of what's new in Excel 1.5

by Judith Mynhier and Charles Seiter

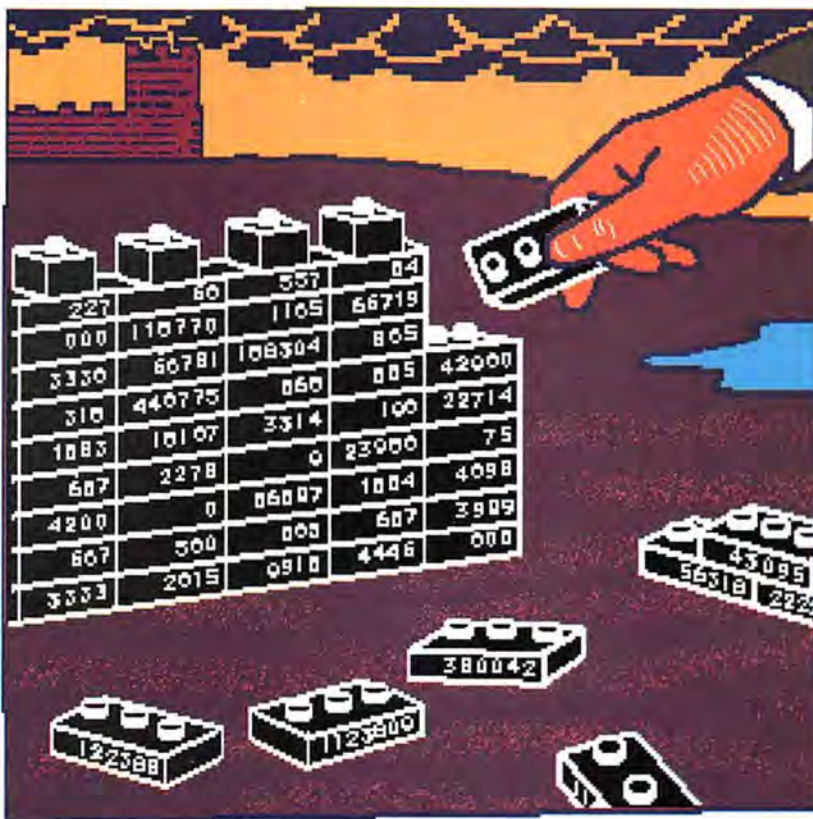
It's been three years since Microsoft released Excel 1.04, the unquestioned standard in Macintosh spreadsheets. During those years, the Mac has evolved into a machine with color and more memory, and Excel users have developed a taste for upgrades and improvements in the software. In fact, since the March 1988 release of Excel for the IBM PC, many Mac spreadsheet jockeys had been gazing covetously at its feature set, slaving over the possibilities for a new Mac version. Version 1.5 of Excel exploits most new Mac features, answers many user requests, and points out some new directions in software.

Excel version 1.5 features many nifty touches: custom menus and dialog boxes, better MultiFinder support, charting by noncontiguous multiple selection, four-part numeric cell formats, "financial statement" formats, and freeze-pane capabilities. Excel now offers full control over color usage in printing, cell formatting, and charting.

Beyond this, the program's macro capability has been extended to constitute a true programming environment. Using an enhanced macro command and function set that's as flexible as traditional programming languages such as Pascal or BASIC, developers can redesign most of the Excel interface to support applications.

Charting a Course

The aesthetic principles for data charting have been clear since the pioneer statisticians William Playfair and Charles Minard first stated them in the early nineteenth century. Now Excel 1.5 has made the application of these principles convenient (see



"Mac Charting Tools" in *Macworld*, January 1988 for an extensive guide to basic Excel charting). Briefly, double-clicking on any part of a chart (a data series, axis, or legend) in the new version brings up a dialog box where you can modify patterns and other chart formatting details. This makes it much easier to revise default settings to improve a chart's appearance.

The principles, as summarized by E. R. Tuft in *The Visual Display of Quantitative Information* (Graphics Press, 1983), boil down to a simple statement: Eliminate nondata ink. Nondata ink is anything in a chart that does not help to communicate information.

Excel 1.5 streamlines production of charts by eliminating the need to group the data to be charted. With the new multiple-selection capability, you simply hold down the **⌘** key and use the mouse to select cells on the worksheet that contain the data you want to chart—even if the cells are not adjacent. Then just open a new chart (press **⌘-N**, then press **C** and **Return**).

The multiple-selection feature also makes it convenient to try out a bunch of chart alternatives quickly. You can, for example, set up a column defining the criteria for a chart's *x* axis and then, without disrupting your worksheet, hold down the **⌘** key and select small batches of data (usually no more than three data series at a

Judith Mynhier is editor of Excellence, a monthly journal for Excel junkies published by the Cobb Group in Louisville, Kentucky. Macworld contributing editor Charles Seiter is a chemistry professor turned computer writer who uses Excel to analyze results of his tests of plastic films.

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How To/Insights

time) for plotting. Try different combinations of data until the chart makes your point most effectively. There are a few more charting tips below, but double-click formatting and multiple selection are the significant advances in Excel 1.5.

Multiple-Selection Printing

If a spreadsheet is organized around large (perhaps 20-row by 10-column) blocks of data, you may find another use for multiple selection. Each multiple-selection block prints on a separate page. If you anticipate this feature when you lay out a spreadsheet, it makes possible exceptionally quick production of a set of one-page reports.

Freeze, Turkey!

You may find yourself staring through more frosty windows than the Little Match Girl with Excel 1.5's freeze-pane feature. Specifically, when you split windows into panes by clicking and dragging the little black spots beyond the upper and left scroll arrows, you can use the Freeze command on the Options menu to hold some of the panes still. That way, if you're working on a budget, for example, you can divide the screen and freeze the row or column headings in place, leaving the lower-right-hand quadrant free to scroll the figures.

Finally, Color

If you have a color monitor, you may have already explored some techniques for creating custom number formats—black for profit, red for loss. Charting is the first place you might think of applying color; when you do, keep in mind that you can double-click a data series to select a new color. Although most aspects of color in Excel 1.5 are straightforward, one is less obvious. To focus attention on areas of interest in a spreadsheet or to hide numbers from curious passersby, simply make some sets of numbers invisible by formatting them the same color as the background. This lets you temporarily observe a smaller set of numbers and then quickly restore everything to full view when you wish.

By the Numbers

Though Excel 1.5 still limits text size and style options, it provides a lot more flexibility with its number formatting. To apply custom formats in Excel 1.5, select a cell or

range of cells, select Number from the Format menu, choose a format that's close to what you want, then move to the Format edit bar and modify the format to your specifications.

In 1.5 custom formats follow this form: positive values;negative values;zero values;text values. For example, Excel's built-in, two-decimal-place currency format `$#,##0.00;($#,##0.00)` displays 1000 as \$1,000.00 and -1000 as (\$1,000.00). Since Excel assigns no special format to zero values, they take on the same format as positive numbers, appearing as \$0.00. Text entries are unaffected by this built-in format.

If you specify the following custom format (with a fourth format for text) `$#,##0.00;($#,##0.00);-0.00-; "Note: @` the results are different. The @ symbol in a custom format acts as a placeholder for text entered in the cell. If you enter 1000, the display in the cell will be \$1,000.00 and -1000 will be (\$1,000.00) and 0 will be -0.00- and the text *Data not available* appears as *Note: Data not available*.

Another example: the format `0%;-0%; "Not applicable"` makes the entry 0.01 display as 1% and -0.01 shows up as -1% and 0 displays as *Not applicable*.

Let's combine these examples another way. To display both text and numbers in a cell, you might create a format like this: `"The current percentage is: 0%"; "The current percentage is: "; -0%; "Not applicable"; "Note: @`.

When you apply this custom format, the entry 0.01 becomes *The current percentage is: 1%* and -0.01 displays as *The current percentage is: -1%* and 0 shows up as *Not applicable* and the entry *Data not available* displays as *Note: Data not available*.

Minor caution: The text that you specify in the Number dialog box must fit within the width of the current column. Otherwise, any cells that contain zero values will display # symbols. Unlike standard labels, numbers formatted with text cannot overlap into adjacent cells. Formatted entries that contain just text can overlap as in the original Excel.

(continues)

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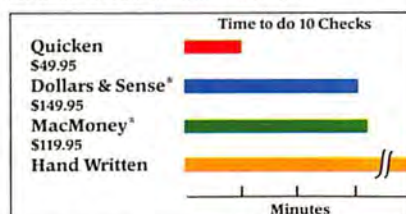
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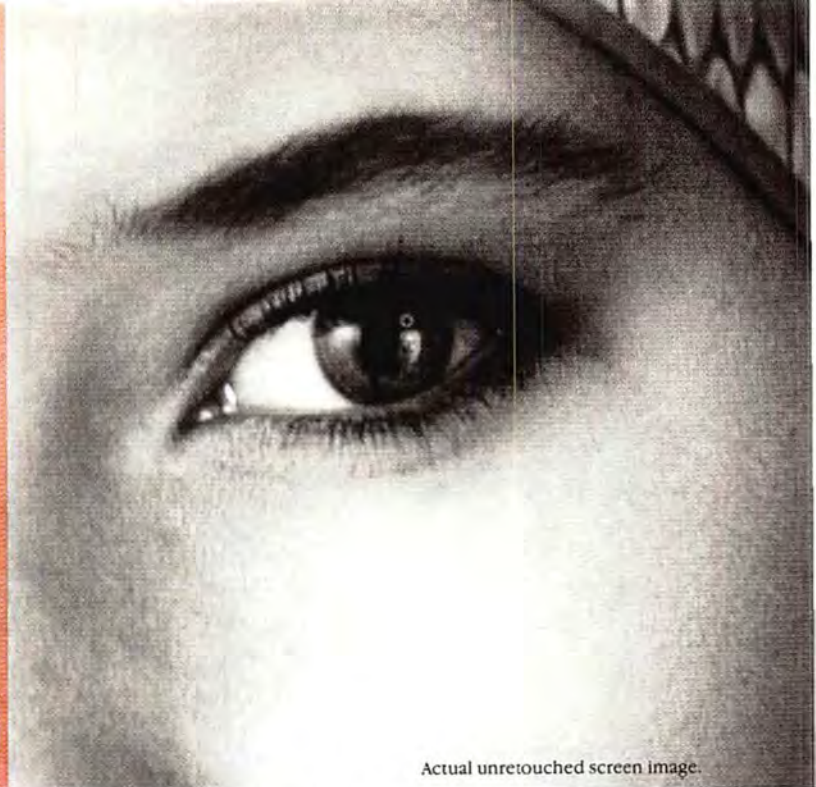
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Irrational Numbers

Excel 1.5 does not require that you use all four formatting arguments, but be careful with formats when you omit arguments.

Here are the somewhat confusing general rules. If you use three arguments, Excel applies the first format to positive values, the second to negatives, and the third to zeros. If you use two arguments, as in Excel's built-in formats, the first format applies to positive and zero values, and the second applies to negatives. If you use only one argument, that format governs positive, negative, and zero values. In all of these cases, text entries are unaffected.

You might be tempted to skip a format argument by entering an extra semicolon as a placeholder and then entering the format for the next type of number. This format, however, instructs Excel to hide the entries rather than to display them in the default General format. To format zero values without changing the appearance of positives and negatives, a custom format like: General;General;"Not applicable" would do the trick.

High Finance

Another new feature is the so-called financial statement numerical format, which can produce the sales-in-thousands tables and charts that pepper corporate annual reports. Basically, a comma at the end of a custom format tells Excel to drop three zeros from the displayed value (see "Rounding Formats").

(continues)

This custom format	Displays the value	Like this
0,	1500 15000 150000	2 15 150
0.0,	1500 15000 150000	1.5 15 150
0.0,,	1500000 15000000	1.5 15

Rounding Formats

The comma in a number format tells Excel to drop three zeros. Since no decimal places are given in the number format in cell A3, Excel rounds the value 1500 to the nearest thousand, displaying it as 2.

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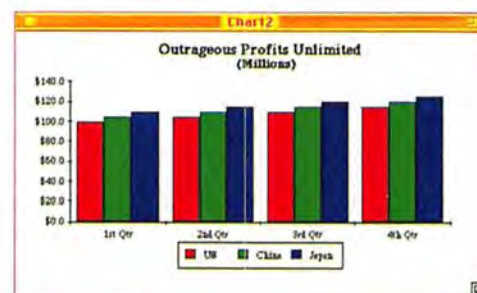
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How To/Insights

Charting the Big Ones

The financial statement formats can simplify charting. In "Charting Round Numbers," for example, at first the labels on the value axis seem to dominate the chart. Changing the number format to \$0.0, in the worksheet brings the tick mark labels under control, as in the "after" version of the same chart. Whenever you round off axis values, be sure to add a label to the chart that clarifies what the units are, as in the example, where (Millions) has been added.



Charting Round Numbers

Applying Excel's new financial statement number format turns numbers with trailing zeros into more manageable round numbers that take up less room, as shown in Chart 2.

Customizing Excel

The most impressive—and complex—improvement featured in Excel 1.5 is the vastly expanded macro language. The changes are so extensive that you could essentially use macros to rewrite most of the way Excel works. Some of the macro extensions will appeal to specialists (Excel now does matrix arithmetic) and programmers (you could program a competent mini-word processor with the new function set), but some of the extensions will find a place in the lives of everyday users.

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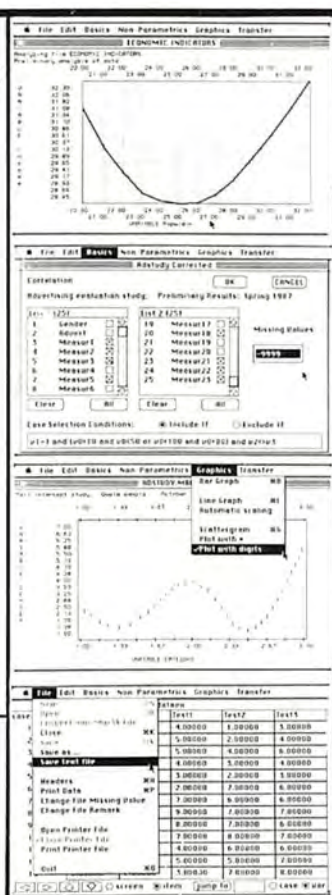
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The Auto, the Exec, and the Net

In the MS-DOS world, an Autoexec file executes a set of commands automatically when you turn the computer on. In Excel 1.5, the new macros auto_open and auto_close execute when a document is opened or closed.

One way to put these macros to good use is on a network. When Excel documents are opened over a network, users must check Read Only to avoid locking out other users. Thus reference spreadsheets that must be accessed by many network users might well be equipped with an auto-open macro that automatically sets the document to Read Only. Another handy auto-open macro could date stamp key parts of a single-user spreadsheet on opening.

A Skeleton Menu

To illustrate custom menus, we'll show how to construct a familiar Edit menu. The macro "Menu by Macro" creates a custom edit menu by taking advantage of the new macro scheme.

"Menu by Macro" shows the standard

form for defining menus, with the names, commands, and keys columns (for designating the keyboard shortcuts). The hyphen character under menu names between Clear and Fill Down tells Excel to place a dividing line between commands.

To replace the standard menu bar with one containing your custom Edit menu, use three macro commands: =ADD.BAR() creates a new menu bar, =ADD.MENU (menu definition range) adds the menu specified in the cell range to the bar, SHOW.BAR (bar number) shows the menu bar you created.

Toggling

Here's a useful technique: creating toggle commands. Toggle commands, like Excel's built-in Short Menus/Full Menus command, change to reflect the current status of the program.

To create a custom toggle command, structure a macro like the one shown in "Custom Toggle." This sample routine adds a pair of custom commands named Formu-

(continues)

	A	B	C
1	=ADD.BAR()		
2	=ADD.MENU(A1,A6:C10)		
3	=SHOW.BAR(A1)		
4	=RETURN()		
5			
6	Edit		
7	Cut	MY MACRO/CUT IT()	X
8	Copy	MY MACRO/COPY IT()	C
9	Paste	MY MACRO/PASTE IT()	B
10	Clear	MY MACRO/CLEAR IT()	
11	-		
12	Fill Down	MY MACRO/FILL DOWN IT()	D

Menu by Macro

This macro creates a custom Edit menu, described in the cells A6 through C12, and adds it to Excel's menu bar.

	A	B
1	Formulas Command	Initially defines Formulas On command
2	=GET.WINDOW(8,WINDOWS())	Determine whether Formulas option is selected
3	=IF(A2,SET.VALUE(C2,"Formulas Off"),SET.VALUE(C2,"Formulas On"))	If so, use Formulas Off; otherwise, use Formulas On
4	=IF(A2,SET.NAME("Formulas",A15),SET.NAME("Formulas",A9))	Define Formulas macro to direct reference in D2
5	=ADD.COMMAND(1,"Options",C1:E2)	Add Formulas On/Off command to Options menu
6	=ENABLE.COMMAND(1,"Options",A5+1,TRUE)	Enable Formulas On/Off command
7	=RETURN()	End of macro
8		
9	FormulasOn	Turns Formulas display on; resets toggle
10	=DISPLAY(TRUE,...)	Issue Display... command, select Formulas option
11	=RENAME.COMMAND(1,"Options",A5+1,"Formulas Off")	Change Formulas On command to read Formulas Off
12	=SET.NAME("Formulas",A15)	Redefine Formulas macro to redirect reference in D2
13	=RETURN()	End of macro
14		
15	FormulasOff	Turns Formulas display off; resets toggle
16	=DISPLAY(FALSE,...)	Issue Display... command, deselect Formulas option
17	=RENAME.COMMAND(1,"Options",A5+1,"Formulas On")	Change Formulas Off command to read Formulas On
18	=SET.NAME("Formulas",A9)	Redefine Formulas macro to redirect reference in D2
19	=RETURN()	End of macro

	C	D	E
1			
2	Formulas Off Toggle.m	Formulas	F

Custom Toggle

This macro adds a new menu item to the Options menu—actually a pair of commands, Formulas On and Formulas Off, that toggle the formula displays on or off. The small table describes the menu item and its \mathbb{H} -key shortcut.

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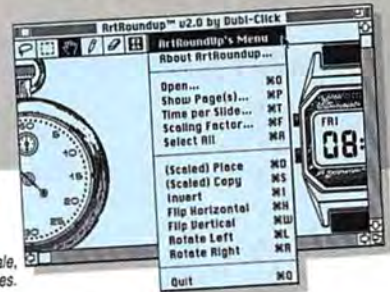
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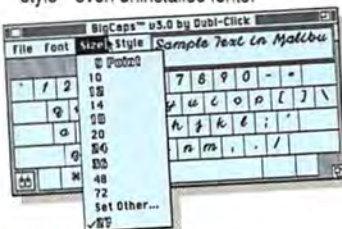


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las On and Formulas Off to the Options menu. The Formulas On/Off commands, which are equivalent to choosing Display from the Options menu and selecting or deselecting the Formulas option, let you quickly turn the formulas display on or off in a worksheet or macro sheet. Think of this toggling command as a handy debugging tool you can use to quickly bring formulas into view for editing and then see the results with just one keystroke.

The first portion of the three-part macro for this toggle, located in cells A1 through A7, uses a GETWINDOW function to determine whether the Formulas option in the Display dialog box is selected or deselected.

If the Formulas option is already selected (TRUE), the FormulasOn section of the macro adds the command Formulas Off to the Options menu by filling in cell C2 in the menu-description table with that name. If the Formulas option is not selected, the FormulasOff subroutine that starts in cell A9 changes the Options menu to include the command Formulas On. That's toggling—switching the command that appears from on to off. Cell E2 in the menu-description table specifies the \mathbb{H} -key shortcut for the command.

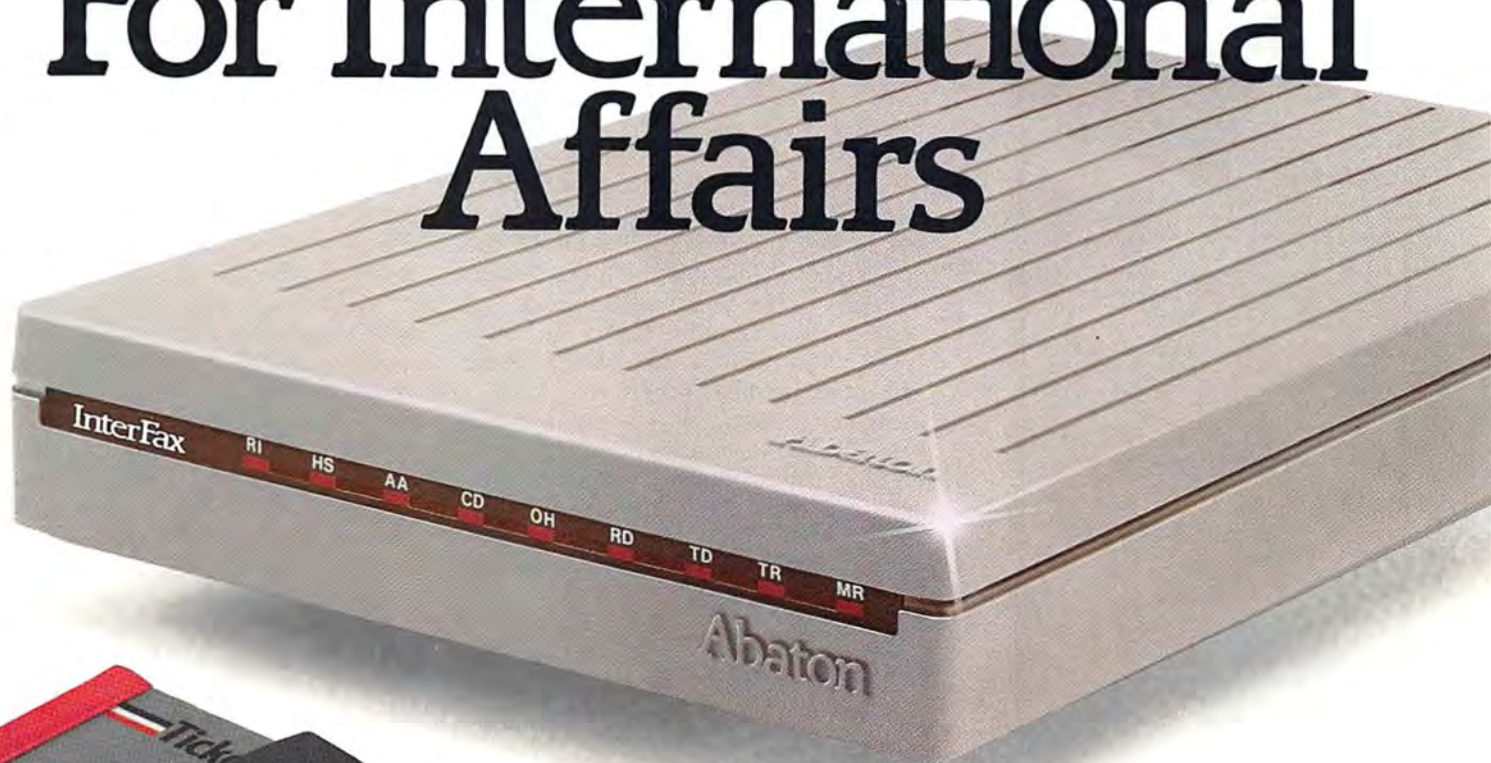
Opening a Dialog

Excel 1.5 comes with an application called Dialog Editor that handles most of the low-level details of creating custom dialog boxes. Dialog Editor lets you place buttons, text, icons, and so on in a dialog box essentially by cutting and pasting. Then Dialog Editor miraculously translates your specifications to dialog definitions on a macro sheet via the Copy command. It's incredibly simple, but before you begin loading worksheets with a plethora of custom dialog boxes, there are a few cautions to keep in mind. First, because Excel macros constitute an interpreted rather than a compiled language, the dialog boxes are created from scratch every time they are invoked. This means that boxes with a furious profusion of buttons, check boxes, lists, and graphics may present themselves in slow motion. You can have a maximum of 64 elements in a dialog box; consider it bad practice to approach the maximum. As

(continues)



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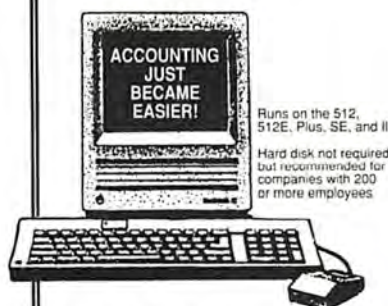


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is often true, in dialogs simplicity equals speed. Second, choose dynamic rather than static dialog boxes for cases when the user may need to see the underlying spreadsheet—for example, to make a judgment about inputs. Dynamic boxes, which are movable and titled, don't involve much more computational overhead than the simpler static boxes.

Resetting Dialog Box Defaults

The Dialog Editor automatically creates an eight-column description table for dialog boxes. This table spells out the specifications for the item type (static text, edit bar, radio button, and so forth), the horizontal and vertical position of items in the dialog box, the height and width of those items, and the text that you want to display (see "Dialog Box and Statistics").

In the last column of the description table, called the Initial/Result field, you en-

ter codes and text to specify the entries and selections that should appear the first time the dialog box is opened. Later, when the user fills in the dialog box while working in Excel, all entries and selections go into the Initial/Results field of the description table, overwriting the values that you entered into that column.

To restore the original dialog box contents, you must rebuild the Initial/Results column each time a user closes the dialog box. Enter a list of defaults elsewhere in the macro sheet and then copy and paste those defaults into place.

Likewise, custom number formats must be specified each time the dialog box macro runs. Unfortunately, when you open a custom dialog box, Excel 1.5 ignores any number formats you may have applied to the entries in the Initial/Result column and displays all numbers in the default General format. Thus, if you want an entry to appear in the two-decimal-place currency format in a custom dialog box, you'll have to convert it to text form first.

This roundup of tips hardly even begins to explore the uncharted territory in the new Excel. We hope you'll share your own discoveries by sending them to Quick Tips, *Macworld*, 501 Second St., San Francisco, CA 94107. □

See *Where to Buy* for contact information.

	C	D	E	F	G	H	I	J
1	Description	Item	Horizontal	Vertical	Width	Height	Text	Initial/Result
2								
3	Trans. No. field name	5	1	1			Trans. No.	
4	Trans. No. entry field	7	1	20	80			108
5	Amount field name	5	100	1			Amount	
6	Amount entry field	8	100	20	80			
7	Date field name	5	200	1			Date	
8	Date entry field	8	200	20	80			3/1/1988
9	To/From field name	5	1	45			To/From	
10	To/From entry field	6	1	65	280			
11	Type group	11	1	100			Type	2
12	Debit button	12					Debit	
13	Credit button	12					Credit	
14	Account group	11	100	100			Account	1
15	Acct. A button	12					Acct. A	
16	Acct. B button	12					Acct. B	
17	OK	1	210	100			OK	
18	Cancel	2	210	130			Cancel	

Dialog Box and Statistics

This custom dialog box (top) serves as an entry form for a database in a worksheet named *Checks*. The program entries appear in column J of the accompanying table (bottom), which describes the dialog box in Excel.

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Updates

This list brings you the highlights of software updates recently received but not yet tested. The first price is the upgrade cost for registered owners; the second is the current list price.

Comment version 2.0 allows users to attach notes to spreadsheet cells, text, windows, and documents on the desktop. Time alarm function (up to 520 alarms at any given time) can be set for specified intervals, and the DA does not have to be open to keep track of alarms. MultiFinder compatible with user-configurable command keys and default settings. Deneba Software, 7855 N.W. 12th St., #202, Miami, FL 33126, 305/594-6965. Free if originally purchased after January 31, 1988, otherwise \$15; \$99.95 new.

FileMaker II version 1.0 is multiuser compatible. Runs on basic Mac networks, with or without a file server, and features record locking, multiple levels of password protection, and creation of confidential layouts. Layout allows changes in font, size, and style on character-by-character basis in each field, including use of ovals and rectangles with rounded corners, and choice of line width and patterned or shaded areas. Nineteen new text calculations allow access and extraction of information by text location and content. New mathematical summary calculations include running total, running count, weighted average, fraction of total, and fraction of

subtotal. Claris Corp., 440 Clyde Ave., Mountain View, CA 94040, 800/544-8554. \$50 for single-unit package; \$299.99 new.

Findswell version 2.0 features Save dialogs, remembers recently opened documents, and searches contents of Get Info comments as well as disks other than the currently selected disk. Users can select documents or folders to be displayed each time Findswell is opened. Creates new folders from within program, adjusts options using Control Panel, and specifies in which programs Findswell should disable itself. Working Software Inc., 321 Alvarado, Ste. H, Monterey, CA 93940, 418/375-2828. \$10 plus \$4 s/h with return of original disk; \$59.95 new.

FoxBase+ version 2.10 includes templates for FoxView that display screens with lines and boxes in color, as well as templates for FoxGen, which creates applications suites. FoxCode template compiler enables users to customize template operation. Includes pop-up and pull-down menus. FoxDoc, a technical documentation system, is also included. Sorting speeds are 200 percent faster than previous version. Fox Software, 118 W. South Boundary, Perrysburg, OH 43551, 419/874-0162. \$75; \$395 new.

GradeBook version 1.1 recalculates grades three times faster. Report sorting is improved and is also several times faster; statistics are added to histogram plot. Tab and

Shift now control column selection. Bobbing Software, 67 Country Oaks Dr., Buda, TX 78610, 512/295-5045. Free; \$99 new.

KiwiEnvelopes version 2.0 automatically pastes information from the Clipboard when DA is opened. Cursor starts in address box if text already exists in return address box. Return addresses can include graphics. Font of return address can differ from font of main address. Bold and italic font styles. Easier default file creation. Return addresses printed closer to the edge on LaserWriters. Supports all Macs. Kiwi Software, Inc., 6546 Pardall Rd., Santa Barbara, CA 93117, 805/685-4031. Shareware price now \$8.

Mac286 version 1.01 for Mac286 coprocessor boards provides line-by-line scrolling 20 times faster than previous version. Features preconfigured C: drive file for easier installation. Can be loaded onto a Mac II hard disk via SCSI drives, across a network, or through an external 5 $\frac{1}{2}$ -inch drive. Adds FKey menu and File Specification menu for searching and selecting DOS files residing on the D: drive. AST Research, Inc., 2121 Alton Ave., Irvine, CA 92714, 714/863-0181. Free; \$1599 new.

MacAtlas Paint version 2.0 includes 2 world maps, 16 maps of world regions by country, 6 maps of the United States, and maps of each of

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Updates

the 50 states by county. Maps can be edited with any paint program. Revised manual. MicroMaps Software, Inc., P.O. Box 757, Lambertville, NJ 08530, 609/397-1611, 800/334-4291. \$35; \$79 new.

MacDraw II features increased speed; up to 500 layers with 1MB; custom fill patterns; pen widths modifiable in 1/1000 increments; customized image libraries; up to 32-times enlargement and 3 percent reduction; object and text rotation with 1/100-degree precision; rescaling of objects; single-letter type font, style, and size editing capabilities; drawing sizes up to 100 by 100 inches; and color plotter output up to E-size. Claris Corp., 440 Clyde Ave., Mountain View, CA 94040, 800/544-8554. \$100 if originally purchased before July 1, 1988, otherwise \$200; \$395 new.

MacEnvelope version 3.0 features bulk printing and font, style, and size changes. Imports lists from other sources and saves at least 1700 names to disk. Synex, 692 Tenth St., Brooklyn, NY 11215, 718/499-6293, 800/447-9639. Free if originally purchased after May 1, 1987, otherwise \$15 plus \$3 s/h; \$29.95 plus \$3 s/h new.

MenuFonts version 2 works with PageMaker 3.0, Aldus FreeHand, KeyCaps, and several other previously unsupported applications. KeyScroll feature selects fonts with a keystroke when mouse is depressed. Beyond, Inc., 6069 E. Grant Rd., Tucson, AZ 85712, 602/290-9790. \$15 with return of master disk; \$49.95 new.

MGMStation CAD versions 2.5I and 2.5II offer greater speed. Version 2.5I is 30 percent faster; 2.5II (for the Mac II) is 800 percent faster and offers enhanced color capabilities.

Both versions copy and paste data into other applications. Micro CAD/CAM, Inc., 5900 Sepulveda Blvd., Van Nuys, CA 91411, 818/376-0008. \$100 for version 2.5I, \$300 for 2.5II; \$999 and \$1399 new.

MultiLedger version 1.1 features enhanced search capabilities. Sorts by due date, customer or vendor name, and document number. Second level of password protection. Improved export capabilities and a bank reconciliation feature. CheckMark Software, Inc., 1520 E. Mulberry, #200, Fort Collins, CO 80524, 800/444-9922. Free; \$395 new.

Trueform version 1.1 incorporates stack searching, gives you increased control of print options, additional spreadsheet functionality, easier data transfer, and online help. Imports greater diversity of TIFF files; five times faster import speed. Spectrum Digital Systems, 2702 International Ln., Madison, WI 53704-3122, 608/244-4300. Free; \$495 for full version; \$150 for run-time version.

VMacS version 2.0 allows Mac-to-VAX connectivity. Provides Kermit protocol support for 7-bit file transfer in addition to 8-bit protocol Xmodem already supported. International character set translation has been added. White Pine Software, 94 Route 101A, Box 1108, Amherst, NH 03031, 603/886-9050. \$25; \$399 single-user license new; \$999 multiuser license new. □

To have products listed in this section, send upgraded software, an outline of major changes since the previous release, upgrade price, suggested retail price, company name, mailing address, and phone number to Updates, Macworld, 501 Second St., San Francisco, CA 94107.

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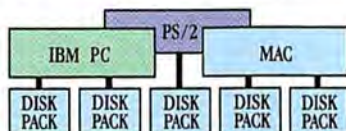


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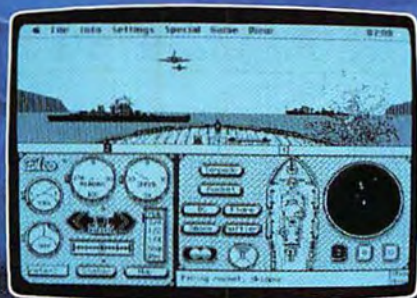
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Accessories

Furniture277
Mouse Pads277
Supplies277

Hardware

Accelerators279
Bar Code . . . . .	.280
Data Acquisition . . . . .	.280
Emulators . . . . .	.280
Expansion Chassis . . . . .	.280
Memory Upgrade . . . . .	.280
Miscellaneous . . . . .	.280
Networking . . . . .	.281
Peripherals . . . . .	.281
Plotters . . . . .	.281
Printers . . . . .	.281

Hypercard Stacks

281

Services

Computer Insurance . . . . .	.282
Data Conversion . . . . .	.282
Desktop Publishing . . . . .	.282
Disk Duplication . . . . .	.283
Laser Recharge . . . . .	.283

Software

Accounting . . . . .	.283
Architecture . . . . .	.283
Astrology . . . . .	.284
Business . . . . .	.284
Business Mgmt. . . . .	.284
Clip Art . . . . .	.285
Communications . . . . .	.285
Desktop Publishing . . . . .	.286
Educational . . . . .	.286
Engineering . . . . .	.287
Entertainment . . . . .	.287
Financial . . . . .	.288
Fonts . . . . .	.288
Fund Raising . . . . .	.289
Genealogy . . . . .	.289

Graphics . . . . .	.289
Health . . . . .	.290
Investment . . . . .	.290
Languages . . . . .	.290
Mail Order . . . . .	.290
Medical . . . . .	.290
Music/MIDI . . . . .	.291
Payroll . . . . .	.291
Plotter Drivers . . . . .	.291
Presentation Mgmt. . . . .	.291
Printer Drivers . . . . .	.291
Programming Tools . . . . .	.291
Public Domain . . . . .	.292
Real Estate . . . . .	.292
Recreational . . . . .	.293
Rental . . . . .	.293
Retail . . . . .	.293
Sales/Marketing . . . . .	.293
Scientific . . . . .	.293
Security . . . . .	.293
Statistics . . . . .	.293
Utilities . . . . .	.294
Word Processors . . . . .	.294

Miscellaneous

Mailing Lists . . . . .	.294
Publications294
Video-Instruction294

Categories are subject to change

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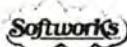
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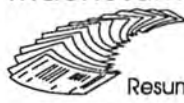
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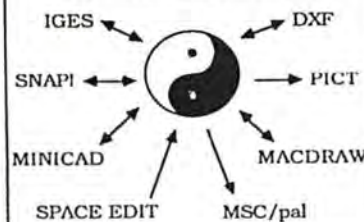
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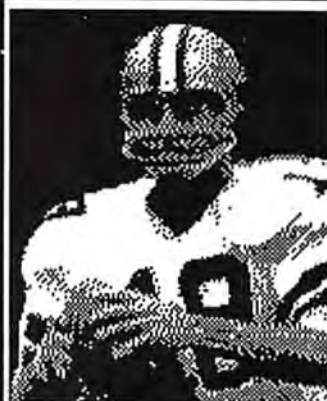
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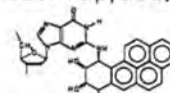
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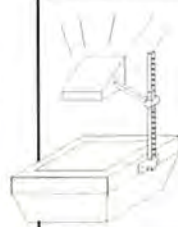
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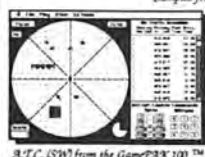
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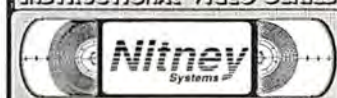
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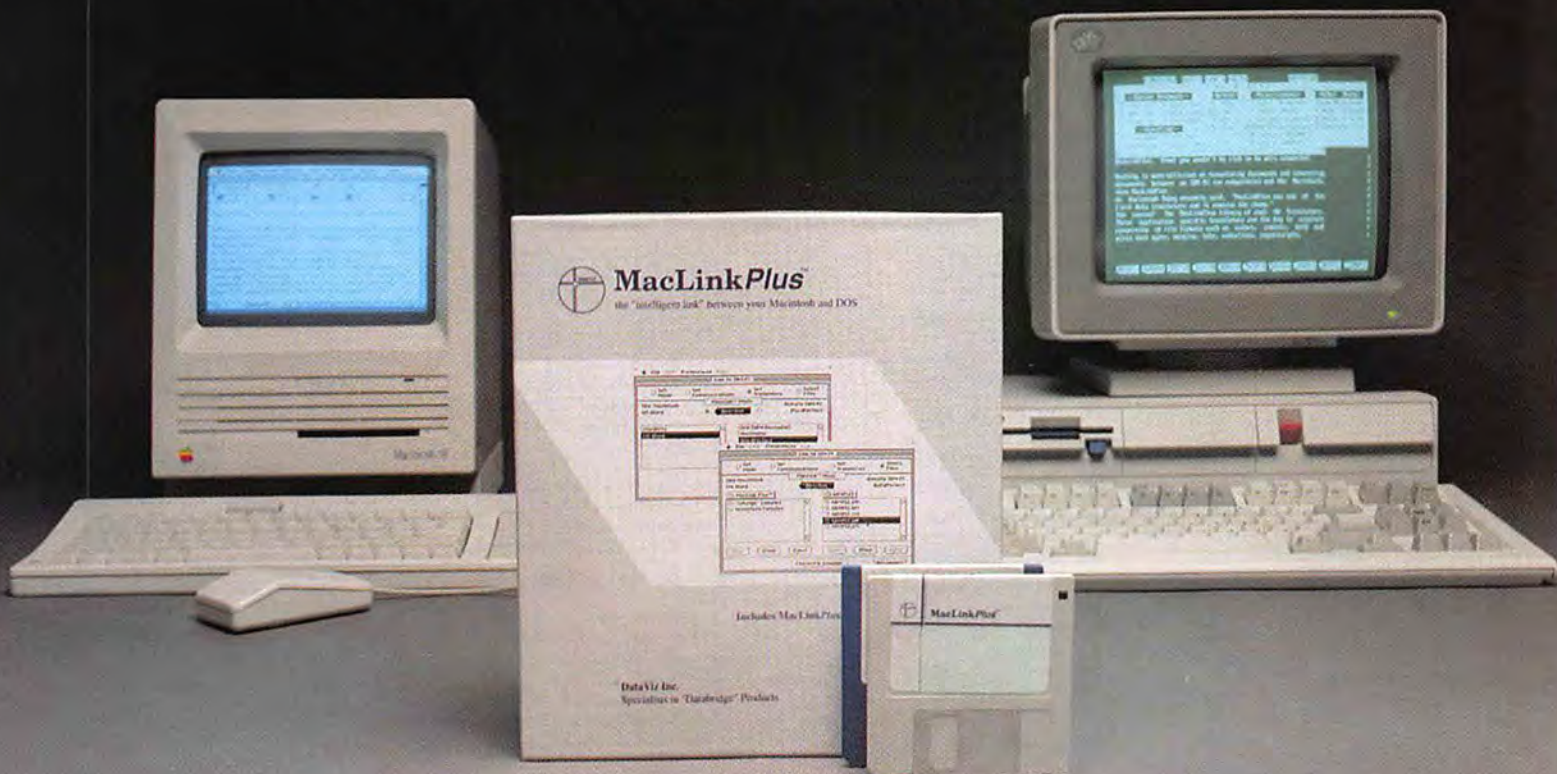
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Product Index

Reader
Service
Number

Software

Business

- 221 Adobe Systems, Inc., 38-39
- Adobe Systems, Inc., 200
- 329 Aldus, 238-239
- 49 Allan Bonadio Associates, 310
- 462 AST Research, 189
- 10 Bedford Software Corporation, 187
- 199 Borland International, 15
- 229 Brainpower, Inc., 36
- 130 CE Software, 223
- Checkmark Software, 268
- Claris, 202-203
- Compugraphic Corp., 171
- 57 CompuServe, 70-71
- 333 D2 Software, 60
- Dac Software, 169
- 155 Dab-Click, 265
- 150 Farallon, 86
- 152 Fox Software, 199
- 341 Information Builders, Inc., 311
- 360 Informix Software, 42-45
- 151 Innovative Data Design, 232-233
- Intuit, 259
- 409 Micro Planning International, 193
- Microsoft, IFC-1
- 228 Mirus, 58-59
- 559 North Edge Software Corp., 173
- 312 Odesta Corporation, 167
- 162 Odesta Corporation, 167
- 553 Peach Tree Software, 210
- Satori Software, 69
- 297 Shana Corporation, 94
- 139 Softsync, 47
- 48 Software Ventures, 18
- 227 Statsoft, 262
- 237 Symantec Corporation, 12
- 215 Symantec Corporation, 6-7
- TOPS, 16-17
- 41 T.B.S.P., 32
- 332 T/Maker, IBC
- 126 WordPerfect, 254
- Vertical**
- 166 Abvent, 84
- 49 Allan Bonadio Associates, 310
- Checkmark Software, 268
- 333 D2 Software, 60
- Dac Software, 169
- 409 Micro Planning International, 193
- 41 T.B.S.P., 32
- Data Management**
- 342 Claris, 74-75
- 152 Fox Software, 199
- Intuit, 259
- 352 Odesta Corporation, 68
- 292 Preferred Software, 212
- 317 Preferred Software, 213
- Word Processing**
- 180 Deneba, 37
- 28 Microlytics, Inc., 62
- 201 Microlytics, Inc., 234
- 215 Symantec Corporation, 6-7
- 332 T/Maker, IBC
- 126 WordPerfect, 254
- CAD/CAM**
- 166 Abvent, 84
- 328 Dynaware Corp., 165
- 129 Gilmeor, Inc., 57
- 151 Innovative Data Design, 232-233

Reader
Service
Number

Communications

- 462 AST Research, 189
- Compugraphic Corp., 171
- 40 DataViz, 295
- 150 Farallon, 86
- 48 Software Ventures, 18
- TOPS, 16-17
- 304 Traveling Software, 8
- 231 White Pine Software, 297
- Educational**
- 42 Personal Training Systems, 30
- Graphics/Desktop Publishing**
- 340 Aba Software, 194-195
- 166 Abvent, 84
- Adobe Systems, Inc., 200
- 221 Adobe Systems, Inc., 38-39
- 329 Aldus, 238-239
- Compugraphic Corp., 171
- 15 Cricket Software, 219
- 384 Cricket Software, 221
- 240 Cricket Software, 77-79
- 538 Cricket Software, 10-11
- 400 CTA, 157
- 333 D2 Software, 60
- 346 Deneba, 34-35
- 155 Dab-Click, 265
- 124 GW Instruments, 220
- 254 Howtek, 229
- 337 Image Club Graphics, 92
- 151 Innovative Data Design, 232-233
- 225 Letraset, 230
- 277 Microillusions, 85
- 228 Mirus, 58-59
- 339 Multi-Ad Services, Inc., 198
- 353 Qume, 201
- 13 Raster Ops, 82-83
- 297 Shana Corporation, 94
- 268 Silicon Beach Software, Inc., 46
- 405 Solutions International, 242
- Entertainment**
- 289 PCAL, 159
- 291 PCAL, 159
- 290 PCAL, 159
- 358 Spectrum HoloByte, 4
- 198 Spectrum HoloByte, 274
- Music**
- 328 Dynaware Corp., 165
- Personal Business/Home**
- 10 Bedford Software Corporation, 187
- 297 Shana Corporation, 94
- 112 Survivor Software, 228
- Utilities**
- 60 1st Aid Software, Inc., 200
- 199 Borland International, 15
- 357 Central Point Software, 9
- 250 Fifth Generation Systems, Inc., 218
- 311 Fifth Generation Systems, Inc., 72
- 237 Symantec Corporation, 12
- Miscellaneous**
- Checkmark Software, 268
- Satori Software, 69
- 300 Softdisk, Inc., 5
- Hardware**
- Printers**
- 177 General Computer, 26
- 104 Laser Connection, 88
- 65 Mitsubishi Electronics, 76
- NEC Info Systems, 263
- 575 Orange Micro, Inc., 61
- 115 Qume, 201
- 93 Varityper, 33

Reader
Service
Number

Boards

- 462 AST Research, 189
- 68 Computer Friends, Inc., 161
- 173 Dove Computer (FastNet), 207
- 174 Dove Computer (Mach II), 207
- 351 MacPEAK Systems, 23-25
- 196 National Semiconductor, 179
- 347 Novell, Inc., 54-55
- 13 Raster Ops, 82-83
- 349 Siclone Sales & Engineering, 298
- Digitizers/Scanners**
- 400 CTA, 157
- 337 Datacopy, 185
- 344 Hewlett Packard, 49-51
- 254 Howtek, 229
- 356 Pixelogic, 211
- 89 Princeton Graphic Systems, 260
- 117 Sigma Designs, 269
- 301 Summagraphics, 177
- Hardware**
- Printers**
- 177 General Computer, 26
- 104 Laser Connection, 88
- 65 Mitsubishi Electronics, 76
- NEC Info Systems, 263
- 575 Orange Micro, Inc., 61
- 115 Qume, 201
- 93 Varityper, 33
- Boards**
- 462 AST Research, 189
- 68 Computer Friends, Inc., 161
- 173 Dove Computer (FastNet), 207
- 174 Dove Computer (Mach II), 207
- 351 MacPEAK Systems, 23-25
- 196 National Semiconductor, 179
- 347 Novell, Inc., 54-55
- 13 Raster Ops, 82-83
- 349 Siclone Sales & Engineering, 298
- Digitizers/Scanners**
- 400 CTA, 157
- 337 Datacopy, 185
- 344 Hewlett Packard, 49-51
- 254 Howtek, 229
- 356 Pixelogic, 211
- 89 Princeton Graphic Systems, 260
- 117 Sigma Designs, 269
- 301 Summagraphics, 177
- Display**
- 354 Compu-Mart, 264
- 586 In Focus Systems, Inc., 52
- 351 MacPEAK Systems, 23-25
- Magnavox, 96
- 65 Mitsubishi Electronics, 76
- 133 Monitorm, 183
- 223 Personal Computer Peripherals Corp., 175
- 46 Radius, 20-21
- Hard Disk/Storage**
- 85 CMS Enhancements, Inc., 307
- 354 Compu-Mart, 264
- 97 Crate Technology, 253
- 260 Iomega, 204-205
- 102 Jasmine Technologies, Inc., 163
- 457 Jasmine Technologies, Inc., 196
- 100 Jasmine Technologies, Inc., 98

Reader
Service
Number

- 145 La Cie Ltd., 40
- 207 Mass Micro Systems, 63
- 33 Mega Drive Systems, 273
- 275 MicroNET Technology, 270
- 243 Microtech Peripherals, Inc., 241, 243
- 223 Personal Computer Peripherals Corp., 175
- 334 Priam, 80-81
- 149 Rodime, 31
- 191 Ruby Systems, 303
- 186 Sun Remarketing, Inc., 191
- 6 Tallgrass Technologies, 235
- 320 Tallgrass Technologies, 235
- Modems**
- 107 Abaton, 267
- Video**
- 68 Computer Friends, Inc., 161
- Miscellaneous**
- 230 Caere, 28-29
- 338 CH Products, 22
- 361 Computer Accessories Corp., 304
- Computer Friends, Inc., 222
- 150 Farallon, 86
- 586 In Focus Systems, Inc., 52
- 86 MacProducts USA, 306
- 575 Orange Micro, Inc., 61
- 304 Traveling Software, 8
- 26 Trimar USA Inc., 310
- Accessories**
- Miscellaneous**
- Apple Collection, 209, 240, 261, 272
- 338 CH Products, 22
- 361 Computer Accessories Corp., 304
- 69 Computer Friends, Inc., 222
- 443 Designer Products, 262
- 330 Direct Micro Products, 206
- 348 John Wiley & Sons, 237
- 192 Kensington Microware Ltd., BC
- 30 Kensington Microware Ltd., 181
- 276 MicroComputer Accessories, Inc., 90
- 336 MIS-Press, 258
- 239 Secure-It, Inc., 302
- Services**
- Macworld Exposition, 216-217
- 293 Safeware, 209
- Mail Order**
- 134 47th St. Computer, 208
- 5 Beverly Hills Computer, 250
- 32 CDA Computer Sales, 56
- 193 CMO Icon Review, 308-309
- 97 Crate Technology, 253
- 330 Direct Micro Products, 206
- 562 Diskette Connection, 249
- Icon Review - see CMO Icon Review,
- MacConnection, 100-105
- 86 MacProducts USA, 306
- 78 MacWarehouse, 224-227
- 45 Open Mac Enterprises, 251
- 44 Programs Plus, 64-67
- 335 Public Domain Exchange, 48
- 141 Software That Fits, 244-248
- 359 Telemart, 256-257
- 295 The New PC Network, 252
- 53 Tussey Computer Products, 214
- 305 USA Flex/Comark, 249

Advertiser Index

Reader
Service
Number

340 Aba Software, 194-195
107 Abaton, 267
166 Abvent, 84
Adobe Systems, Inc., 200
221 Adobe Systems, Inc., 38-39
329 Aldus, 238-239
49 Allan Bonadio Associates, 310
— Apple Collection, 209, 240, 261, 272
331 Apple Computer, Inc., 300-301
462 AST Research, 189
10 Bedford Software Corporation, 187
5 Beverly Hills Computer, 250
199 Borland International, 15
229 Brainpower, Inc., 36
230 Caere, 28-29
32 CDA Computer Sales, 56
130 CE Software, 223
357 Central Point Software, 9
338 CH Products, 22
— Checkmark Software, 268
342 Claris, 74-75
— Claris, 202-203
193 CMO Icon Review, 308-309
85 CMS Enhancements, Inc., 307
— Compugraphic Corp., 171
57 CompuServe, 70-71
361 Computer Accessories Corp., 304
68 Computer Friends, Inc., 161
— Computer Friends, Inc., 222
354 Compu-Mart, 264
97 Crate Technology, 253
15 Cricket Software, 219
538 Cricket Software, 10-11
384 Cricket Software, 221
240 Cricket Software, 77-79
400 CTA, 157
333 D2 Software, 60
— Dac Software, 169
337 Datacopy, 185
40 DataViz, 295
346 Deneba, 34-35

Reader
Service
Number

180 Deneba, 37
443 Designer Products, 262
330 Direct Micro Products, 206
562 Diskette Connection, 249
173 Dove Computer, (Fast Net) 207
174 Dove Computer, (Mach II) 207
155 Dubl-Click, 265
328 Dynaware Corp., 165
150 Farallon, 86
250 Fifth Generation Systems, Inc., 218
311 Fifth Generation Systems, Inc., 72
60 1st Aid Software, Inc., 200
134 47th St. Computer, 208
152 Fox Software, 199
177 General Computer, 26
129 Gimeor, Inc., 57
124 GW Instruments, 220
344 Hewlett Packard, 49-51
254 Howtek, 229
— Icon Review - see CMO Icon Review
337 Image Club Graphics, 92
586 In Focus Systems, Inc., 52
341 Information Builders, Inc., 311
360 Informix Software, 42-45
151 Innovative Data Design, 232-233
— Intuit, 259
260 Iomega, 204-205
100 Jasmine Technologies, Inc., 98
102 Jasmine Technologies, Inc., 163
457 Jasmine Technologies, Inc., 196
348 John Wiley & Sons, 237
192 Kensington Microware Ltd., BC
30 Kensington Microware Ltd., 181
145 La Cie Ltd., 40
104 Laser Connection, 88
225 Letraset, 230
— MacConnection, 100-105
351 MacPEAK Systems, 23-25
86 MacProducts USA, 306
78 MacWarehouse, 224-227
— Macworld Exposition, 216-217

Reader
Service
Number

— Magnavox, 96
207 Mass Micro Systems, 63
33 Mega Drive Systems, 273
409 Micro Planning International, 193
276 MicroComputer Accessories, Inc., 90
277 MicroIllusions, 85
28 Microlytics, Inc., 62
201 Microlytics, Inc., 234
275 MicroNet Technology, 270
— Microsoft, IFC-1
243 Microtech Peripherals, Inc., 241, 243
228 Mirus, 58-59
336 MIS:Press, 258
65 Mitsubishi Electronics, 76
133 Moniterm, 183
339 Multi-Ad Services, Inc., 198
196 National Semiconductor, 179
— NEC Info Systems, 263
559 North Edge Software Corp., 173
347 Novell, Inc., 54-55
352 Odesta Corporation, 68
162 Odesta Corporation, 167
312 Odesta Corporation, 167
45 Open Mac Enterprises, 251
575 Orange Micro, Inc., 61
289 PCAL, 159
290 PCAL, 159
291 PCAL, 159
553 Peach Tree Software, 210
223 Personal Computer Peripherals
Corp., 175
42 Personal Training Systems, 30
356 Pixelogic, 211
292 Preferred Software, 212
317 Preferred Software, 213
334 Priam, 80-81
89 Princeton Graphic Systems, 260
44 Programs Plus, 64-67
335 Public Domain Exchange, 48
115 Qume, 201
353 Qume, 201

Reader
Service
Number

46 Radius, 20-21
13 Raster Ops, 82-83
149 Rodime, 31
191 Ruby Systems, 303
293 Safeware, 209
— Satori Software, 69
239 Secure-It, Inc., 302
297 Shana Corporation, 94
349 Siclon Sales & Engineering, 298
117 Sigma Designs, 269
268 Silicon Beach Software, Inc., 46
300 Softdisk, Inc., 5
139 Softsync, 47
141 Software That Fits, 244-248
48 Software Ventures, 18
405 Solutions International, 242
358 Spectrum HoloByte, 4
198 Spectrum HoloByte, 274
227 Statsoft, 262
301 Summagraphics, 177
186 Sun Remarketing, Inc., 191
112 Survivor Software, 228
215 Symantec Corporation, 6-7
237 Symantec Corporation, 12
6 Tallgrass Technologies, 235
320 Tallgrass Technologies, 235
359 Telemart, 256-257
295 The New PC Network, 252
— TOPS, 16-17
304 Traveling Software, 8
26 Trimar USA Inc., 310
53 Tussey Computer Products, 214
41 TB.S.P., 32
332 T/Maker, IBC
305 USA Flex/Comark, 249
93 Varsityper, 33
231 White Pine Software, 297
126 WordPerfect, 254

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This listing provides company addresses and phone numbers for products mentioned in this issue. Allow several weeks for responses to Reader Service Card inquiries. Asterisks indicate vendors who prefer to be contacted by phone.

Reader
Service

A

- 751 **A/UX Upgrade Bundle.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
- 752 **AAIS Prolog.** Advanced AI Systems, Inc., P.O. Box 39-0362, Mountain View, CA 94039, 415/961-1121.
- 753 **Ad/Art/Plus.** Freemeys Design, 575 Nelson Ave., Oroville, CA 95965, 916/533-9365.
- 754 **Adobe Collector's Edition.** Adobe Systems, Inc., P.O. Box 7900, Mountain View, CA 94039-7900, 415/961-4400.
- 755 **Adobe Illustrator 88.** Adobe Systems, Inc., P.O. Box 7900, Mountain View, CA 94039-7900, 415/961-4400.
- 756 **Allegro Common Lisp.** Coral Software Corp., 336 Windsor St., Cambridge, MA 02141, 617/547-2662, 800/521-1027.
- 757 **ArtDisks 1-3.** D.V. Franks, 3721 Sue Ellen Dr., Raleigh, NC 27604, 919/872-5379.
- 758 **ArtGrabber+.** MacroMind, Inc., 1028 W. Wolfram St., Chicago, IL 60657, 312/871-0987.
- 759 **Artware.** Artware Systems, Inc., 3741 Benson Dr., Raleigh, NC 27609, 919/872-6511.

B

- 760 **Business Advantage.** Reality Technologies, Inc., 3624 Market St., Philadelphia, PA 19104, 215/387-6055, 800/346-2024.

C

- 761 **Click & Clip 500.** Studio Advertising Art, P.O. Box 43029, Las Vegas, NV 89116, 702/641-7041, 800/453-1860.
- 762 **ClickArt.** T/Maker Co., 1973 Landings Dr., Mountain View, CA 94043, 415/962-0195.
- 763 **ClickArt EPS Illustrations.** T/Maker Co., 1973 Landings Dr., Mountain View, CA 94043, 415/962-0195.
- 764 **Clip Art Disk + 1.** Compuset, 517 Third St., #40, Eureka, CA 95501, 707/443-8602.
- 765 **Cognate.** Peridom, Inc., P.O. Box 1812, Bowie, MD 20716, 301/390-9570.
- 766 **Color Image Printer Model 4639D.** Tektronix, Inc., P.O. Box 1000, Mail Stop 63-447, Wilsonville, OR 97070, 503/235-7202, 800/225-5434.
- 767 **Coloring Book/Clip Art.** Bede Tech, 8327 Clinton Rd., Cleveland, OH 44144, 216/631-4214, 800/772-4536.
- * **Concept Modeller.** Wisdom Systems—A McDermott Company, 100 N. Main St., Chagrin Falls, OH 44022, 216/247-2705.
- 768 **Cricket Presents.** Cricket Software, Inc., 30 Valley Stream Pkwy., Malvern, PA 19355, 215/251-9890, 800/345-8112.

D

- 769 **Data Desk Professional.** Odesta Corp., 4084 Commercial Ave., Northbrook, IL 60062, 312/498-5615.
- 770 **DavkaGraphics.** Davka Corp., 845 N. Michigan Ave., #843, Chicago, IL 60611, 312/944-4070, 800/621-8227.
- 771 **dBase Mac.** Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502-1319, 213/329-8000.
- 772 **DeskTop Art.** Dynamic Graphics, 6000 N. Forest Park Dr., Peoria, IL 61614-3592, 309/688-8800, 800/255-8800.
- * **Digit-Art.** Image Club Graphics Inc., 2915 19th St., #206, Calgary, Alberta, Canada T2E 7A2, 403/250-1969, 800/661-9410.
- 773 **Digital Darkroom.** Silicon Beach Software, Inc., P.O. Box 261430, San Diego, CA 92126, 619/695-6956.
- * **DiskFit.** SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043, 415/964-8884.
- 774 **Double Helix II.** Odesta Corp., 4084 Commercial Ave., Northbrook, IL 60062, 312/498-5615.
- 775 **Douglas CAD/CAM Professional System 6.0.** Douglas Electronics, 718 Marina Blvd., San Leandro, CA 94577, 415/483-8770.
- 776 **Drawings by Leonardo.** ScanMaster, 2700 W. Coast Hwy., #220, Newport Beach, CA 95663, 714/548-5967.

E

- 777 **EPS Clip Art.** DiskArt, P.O. Box 354, San Ramon, CA 94583, 415/680-1005.
- 778 **ExperCommon Lisp.** ExperTelligence, 5638 Hollister Ave., #302, Goleta, CA 93117, 805/967-1797.

F

- 779 **Flags of the United States.** DiskArt, P.O. Box 354, San Ramon, CA 94583, 415/680-1005.
- 780 **Flags of the World.** DiskArt, P.O. Box 354, San Ramon, CA 94583, 415/680-1005.
- 781 **4th Dimension.** Acius, Inc., 20300 Stevens Creek Blvd., #495, Cupertino, CA 95014, 408/252-4444, 800/538-8157.
- 782 **FoxBASE+Mac.** Fox Software, 118 W. South Boundary, Perrysburg, OH 43581, 419/874-0162.
- 783 **FullWrite Professional.** Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502-1319, 213/329-8000.

G

- * **G2.** Gensym Corp., 125 Cambridgepark Dr., Cambridge, MA 02140, 617/547-9606.
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- Reader Service
- 785 **HyperAtlas.** MicroMaps Software, Inc., Box 757, Lambertville, NJ 08530, 609/397-1611, 800/334-4291.
 - 786 **HyperBook Maker.** Ideaform Inc., P.O. Box 1540, Fairfield, IA 52556, 515/472-7256.
 - **ICAD.** ICAD, 1000 Massachusetts Ave., Cambridge, MA 02138, 617/868-2800.
 - 787 **ImageStudio.** Letraset USA, 40 Eisenhower Dr., Paramus, NJ 07653, 201/845-6100, 800/526-9703.
 - 788 **Images with Impact/Graphics & Symbols.** 3G Graphics, 11410 N.E. 124th St., #6155, Kirkland, WA 98034, 206/823-8198.
 - 789 **inLarge.** Berkeley System Design, Inc., 1708 Shattuck Ave., Berkeley, CA 94709, 415/540-5536.
 - 790 **Instant-Expert Plus.** Human Intellect Systems, 1670 S. Amphlett Blvd., #326, San Mateo, CA 94402, 415/571-5939, 800/521-5939.
 - 791 **Intelligent Developer/IntelliCard.** Hyperpress Publishing, Technical Product Group, P.O. Box 8243, Foster City, CA 94404, 415/345-4620.
 - **Japanese Clip Art.** Qualitas Trading Co., 6907 Norfolk Rd., Berkeley, CA 94705, 415/848-8080.
 - **Kwikkee Inhouse Graphic System.** Multi-Ad Services, 1720 W. Detweiller Dr., Peoria, IL 61615-1695, 309/692-1530, 800/447-1950.
 - 793 **Level 5/Mac.** Information Builders, Inc., 1250 Broadway, New York, NY 10001, 407/729-9046.
 - 794 **LPA MacProlog.** Logic Programming Associates Ltd., distributed by Programming Logic Systems, Inc., 31 Crescent Dr., Milford, CT 06460, 203/877-7988.
 - 795 **Mac the Knife.** Miles Computing, Inc., 7741 Alabama Ave., #2, Canoga Park, CA 91304, 818/341-1411.
 - 796 **Mac-Art Library.** CompuCraft, P.O. Box 3155, Englewood, CO 80155, 303/791-2077.
 - 797 **MacAtlas Professional Version.** MicroMaps Software, Inc., Box 757, Lambertville, NJ 08530, 609/397-1611, 800/334-4291.
 - 798 **MacAccessories Graphic Accents.** Kensington Microware, 251 Park Ave. S, New York, NY 10010, 212/475-5200, 800/535-4242.
 - 799 **MacGallery.** Dream Maker Software, 4020 Paige St., Los Angeles, CA 90031, 213/221-9987.
 - 800 **MacGolf Classic.** Practical Computer Applications, Inc., 336 Windsor St., Cambridge, MA 02141, 617/547-2662, 800/521-1027.
 - 801 **MacSchedule.** Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301, 818/991-6540.
 - 802 **MacSmarts.** Cognition Technology, 55 Wheeler St., Cambridge, MA 02138, 617/492-0246, 800/622-2829.
 - 803 **MacWrite.** Claris Corp., 440 Clyde Ave., Mountain View, CA 94040, 415/960-1500, 800/334-3535.

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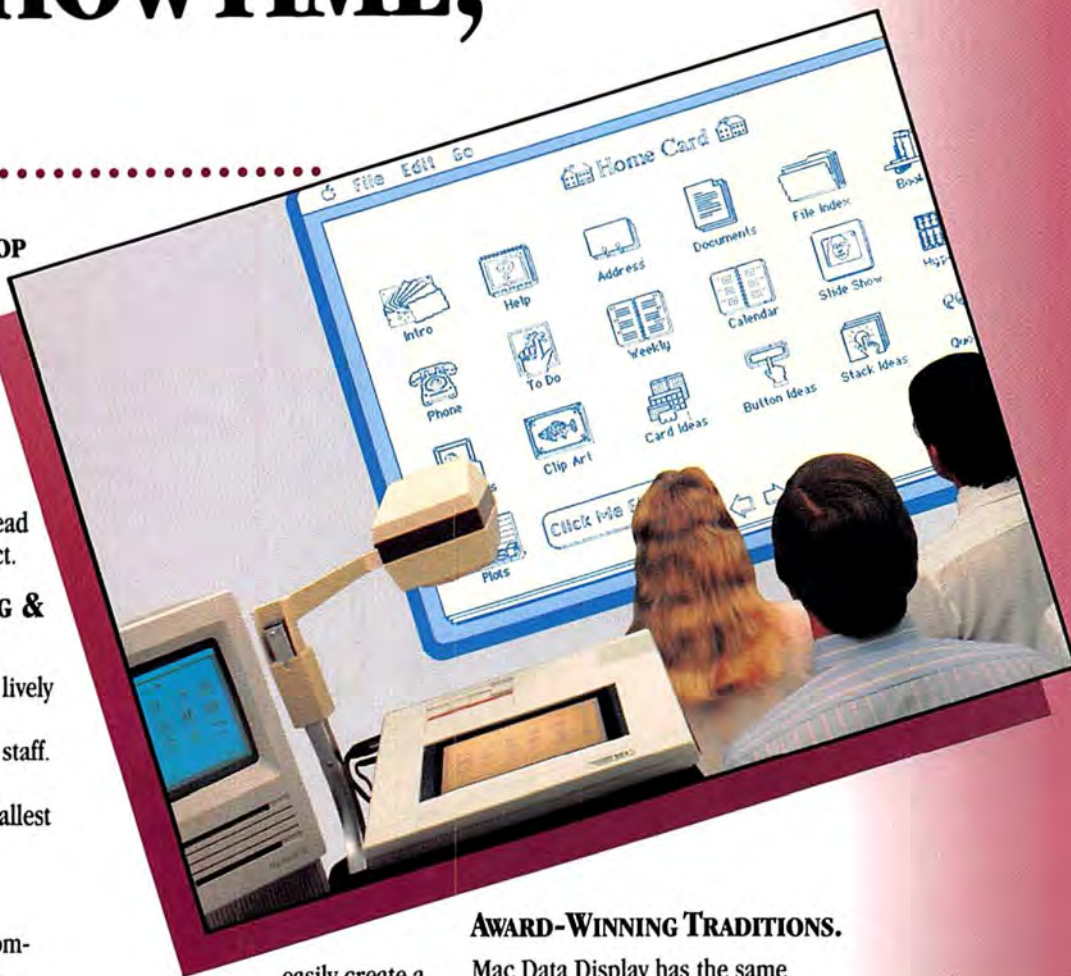
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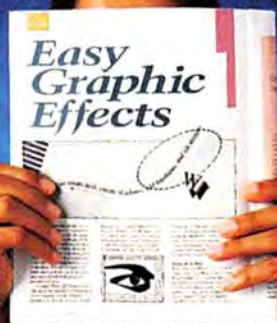
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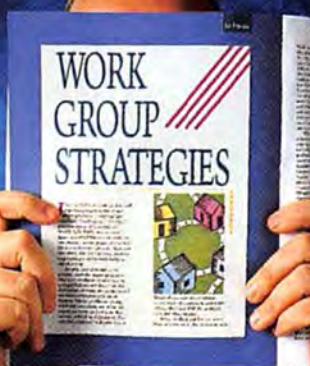
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- 805 **microExplorer.** Texas Instruments, Data Systems Group, P.O. Box 2902, Mail Stop 2243, Austin, TX 78769, 800/527-3500.
- * **Microsoft Excel.** Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206/882-8080, 800/426-9400.
- * **Microsoft Word.** Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206/882-8080, 800/426-9400.
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- 819 **Simply Accounting.** Bedford Software Corp., 15311 N.E. 90th, Redmond, WA 98052, 206/883-0074.
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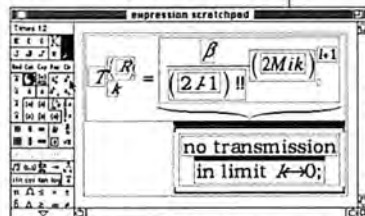
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28	3	4	PageMaker <i>Aldus</i>
18	6	5	MacWrite <i>Claris</i>
3	—	6	Quark XPress <i>Quark</i>
5	—	7	FileMaker Plus <i>Claris</i>
1	—	8	Adobe Illustrator <i>Adobe Systems</i>
18	7	9	SuperPaint <i>Silicon Beach Software</i>
4	—	10	Cricket Graph <i>Cricket Software</i>

Education Software

8	2	1	Reader Rabbit <i>The Learning Company</i>
24	1	2	Math Blaster <i>Davidson & Associates</i>
12	—	3	Early Games <i>Springboard Software</i>
4	—	4	Speed Reader II <i>Davidson & Associates</i>
23	—	5	KidsTime <i>Great Wave Software</i>

Entertainment Software

24	1	1	MacGolf <i>PCAI</i>
24	2	2	Flight Simulator <i>Microsoft</i>
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24	2	3	LocalTalk (formerly AppleTalk) <i>Apple Computer</i>
11	4	4	PhoneNet <i>Farallon Computing</i>
21	—	5	MacServe <i>Infosphere</i>

Months on chart	Last month	This month	
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5	3	2	MacStack 20 <i>CMS Enhancements</i>
13	2	3	Rodime 20 Plus <i>Rodime</i>
1	—	4	Pro Series SE 80 <i>CMS Enhancements</i>
1	—	5	Apple Hard Disk 40SC <i>Apple Computer</i>

Add-in Boards

11	1	1	Radius Accelerator <i>Radius</i>
11	2	2	Apple 1MB Memory Expansion Kit <i>Apple Computer</i>
11	3	3	Apple 2MB Memory Expansion Kit <i>Apple Computer</i>
5	—	4	Video Board/Large Screen <i>Ryad</i>
1	—	5	MacSnap 524E <i>Dove Computer</i>

Product Watch

Editors' choice: other recent or forthcoming products of particular interest.

Aldus Persuasion *Aldus* presentation software

LaserPaint Color II *LaserWare* color graphics software

Timbuktu Remote *Farallon Computing* remote node controller program

Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order suppliers. Covers sales during June 1988.

*Does not include hard disks installed at the factory.

The WriteNow difference: *Ease, Performance, and...*



	WriteNow 2.0	MacWrite 5.0	MS Write	MS Word 3.01
Spelling checker size	100,000 words	100,000 words	80,000 words	80,000 words
Font size range	4-127 pts.	7-24 pts.	7-72 pts.	2-127 pts.
Maximum recommended document size (in pages)	Over 2,000	240	50	500
Number of open documents	Unlimited *	1	30	30
Mail merge	Yes	No	No	Yes
Number of editable, on-screen columns (WYSIWYG)	4	1	1	1
On-screen auto-numbering footnotes	Yes	No	No	No
Automatic repagination	Yes	Yes	No	No
Graphics in same line as text	Yes	No	Yes	Yes
Multiple headers and footers	Yes	No	No	Yes
Extensive Undo	Yes	No	No	No
Variable line spacing (in points)	Yes	No	No	Yes
Selective font, size, style, and ruler changes	Yes	No	No	Yes
MacUser Magazine's Best New Word Processor	Yes	No	No	No
Search for a word	2.4 sec	7.6 sec	9.5 sec	9.7 sec
Spell Check document	6.3 sec	2 min 34.0 sec	2 min 2.3 sec	1 min 48.0 sec
Copy & Paste large area	6.8 sec	1 min 0.9 sec	12.4 sec	12.3 sec
Change font size of document	10.7 sec	50.2 sec	17.6 sec	16.2 sec
Change font of document	10.8 sec	37.1 sec	14.1 sec	15.2 sec
'Save As' a 12-page document	3.6 sec	9.4 sec	20.3 sec	19.6 sec
Retail Price	\$195	\$125	\$175	\$395
Happy Users	Yes	?	?	?



...Happy Users!

Our users love WriteNow—a claim our competition can't easily make for their products.

How do we know? Because our users tell us—on registration cards, on the telephone, on bulletin boards, and in letters.

We've heard dramatic stories about how WriteNow has significantly reduced training and support costs. And how clean, fast, and enjoyable it is to use. And how WriteNow got the job done when our competition sputtered.

You see, at T/Maker we feel a great word processor is more than just a stockpile of features. It's the *usability* of those features—how easy they are to learn and use, and how they *feel* under your fingertips when doing real work.

And from their overwhelmingly terrific response, it's clear our users agree.

WriteNow 2.0 is the user's choice for best Macintosh word processor—and we'll show anyone our customer registration cards to prove it!

What's new with WriteNow 2.0?

Mail merge, 100,000-word dictionary, Cursor key support, Direct import/export of Text, MacWrite, and RTF (Word, Write, and Works option) files, Window menu, Decimal tabs, Hide pictures option, MultiFinder and network compatibility, ...and more!

Registered users will receive upgrade details in the mail. Non-registered users should call or write for details.



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All timing tests performed by an independent testing organization on a 12-page document using a Macintosh SE and a 20 megabyte hard disk.

* Number determined by Macintosh system constraints.

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Demo version of WriteNow included on all Jasmine hard drives.

Circle 332 on reader service card

10 reasons why you should switch to New Turbo Mouse.



1 Fly across even the biggest screen with automatic acceleration. Turbo Mouse® senses the speed at which you're working and moves the cursor further when you move faster.

2 No rolling room required. With the Turbo mouse ball on top, you move only the ball, not the whole mouse.

3 Three times as precise as a mouse. New patented "optical levering" technology offers 200 CPI pin-point precision.

4 One button is for regular clicking, the other is a click lock. You choose which is which.

5 Advanced two-button design allows for either right or left-handed use!

6 Only 4" by 6", Turbo Mouse fits neatly beside any Macintosh® or Apple IIgs® keyboard.

7 Turbo Mouse offers a second mouse port. Turbo Mouse ADB offers a second ADB port.

8 Perform one of seven functions—Save, Print, Open, Close, New, Quit, or Undo when you click both buttons at once. (Only in Turbo Mouse ADB.)

9 Turbo Mouse ADB, #62360, works with Mac SE, Mac II, or Apple IIgs. Turbo Mouse, #62358, works with Mac or Mac Plus. Both have a suggested retail of \$169.95.

10 It's easy to find. For a Turbo Mouse dealer near you, just call **1-800-535-4242**, or **212-475-5200**.

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