

MACWORLD

December 1988 \$3.95

Canada \$4.95

The Macintosh® Magazine

New Design Tools:

CAD in Three Dimensions

**Cricket Presents versus
PowerPoint: How to
Prepare a Slide Show**

**Thirteen 20MB
Drives Compared**

Best Games of 1988

Seven Ways to Go Online

Christmas Gifts—20 Ideas



How do you explain the magnitude of the new Microsoft Works?

Whether you run a small business or your knowledge about computers happens to be less than monumental, the new Microsoft® Works 2.0 has you covered.

Microsoft Works 2.0 is actually five tools in one: word processing, spread sheet, database, drawing and communications. But as far as you're concerned, it's one integrated program—so it's easy to move between the different tools and use them together.

In fact, from the moment you take it out of the box, Microsoft Works 2.0 is easy to use. It comes with an animated training program written in HyperCard® format. As well as on-line help and unlimited phone support to help answer any questions you may have.

No matter how varied your projects are, Microsoft Works 2.0 can handle the job. Its newest feature, the drawing module (with page layout), can enrich otherwise plain, fact-filled documents with compelling graphics.

The word processor can create everything from a simple memo to a detailed report—and it even includes a spell-checker aimed at typos.

Of course, if your document needs to be supported with numbers, you can always jump over to the spreadsheet to compute and analyze data. And then transform it all into easy-to-read, easy-to-understand charts.

As for information that keeps your business going, the database is indispensable for keeping track of clients and orders.

And you can count on the communications module to bring information to your desktop through a modem.

If you'd like to learn more about Microsoft Works 2.0, just call (800) 541-1261, Dept. I76 for the name of your nearest dealer.

No wonder Microsoft Works 2.0 is the best-selling application in its class. Aside from being a great value, Microsoft Works 2.0 is one program that can handle a myriad of business needs.

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*To help get you started, we've included
an animated training program written in
HyperCard format.*

It's simple.

HOME FRONT

Real Estate News for the Greater Aspen Community - Published by Martin Realty

Lowest Lending Rates Since 1983!

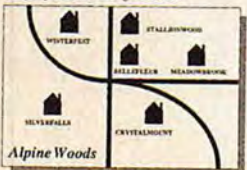
Last week mortgage interest rates reached a five-year all-time low. First Mortgage offered a 30-year, 95 percent new home loan at 8.5 percent with no points. Unheard of in recent years.

Resale of homes has jumped 13 percent over sales recorded during the same period last year.

New Home sales are up 17 percent. Several local lenders have put together special new home financing packages in cooperation with local contractors. Call our Aspen office at (426) 838-2961 for details.

Crown Construction Opens This Year's Alpine Woods Development

The Alpine Woods development will be open for public tours from July 15 until August 21. Each home represents a distinct style from contemporary to French provincial - all homogeneously placed to create a uniquely attractive neighborhood.



Each home has been fully decorated by a local interior design firm and each is singular.

Just shopping for ideas, we recommend this year's Alpine Woods development.

You can park at the Denny Shopping Center and take a tour bus from there between 9:00 a.m. and 6:00 p.m. daily.

HOME OF THE MONTH

Lakefront Country House: Designed for Entertaining!



This lovely brick and cedar country house can be found just fifteen-minutes from downtown Aspen. Nestled in giant firs, it represents true Colorado style!

The master bedroom suite features a panoramic view of Lake Diamond. The master suite also has his-and-hers walk-in closets, a separate vanity, and a stunning shower area made of glass bricks.

The living room, study, family room, and bedrooms (2+) feature hand-polished redwood paneling and skylights.

The three-car garage has special wall-mounted ski racks and an extra-sized third stall to accommodate up to a 24-foot boat.

Two additional baths, a stone fireplace, 800 square feet of decking, three wooded acres, and a private dock complete this rural dream home.

July 28, 1988

Gary and Lisa Elliot
533 4th Street
Denver, CO 84556

Dear Gary and Lisa,

This Saturday, I look forward to showing you a few of the quality homes in the Aspen community.

Per our phone conversations, we will be looking at family homes with a minimum of four bedrooms, two-and-a-half baths, a family room, and a three-car garage. It sounds like you are a pretty active family, so I've also chosen homes with a "mud room" for changing wet boots, etc.

One issue that we haven't really discussed is schools. Before Saturday, you might want to jot down a few priorities. Public, private, parochial? Level needed—from pre-school to college. And any special needs your children may have, like proximity to an indoor pool or gym.

I can also put you in touch with any youth organizations you may be interested in like The Boy Scouts or 4-H. We have it all.

You mentioned wanting a fairly good-sized lot. Does this mean that you will need stables or a barn? I can even put you in touch with a local riding stable if you wish.

Since you plan to be here for the whole weekend, let me know if I can be of any help with hotel reservations or activities. I can arrange for anything from theatre tickets to a riding lesson.

Whatever might make your stay more pleasant, and leave a good impression of Aspen.

It's a beautiful place and we're happy that you've decided to make it your home.

Sincerely,

Peter Cohen
Residential Agent

cc:file

COMMISSIONED SALES REPORT—JUNE

Sales Person	Type	Rate	Sales YTD	Billings	Check Amt.
Shannon Pitts	Commercial	3.80%	\$275,000	\$88,000	\$3344.00
Lisa Doan	Residential	3.00%	\$320,000	\$120,000	\$3600.00
Peter Cohen	Residential	3.00%	\$230,000	\$100,000	\$3000.00
Robbie Ross	Commercial	4.00%	\$500,000	\$340,000	\$13600.00
Mike Lucero	Residential	4.00%	\$150,000	\$65,000	\$2600.00
Gary Gigot	Residential	7.00%	\$700,000	\$260,000	\$18200.00
Mary Freeman	Residential	3.80%	\$450,000	\$60,000	\$2280.00
Joan McArthur	Residential	2.60%	\$250,000	\$99,000	\$2574.00
Barbara Miller	Commercial	3.00%	\$250,000	\$130,000	\$3900.00
Rohyn Komachi	Commercial	2.80%	\$780,000	\$240,000	\$6720.00
Residential			704,000		
New			325,000	46.16%	
Prev. Owned			250,000	35.51%	
Land Only			129,000	18.32%	
				100.00%	

Breakdown of Residential Sales

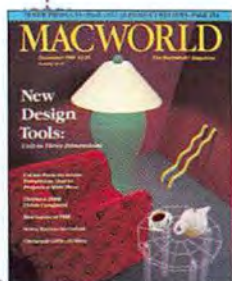


Everything you see above was created using some combination of the five tools within Microsoft Works 2.0: word processing, spreadsheet, database, drawing and communication. As you can see, the real power of Microsoft Works 2.0 comes into play when all the tools are used together.

MACWORLD

December 1988

The Macintosh® Magazine



On the Cover
This month's cover art was accomplished through the combined efforts of photographer Mark Johann and Joe Sparks of Para-comp, who rendered the 3-D images of the table and lamp using Swivel 3D.

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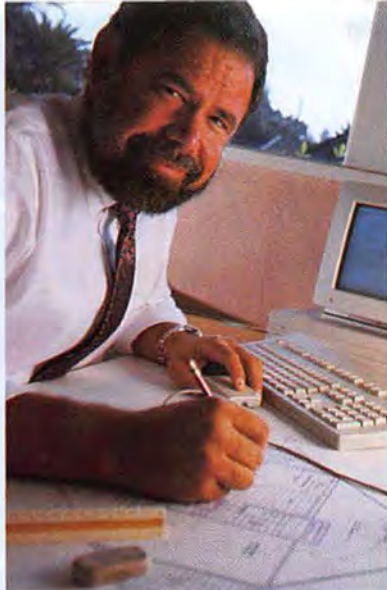
83 Macworld News

- **68030 at Last** It's here and there are three ways to upgrade.
- **Video Snapshots** Six new frame grabbers capture screen images.
- **Give Mac a Brain** Neural networks learn by example.

Plus, new directions for HyperCard, Mac holograms, 4MB of memory for the II, Apple pushing A/UX toward UNIX standards, and more.

We experience life in three dimensions—and now, with a score of 3-D programs on the horizon, the Mac can, too. (p. 108).

Drafting professionals will want to check out the new 2-D color CAD package from Claris (p. 99).



Features

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Stuffing stockings with Mac-related gifts can be great fun (p. 136).

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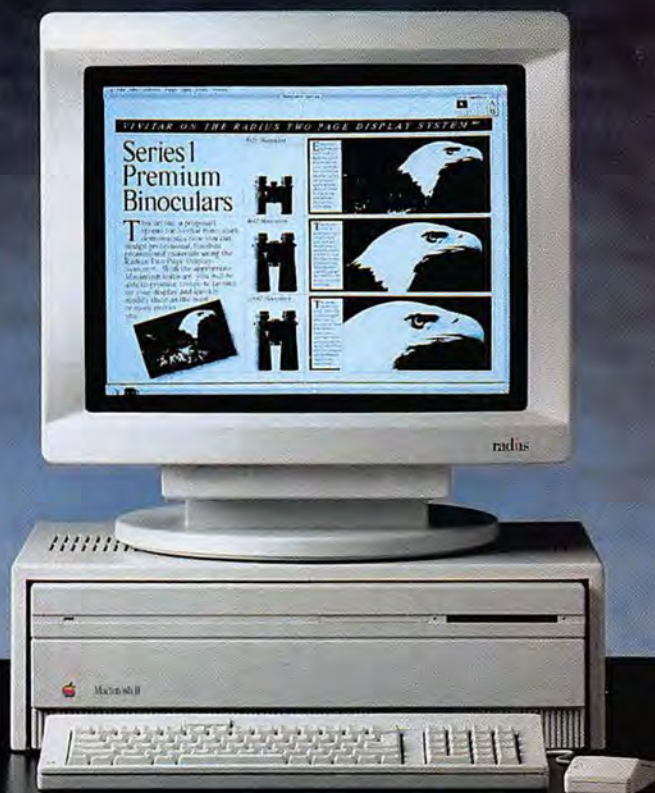
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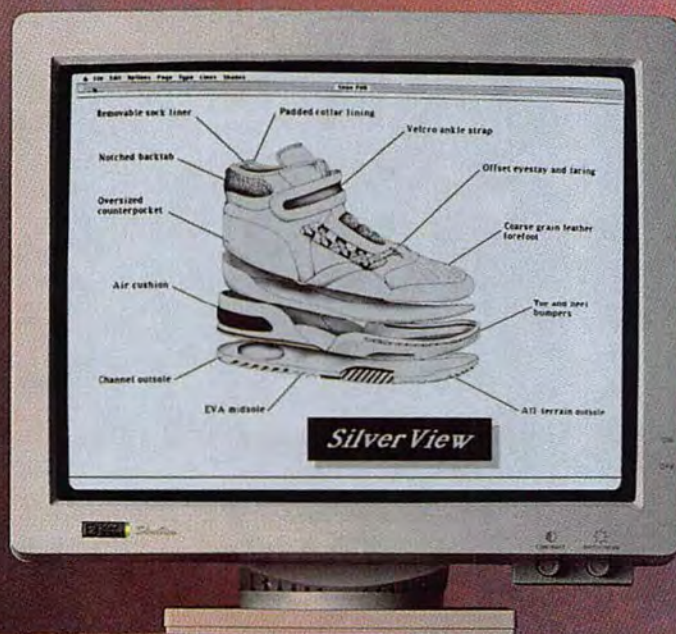


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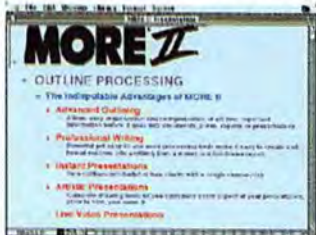


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See Us At Comdex, West Hall Booth #W640

Exchange E-mail with a VAX

► Communication lines are open between DEC's VAX minicomputers and the Macintosh—thanks to Symantec's new version of its InBox E-mail system. InBox 3.0 provides full connectivity for all three environments and supports the X.400 international standard electronic messaging protocol, with MicroVAX systems as AppleShare-compatible file servers. The InBox interface, with its typical Macintosh-style ease of use, facilitates interaction with large corporate communications systems; users can send messages and transfer files from Macs and PCs to VMS mail systems, such as Digital's All-in-1. Contact Symantec, in Bedford, Massachusetts, at 617/275-4800 for more information about InBox 3.0.

A Line o' Type or Two

► Linotype's new PostScript Imagesetter, the Linotronic 200P, costs less than \$30,000 and produces output with resolution up to 1693 lines per inch. While not quite comparable to the Linotronic 300, which produces 2540-lpi output, it is expected to set a new standard for price and performance. The 200P is based on laser diode technology, which has low power requirements. It reads PostScript files using the true Adobe PostScript interpreter;

text and line art, as well as 120-line halftones, come out crisp and clear. For more information on the Linotronic, call Linotype at 516/434-2000 or write to the company at 425 Oser Ave., Hauppauge, NY 11788.

System Software Version 6.0.2

► Apple assured Macintosh users that System software version 6.0.1 would solve the problems they had with System 6.0. System 6.0.1 did indeed fix System 6.0's bugs, but System 6.0.1 had its own bug, which wreaked havoc with bold-face fonts. So the next System software update for the general public will be version 6.0.2, not 6.0.1.

A summary of changes between Systems 6.0 and 6.0.1 reveals 53 bug fixes, including the following:

- all format selections of the International Utilities Package now work properly;
- the sound CDEV now appears on the Mac Plus;
- the correct driver is now called when a local driver is being run in a background application.

System 6.0.1 also corrected bugs in QuickDraw, Color QuickDraw, QuickerDraw, Font Manager, Palette Manager, Dialog Manager, Menu Manager, and System 6.0's Disk INIT Package. It contained the latest versions of the MacroMaker utility, AppleShare WorkStation, and Disk First Aid, plus new printer resources for the ImageWriter LQ.

The boxed System software update 6.0.2, including original disks and documentation, costs \$49. The software itself, without documentation, is expected to be available free from authorized user groups and bulletin boards. For further information, contact Apple Computer at 408/996-1010.

Nimbus CD ROM

► A CD ROM demonstration disk containing about 300 megabytes of Macintosh public domain software and shareware has been produced by Nimbus Information Systems, of Charlottesville, Virginia, in cooperation with Quantum Leap Technologies of Coral Gables, Florida. Nimbus's entry into the CD ROM field—the company is known as a CD producer—was announced at the CD ROM Exposition in Chicago in late September, where free copies of the disk were distributed to CD ROM developers to introduce Nimbus to the Mac market.

The CD ROM, known as the Mega-ROM, is available from Quantum Leap for \$30 while supplies last. For more information, call Nimbus at 804/985-1100 or Quantum Leap at 305/446-2477.

Mac Presentation Products

► Early desktop presentation systems used IBM PCs and compatibles; now the Mac II, with its superior

color, sound, and graphics capabilities, is becoming the platform of choice for producing exciting, impressive presentations.

General Parametrics, of Berkeley, California, has announced a new group of presentation products for the Mac Plus, SE, and II, planned for release in early 1989. The VideoShow presentation system, based on a portable unit operated with wireless remote control, comes in three models: VideoShow Professional and VideoShow Executive, for the Mac II, and VideoShow Companion, which works with the SE. VideoShow Professional can show up to 100,000 colors in a picture, with photographic and synthetic images displayed in the same picture. VideoShow is compatible with all QuickDraw graphics products.

The PhotoMetric Slide-Maker, which works with any Macintosh and with VideoShow, is a 4000-line desktop film recorder with sophisticated graphics and text capabilities. PrintMaker software produces full-color, high-resolution overheads and hardcopy to accompany presentations. For more information, call General Parametrics at 415/524-3950.

Mac to IBM

► Things are starting to look up for Mac-to-IBM-mainframe connectivity. Avatar, one of the main producers of IBM 3278

(continues)

emulation boards for the Mac, has announced the development of an Application Programming Interface (API) for use with Avatar boards. In addition to providing a library that programmers can incorporate into their own applications, the package includes prewritten XFCNs for programmers interested in utilizing HyperCard as a front end to an IBM mainframe.

Avatar's API is accessible through its MacMainFrame Programmers' Toolkit. In addition to supporting access through the Avatar API and the HyperCard API, the Toolkit allows programmers to utilize a Transport Layer Protocol Module (TLPM) for use with Apple's MacWorkStation. The Avatar MacMainFrame Programmers' Toolkit will be available free to owners of any of Avatar's MacMainFrame 3278 terminal emulation devices. For further information, contact Avatar Technologies, Hopkinton, Massachusetts, 617/435-6872.

Letraset's

▶ Letraset is now offering add-on special-effects modules for its ImageStudio

controls for image rotation, scaling, transparency, drop shadows, and smoothing. Another module creates and previews halftone screens, so the user can set dot shapes and screen angles and can create digital mezzotints.

ImageStudio lists for \$495, and the special effects modules are expected to list for under \$100 each. For further

information, contact Letraset, in Paramus, New Jersey, at 201/845-6100.

Apple and MS-DOS Compatibility Disk

▶ As part of its effort to convert corporate clients, Apple has produced a 5 1/2-inch floppy disk titled The Compatibility Guide for use on MS-DOS PCs. Designed with the help of the SoftAd Group of Sausalito, California, the disk is an interactive guide to Macintosh-MS-DOS compatibility. Menu selections introduce compatibility issues and solicit your work profile: What kinds of computers do you use? How large is your workgroup? What kinds of software do you use? Is it customized or off-the-shelf? Ensuing product recommendations come complete with graphics and animated illustrations. You may not like the idea of an interactive sales pitch, but technical shopping can get boring—and this approach may make it more fun than wading through pages of specs. For further informa-

tion, contact Apple Computer, 408/996-1010.

Color It Mac

▶ *Color It Mac*, a software from Pre-Press Technologies, enables graphic designers to use the Mac II to do color corrections and separations inexpensively and in a fraction of the time traditional methods would take. SpectreMatch/Print's user interface emulates a sophisticated laser drum scanner, with interactive dials and displays that modify range and gradation of highlight and shadow in 1 per-

cent increments of yellow, magenta, and cyan. With the output module, you can create color separation files in a variety of formats, including PostScript, encapsulated PostScript, and TIFF. Designers can also make color slides by outputting complete images to a film recorder.

For information about SpectreMatch/Print, call Pre-Press Technologies in Encinitas, California, at 619/753-0194.

300 Fonts on a Hard Disk

▶ Adobe is now shipping a hard disk containing the entire Adobe Type Library, which includes over 300 typefaces. The Adobe Font Folio is a 45MB, high-performance disk selling for \$9600 (nearly a third less than the cost of purchasing the company's library one package at a time). Adobe Font Folio requires the Plus, SE, or II, and the LaserWriter NTX, and plugs into the Apple SCSI port. For further information, contact Adobe Systems, in Mountain View, California, at 415/961-4400.

MacMusic Fest 2.0

▶ *MacMusic Fest 2.0*, a Record Plant affiliate, is teaming up with Apple again for MacMusicFest 2.0. The festival will feature the latest in Apple systems, music software, synthesizers, and film and television products; and it will offer seminars in integrating MIDI in your studio, feel factoring, and graphics/Multimedia, plus demonstrations of sequences and music-notation systems. Seminar hosts will include

Apple Fellow Alan Kay; Marc Canter, president of MacroMind; Dominic Milano, editor of *Keyboard* magazine; and Craig Anderton, editor of *Electronic Musician*.

The festival will be held December 3 to 4, 11 a.m. to 6 p.m., at Record Plant's massive scoring stage and adjacent studios on the Paramount Pictures movie lot at 5555 Melrose Avenue in Hollywood. Tickets are \$25 in advance for both days, \$30 on the day of the show. For further information, contact Filmsonix, at 213/653-0240.

NeXT, Finally

▶ NeXT unveiled its system in San Francisco before 3000 developers and reporters on October 12. The computer's single board has a 68030 CPU and a math coprocessor, both running at 25 MHz. A digital signal processor provides CD-quality stereo sound and supports fax and modem functions. Eight megabytes of RAM and an Ethernet port are standard. The built-in erasable optical disk drive uses removable cartridges that store 256MB. A \$2000, 400-dpi laser printer is optional. The NeXT 17-inch high-resolution monitor displays four shades of gray. The monitor houses a speaker, stereo output jacks, and a microphone jack. The multitasking operating system, called Mach, is a version of UNIX. Display PostScript drives the graphical user interface. Proprietary software called NextStep furnishes the operating and development environment. The \$6500 system will be available in volume in the second quarter of 1989; it will be sold only to students and workers at colleges and universities. □

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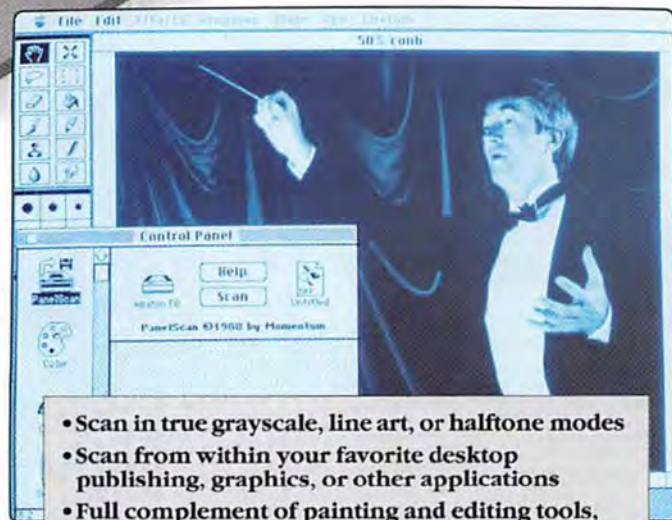
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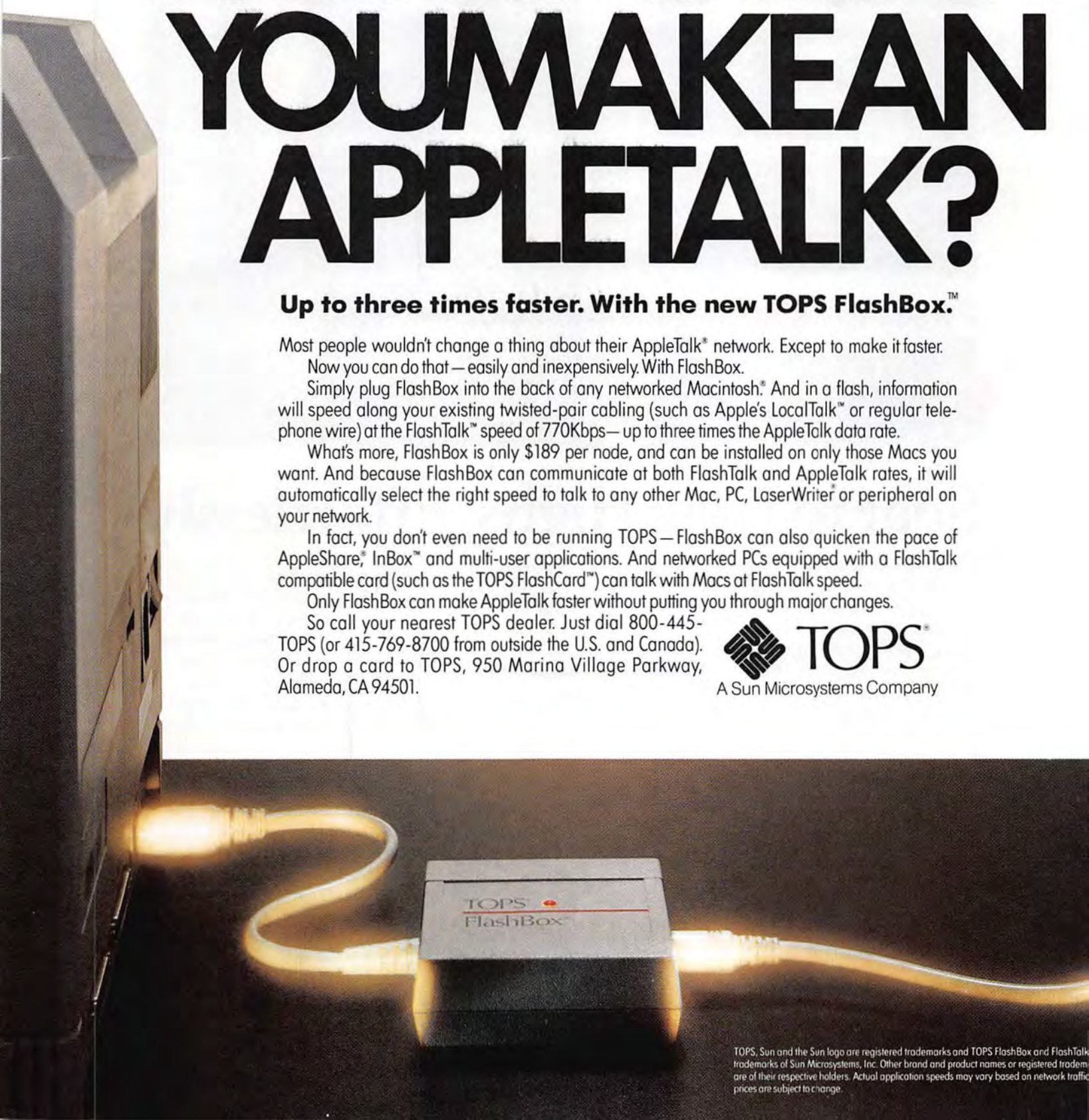
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Now You See It, . . .



Apple's latest executive shuffle makes me wonder who's watching the big picture.

Ordinarily, there's only so much I'm interested in knowing about a company's in-nards—who's in, who's out, what the new organizational chart looks like. So Apple's latest reorganization didn't exactly leave me panting for more news than I got. For those who haven't kept up with the latest details, John Sculley is still chairman of the board and chief executive officer. There are now four Apple divisions, each headed by a president who reports to Sculley. Following grade-Z soap operas: much ado about very little, in terms of the rest of the world. The more I thought about it, though, I did begin to wonder what this new shuffle means for the big picture at Apple. Who's in charge of its vision—Sculley, Jean-Louis Gassée, someone new, or no one at all?

Sculley certainly likes to play the role of visionary. He often shows a special-effects-filled video that touts the Knowledge Navigator—something between a product announcement and a sci-fi story—to an odd mix of audiences around the globe. If you don't believe he's a visionary, just look at the title of his book: *Odyssey: A Journey of Adventure, Ideas and the Future*.

In terms of the reorganization, it looks like Gassée really fills the role of head philosopher. As president of Apple's products division, he has control over everything from the advanced research stage through design and manufacturing to marketing. As much as anyone could be, Gassée is up to doing all of this, but I wonder how much time there is for him to walk on the beach and think about the future. Not that he himself doesn't recognize the need for meditation. At the last Macworld Expo, he told me that every Apple employee should be required to take a short sabbatical each year.

There are three other presidents now running divisions. Michael Spindler presides over Apple Europe, which also includes the rather stationary African and Middle Eastern markets. He used to run Apple International, so this could be viewed as either a better focus on—or a cutback of—his territory.

Del Yocam was formerly chief operating officer of Apple's entire operation. He is now president of its Pacific and education markets, which is certainly a cutback, although Yocam says it's a welcome one. He's been quoted as saying he was getting too far afield from people, too deep into policies (and politics) to make life meaningful.

The new player in these proceedings is Allan Loren, newly named president of Apple USA. Not only is he a newcomer to Apple, having been there only a year or so, but he had not managed sales or marketing efforts prior to his arrival. That doesn't faze Loren, though. His forte is strategic planning, and this may help in the big-picture department. He has his work cut out, since Apple still has some serious selling to do in order to catch up to IBM.

Given this cast of players, and the number of reorganizations Apple has endured since Steve Jobs's ouster in 1985, I wonder if this latest high-level shuffle is going to be beneficial, or even matter, three years from now. We know that the 68030 SE is in the works; that a "baby" Mac II, with fewer slots and a lower price, is coming out; and that the long-overdue laptop promises to appear next year. But these developments reflect a straight-ahead marketing plan, not breathtaking technological breakthroughs. Managers, not visionaries, are the ones to make these kinds of developments real. I guess my question is this: Where's the next stunning departure for the user and the whole industry going to come from? Who's thinking about the next new Macintosh?

Apple's incredible growth (it hired 3000 new employees this year) and subsequent need to constantly reorganize have led to a higher than normal level of internal confusion. Could the rises, falls, and lateral moves that consume so much staff time and energy keep Apple execs from scanning the whole horizon? I hope not, because the company's success has been historic and dramatic. Don't get too corporate on us, Apple—let's keep the vision department intact. □



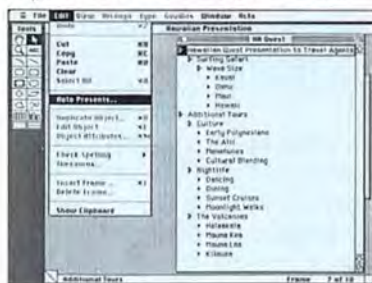
They all have

Conventional wisdom tells us that just like shoes, there's no such thing as one-size-fits-all software. People have distinct workstyles, and varying levels of Macintosh® proficiency. And when you take into account the many types who create presentations, from executives to educators, artists to accountants, it would seem impossible to find a desktop presentation package that suits them all.

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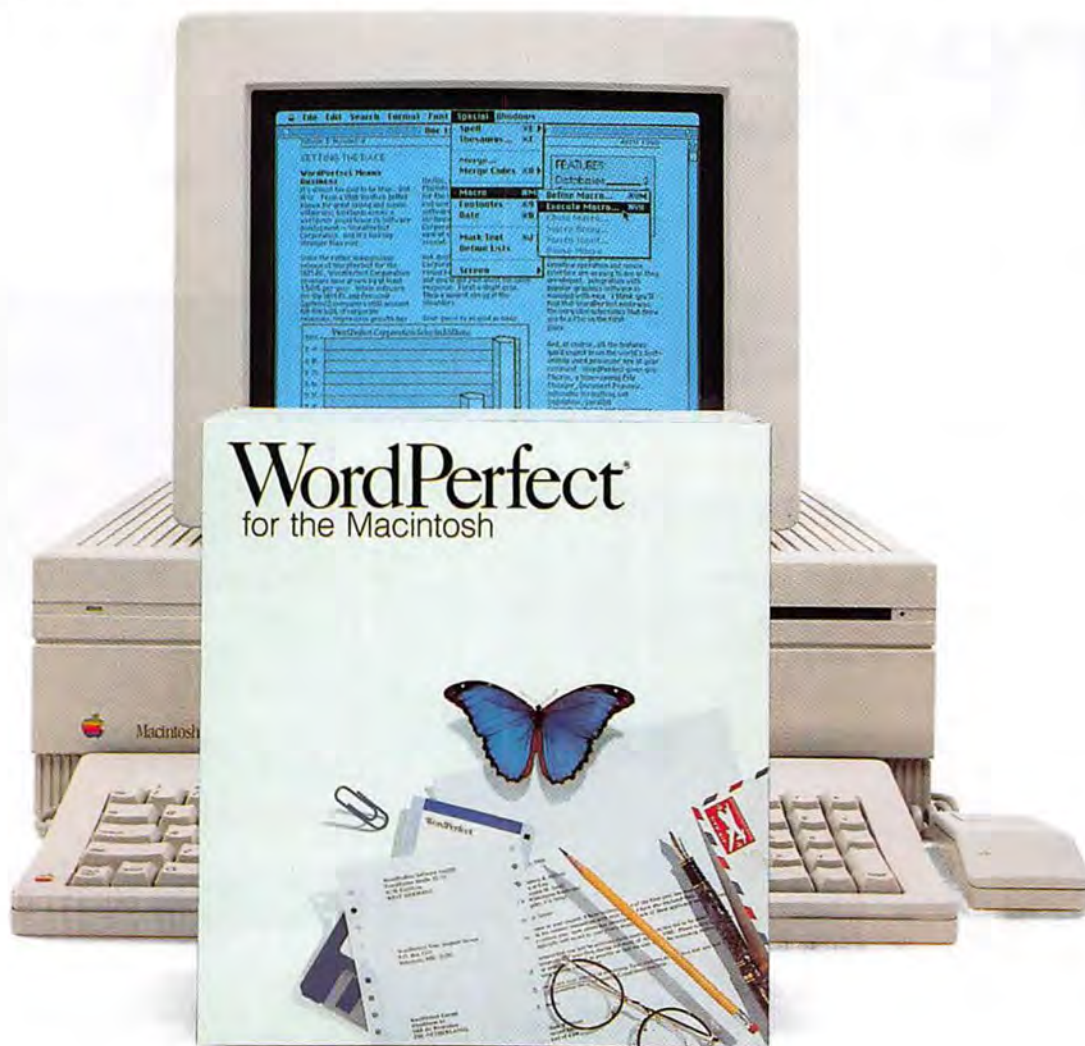
How to impress the powers that be with the power that is.

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Letters

A forum for Macworld readers

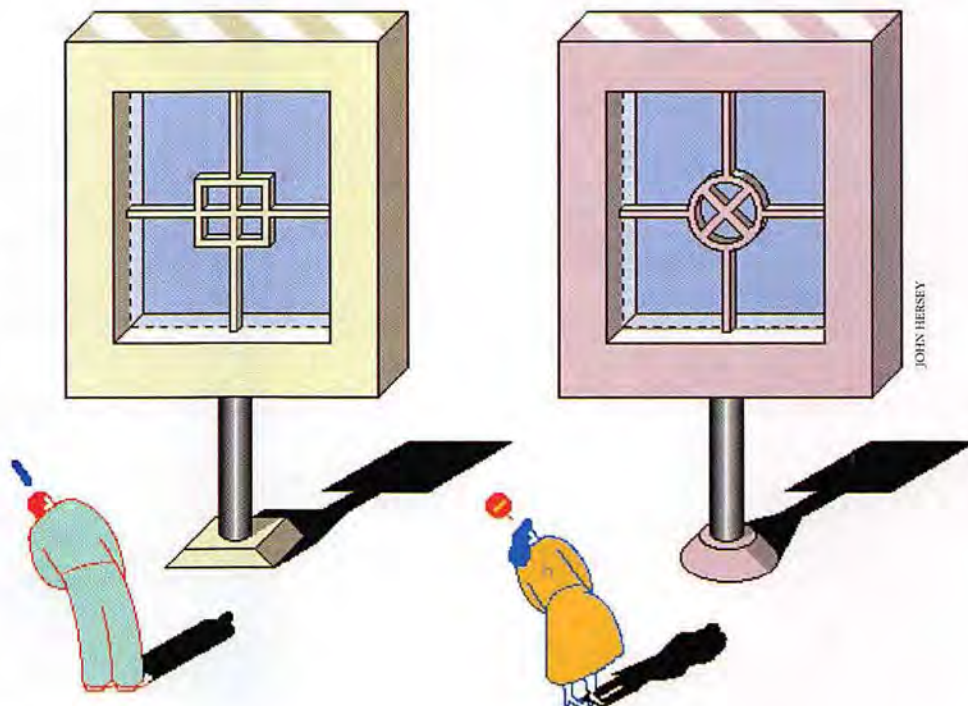
Look and Feel?

Having been a zealous lieutenant in AILF (Anti-IBM Liberation Front) for over ten years, I felt Apple was justified in attempting to protect its technology. Today I changed my mind.

A coworker with two Compaq 386 clones commented on the relative power of his machines compared to my Mac SE and then stated proudly, "Plus, I've got the 'look and feel'." That's when it hit me. The Mac interface is more than just windows, it's an entire philosophy. All Windows will do is allow DOS developers to toss up a rectangle and chuck their application into it.

So why is Apple suing? Why give the competition more credit than it deserves? Apple's time would be better spent promoting the differences and advantages of the Macintosh interface over Windows.

*Marvin L. Price
Pasadena, California*



Corrections

The new address for Mira Imaging (Macworld News, August 1988) is Mira Design Corp., 101 First St., #258, Los Altos, CA 94022; 415/961-6070.

The phone number for Modern Graphics, maker of ChemStack (New Products, August 1988), is 317/253-4316.

The Mac-101 Enhanced Keyboard (World-Class Macintosh, September 1988) is from DataDesk International, 818/780-1673, not Apple.

The phone number of MLT Software, maker of Sun Clock (New Products, September 1988), is 503/245-7093.

The phone number for the MacMAD user group, Melbourne, FL (A Guide to Macintosh User Groups, September 1988), is 407/259-7221.

Sony Warranties

I have religiously purchased Sony disks for the past four years and have had only a few go bad—until this last week when four went bad. I called the Sony customer service line at 201/930-7669 to ask about the lifetime warranty and was told to mail the bad disks to Sony Corp. of America, 1 Sony Dr., Park Ridge, NY 07656, Mail Drop 3-1. I got my replacement disks in about three weeks.

*Bob Harris
Inverness, California*

Don't throw those bad disks out. An informal survey of the major disk manufacturers confirmed that most disks have lifetime warranties. If you suspect a disk is defective, contact the customer service department of the manufacturer and ask where you should send the bad disk for replacement.

PostScript Tips

Recently, I have been trying to add flair to the title pages of the reports I generate by customizing the PostScript fonts in the LaserWriter, but I find this extremely difficult. Is there a product that modifies PostScript with shadowing, skewing, perspective, and so forth?

*Kenneth S. Ralph
Thorold, Ontario, Canada*

Illustrator 88 (Adobe, 415/961-4400), FreeHand (Aldus, 206/622-5500), and Cricket Draw (Cricket, 215/251-9890) can all be used to enhance PostScript fonts. Some font-specific programs that can be used to display special effects with type are Laser FX (Postcraft, 818/718-1598), LetraStudio (Letraset, 201/845-6100), LP Text (London Pride, 203/866-4806), and TypeStyler (Broderbund, 415/492-3200). You can put existing fonts into Fontographer (Altsys,

(continues)

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A To an architect, fine hairlines like ours are pure poetry.

B Auto-tracing built this banana from a scanned-in produce ad. In split seconds.

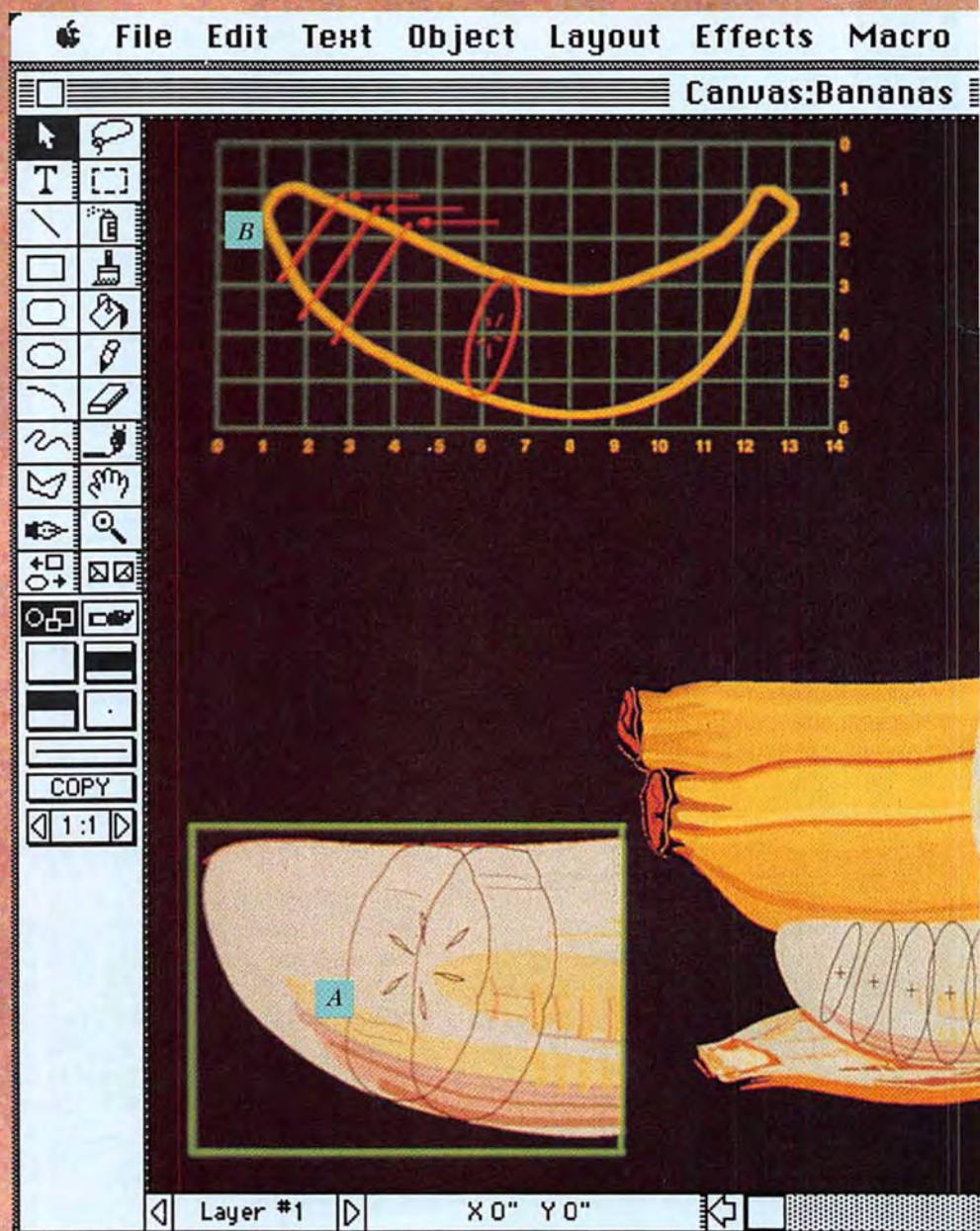
C Multi-point bezier curves make drawing a bunch easier. Colors are added in layers.

D Auto-resizing helped this V.P. of Sales display the fruits of his labor, graphically.

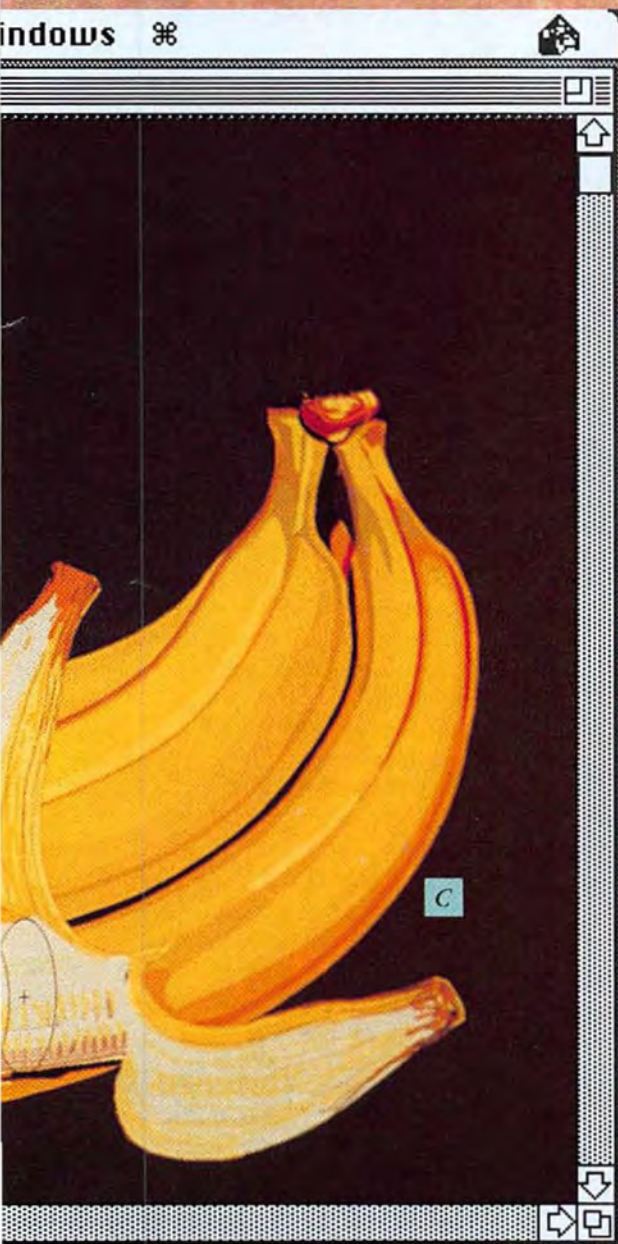
E Smooth continuous color blending inspired this art director to new heights.

F What are mere words compared to WYSIWYG text with special effects?

G After he slipped away, we added rich Postscript® gray scales to Koko's leftovers.



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Real Action. Real Sound. Real Fun.



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.

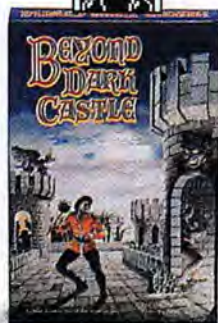


If scary old castles aren't your taste, picture yourself strapped into an attack helicopter with a do-or-die mission behind enemy lines. Now you're ready for *Apache Strike*.™ This arcade-style game pits you against defending tanks and helicopters as you fly your chopper through the urban canyons of 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.



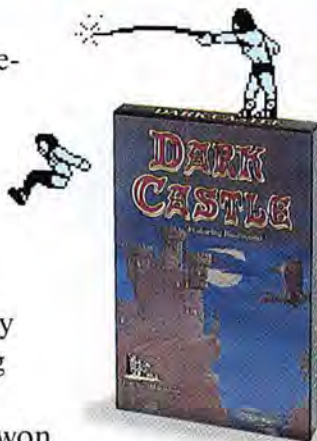
So you think the castle is safer after all? Think again. And welcome to *Beyond Dark Castle*, which picks up where *Dark Castle* left off. The Black Knight has returned, but venomous snakes, flying vultures make him even harder to reach. Scrolling scenes, more sounds and a cataclysmic finale combine 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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Letters

214/424-4888) and alter them. Three books from Adobe published by Addison-Wesley, PostScript Language Program Design (1988), PostScript Language Manual (1986), and PostScript Language Tutorial and Cookbook (1985) offer valuable hints and routines. —Ed.

No Clones

In "Where Are the Clones?" (August 1988), you wrote that "General Computer Corporation offers a 'PostScript brain transplant' that adds a clone interpreter to its QuickDraw Personal LaserPrinter and costs about \$2000."

GCC feels there are only two possible printing solutions on the Macintosh, Adobe-brand PostScript and QuickDraw-based raster image processing. GCC offers the Personal LaserPrinter and PLP Plus for \$1999 and \$2199 as QuickDraw laser printers for individual use. PostScript features are available in the Business LaserPrinter, which has many of the advanced NTX options such as expandable memory and SCSI hard disk port for font expansion. It costs \$4199. The upgrade board for the Personal LaserPrinter that you referred to in your article is actually an Adobe version 49 PostScript board shipped with the Business LaserPrinter.

Douglas B. Macrae
GCC Technologies
Waltham, Massachusetts

APDA Vitals

In the July 1988 *Macworld News*, you mention the Apple Programmer's and Developer's Association, but you don't mention how to contact it.

Scott A. Smith
Pittsburgh, Pennsylvania

APDA can be reached at 290 S.W. 43rd St., Renton, WA 98055; 206/251-6548. —Ed.

So Long, Mac Plus?

In both *Mac Bulletin* and *Verbatim* (June 1988), you mentioned that the Macintosh Plus is on its way out. Will there be a dearth of articles on the Plus and related software? Whatever the answer, please give it to me straight. I'll find out the truth sooner or later.

Jane Skorina
New York, New York

There are too many Mac Pluses out there for Macworld to abandon their owners. Please stay tuned. —Ed.

(continues)

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AT THE RISK OF SEEMING GRANDILOQUENT
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t's quite simple, really.

All we're saying is that the limited scale spell checkers that come tacked onto today's word processing packages are, in a word, underpowered.

Oh, they work okay as long as everyone's content to use more or less the same words all the time. But then, sameness is not exactly a highly regarded concept amongst Macintosh users.

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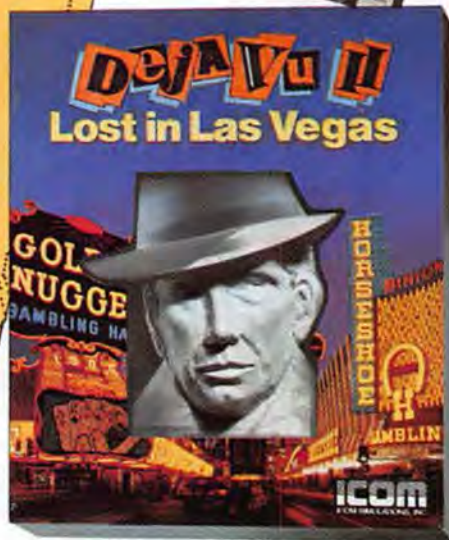
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Circle 256 on reader service card

Letters

Back Issues

I have read your most recent issues, but in this rural area, I have no means of researching the feature themes of your back issues. Please tell me how I can do this and how I can order back issues.

*Elisabeth Gould-Baessler
Brevard, North Carolina*

Each January issue of Macworld contains an index covering articles that have appeared in the magazine during the previous year. To order individual issues, write Macworld Back Issues, 144 Townsend, San Francisco, CA 94107 and include \$6 for each copy ordered.

Mac Soon

In "Desktop Video" (*Macworld News*, August 1988) you said that Aegis's video products for the Mac have helped create Coca-Cola, Timbuk 3, Tom Petty, and Todd Rundgren videos. While I don't know about the Rundgren video, the others were not done on the Mac. They were done on an Amiga.

*Steve Pietrowicz
via CompuServe*

You're right: the graphics and special effects mentioned in the item were created on Commodore Amiga versions of Aegis products, some of which will soon be released for the Mac II. —Ed.

Techno-Sharks

We have built our company around the Macintosh as the microcomputer of choice for competing within the process-engineering and composite-materials arena. Our concern is the Apple's short (90-day) warranty time. Enclosed is a price list being offered by a local Apple dealer for longer warranties on various Apple products. The prices are absurd. This kind of techno-shark tactic is the direct result of the warranty void left by Apple.

How can Apple be considered a serious contender in the field of business computers when manufacturers of IBM compatibles offer warranties up to two years long?

*Mark S. Almquist
Riverside CA*

Manhole Fan

I'm not usually in the habit of writing fan letters, but I had to tell you how much I enjoyed *The Manhole* by Prolog Software

(continues)



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1024 X 768 Resolution ■ ■



SuperMac Trinitron 19" Color Monitor
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All you need to know

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Just as you choose speakers with your ears, you choose your monitor with your eyes. You'll know your monitor when you see it.

So you'll want to look at Apple's color and monochrome monitors, which may well be all the monitor you'll ever need.

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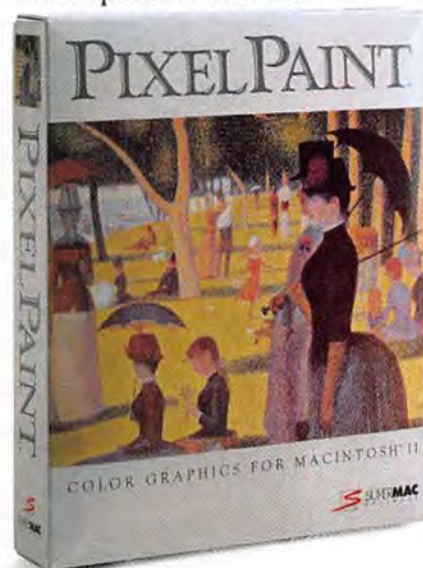
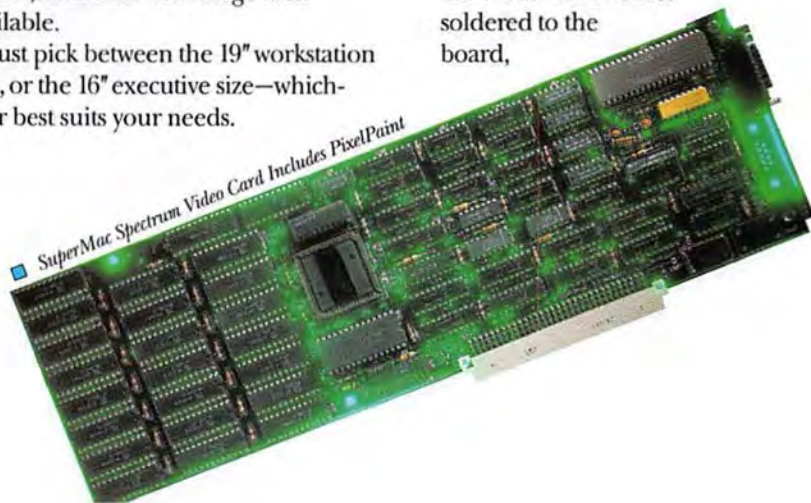
not slipped in as an upgrade.

And for a limited time, you get PixelPaint for free.

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The *SuperMac Spectrum* will drive *all* the monitors shown, at their full resolution. You get 8 bits of resolution standard, for 2, 4, 16, or 256 colors or gray scales simultaneously, chosen from a palette of over 16 million.

SuperMac Spectrum Video Card Includes PixelPaint



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SuperMac Standard 19" Color Monitor
1024 X 768 Resolution ■ ■



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about Mac II video:

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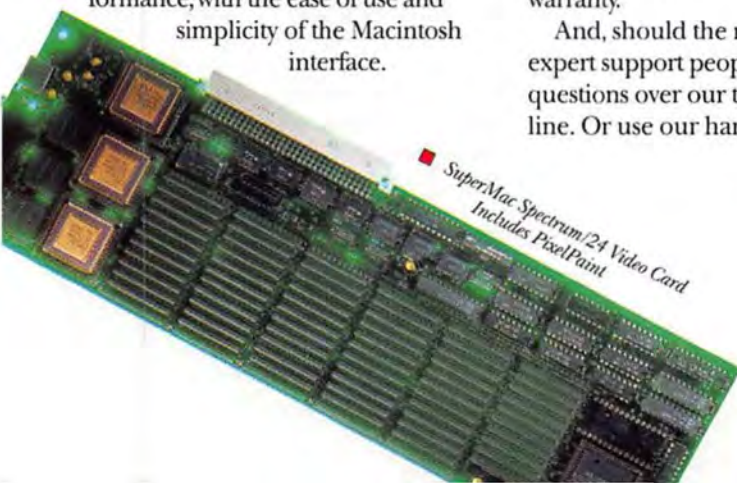


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Map: Barbara Smyth, using PixelPaint. Tennis Player: Keith Ohls, using PixelPaint. Floating Balls: Jim Batson, 24 bit ray tracing. Lamborghini: Markus Houy, using Dimensions. The Victorians: Image Studio.

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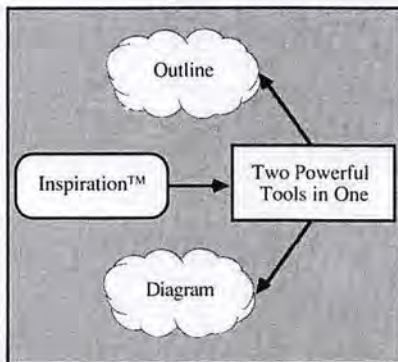
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Letters

(available from Mediagenic). I enjoy it and was delighted to see the awe and wonder in my son's eyes as he explored the many different locales. If Prolog develops any more programs for HyperCard, I'll be the first customer.

Clay Nixon
Louisville, Kentucky

The judges in our "SuperStacks" competition (November, 1988) agree. They named *The Manhole* our Wild Card winner in the commercial stacks division.
—Ed.

Bait and Switch

The much-ballyhooed price reduction of the "entry-level" Mac Plus appears to be little more than a bait-and-switch ploy. Lure them in with the \$1399 list price, then hit them with the extra \$399 or more it'll take to use the System 6.0 and HyperCard 1.2 software shipped with the Plus. [Apple increased the price of its external 800K drives to \$429 on September 12. —Ed.] You wouldn't expect to be sold a suit, and then be told that the slacks aren't included.

David Butler
via CompuServe

Macs Ahoy

My early-model Mac (purchased February 1, 1984) is a stowaway on our sailboat. Although I had a terrible time getting it back online after 11 months of stowage in very hot weather, I had the real pleasure of learning that in my 3½ years at sea, Mac has gone cosmic. Perhaps when we complete our circumnavigation, I will write a small Macintosh report. I have met other sea-going Macs en route, and I have a lot of stories to tell about transformers, dead mice, and sympathetic service personnel along the way. The Macintosh family is very special.

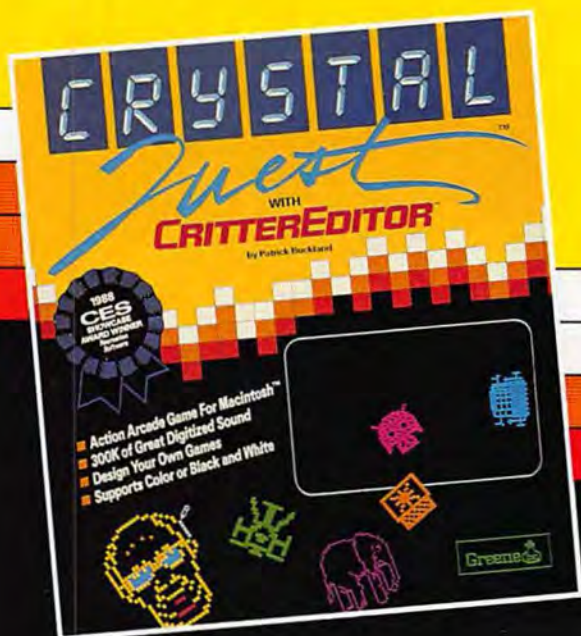
Anne Foley
Pointe-des-Galets, Réunion,
France

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—Rick Coombs, Mac II Review

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Circle 145 on reader service card



The Winds of Change

Musings on the Twenty-first Century

Sometimes I have a terrible urge to write a book about Apple in transition. Especially now, as fall becomes winter. Although in many ways things are heating up in Cupertino again. The leaves don't turn colors here, only a few even fall off the trees, but there is a definite air of change. It might begin something like this. . . .

Nearly one month after the announcement of a 68030-based Macintosh and just at the time Steve Jobs's NeXT announced its new machine, two young men met somewhere in the corridors of the product development and marketing buildings at Apple. One was from product marketing, the other from product development. Lost in thought, they were pacing in the same direction and almost bumped into one another.

"Whoa. Where're you headed?" said the less absorbed of the two.

"Any safe harbor in a storm."

"What's up?"

"Another reorg."

"Again?"

The last reorganization had taken place during the summer—when product marketing had left the sales and marketing group and shifted to the engineering/development side of the company. Business school had prepared the two men for these kinds of changes; both were MBAs. In fact there are so many MBAs at Apple these days that even the old-timers don't take note of them.

"Loren again?"

"Yep."

Allan Loren, the mercurial, driven president of Apple USA, had become the promise, and the bane, of many in the company. He was already making a bid to recapture product marketing from Jean-Louis Gassée.

"Got a minute?"

He gestured toward the Norman Bates conference room they were passing.

"Sure."

They ducked in and sprawled out, feet up on the table. They had both worked at Apple for nearly five years, and with each other on a few occasions. They were friends, but these days they never had time for more than hallway conversations. It had been a long while since either had even attended a Friday beer bust. Did those still happen?

"This is my fifth reorg."

"I stopped counting."

"Well at least we didn't have the sales meeting."

They nodded in agreement. There was no time to jet off for three days—especially to the exotic location of Orlando, Florida. At one time the Apple sales meetings were an annual rite: looked forward to, like spring break in the fall, by Apple staff around the world. Loren had cancelled the meeting for the first time in the company's history. Had the company become too large for one all-company meeting? Were they losing another tradition because of new management? Or had all the changes made the meeting premature?

"Remember that time we trashed the hotel in Hawaii? That was a sales meeting."

"Yeah. Remember when they showed the 1984 tape."

"And Campbell's speech. Just great."

"Disneyland."

"The intro of the IIGS."

"The Christmas parties."

"The bow tie Del wore to Star Trek."

They stared at each other vacantly, remembering. Reorganizations had become the only ongoing activity that the company retained from the old days. Reorgs and space shortages.

"And meetings."

"Loren is still chasing people out of his office."

"No way!"

"Hear what he did to Thompson?"

"Bad?"

"Had him in front of a group of his people and cut him to pieces. It was awful."

"I hear Thompson was pretty easygoing."

"For that you destroy someone?"

"You know the space problem doesn't seem so bad anymore, does it?"

The space situation was such that Apple managers could hire new people only if they had a place for them to sit. That is, they could hire, provided no one squawked about their lack of space.

"Well, at least the products are on track. There's not much we can do wrong there."

"Not with a \$200 million backlog."

"Battery's fixed on the portable."

"I hear Mac II Jr. is slipping a bit."

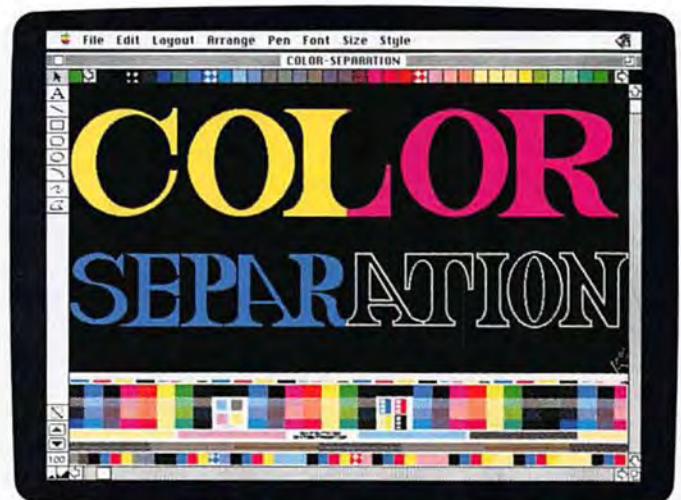
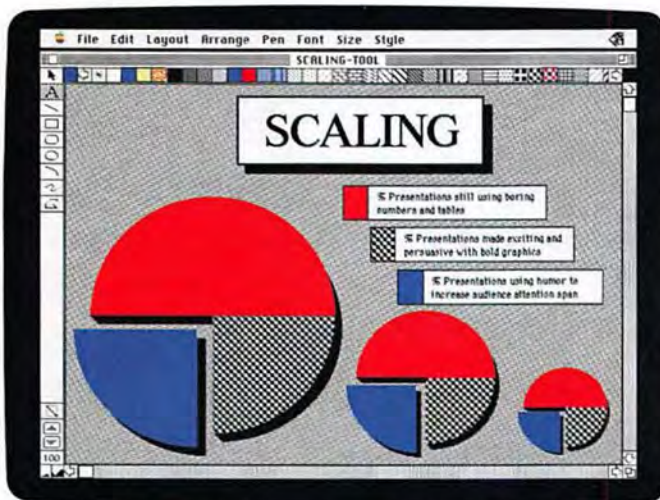
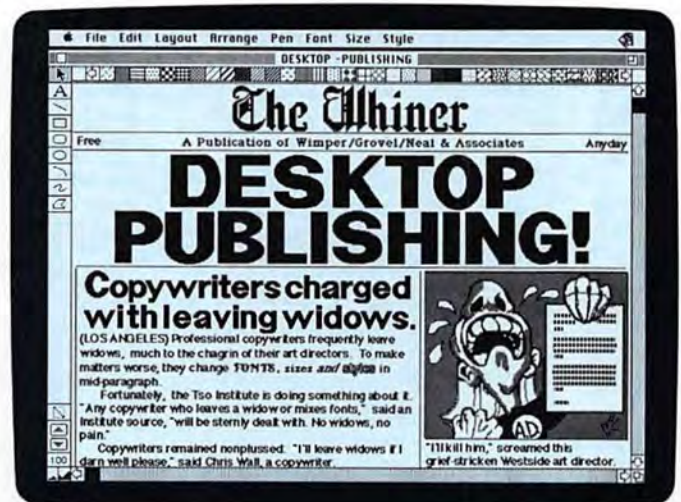
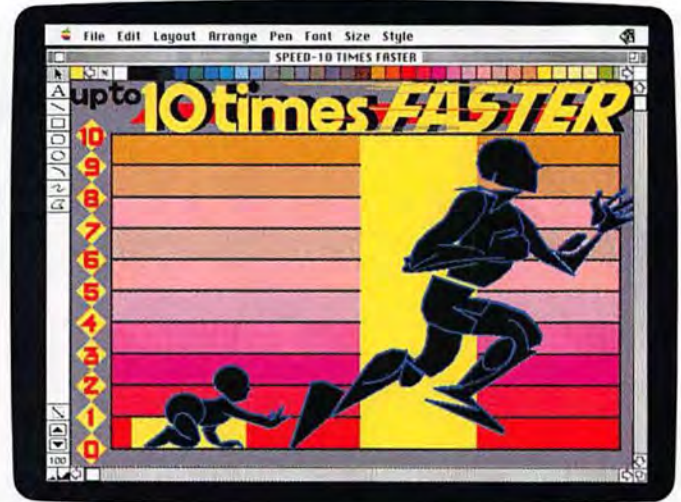
"But we'll sell everything we produce on it too."

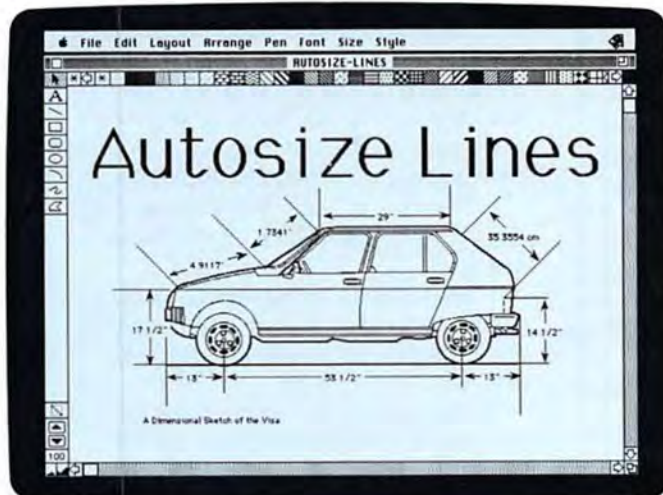
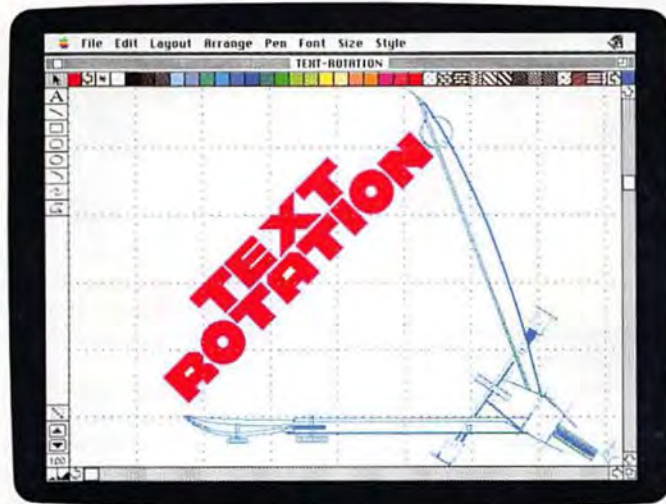
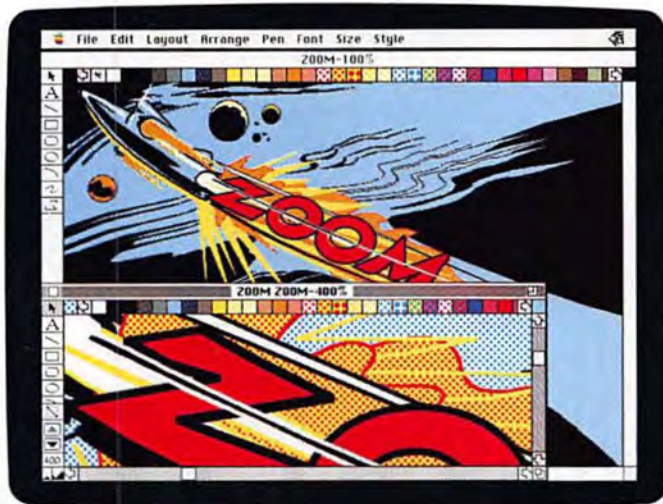
"We could always raise the prices again."

They stared at one another. The recent price hikes had been overwhelming across the board. The financial analysts loved it, the price of stock went up. The bottom line improved. The hike had knocked down demand a bit, taking the heat off production.

However, many of the old-timers, and even the MBAs, had a lingering feeling that the company was taking a little too much out of the market. Some of the MIS people in corporations where Apple had finally made inroads were badly shaken—they

(continues)





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Commentary/Jerry Borrell

had never dealt with a personal computer company that raised prices.

Still, Apple had enough products in the pipeline to ensure two solid years of growth, spectacular growth in comparison to other computer companies. But you had to wonder where the next "Macintosh" was going to come from. Applications for desktop publishing were becoming ever more profitable. The animation stuff and computer graphics were smoking the doors off all of the competition. But no one seemed to have a clear idea of what lay between the progression of machines based on 030, 040, or RISC CPUs and the Knowledge Navigator.

"Think they'll get the bugs fixed in 32-bit QuickDraw in time for the new system release?"

"Think NTSC will work first time out of the box?"

"Sure. Or at least we'll be real close."

Everyone felt good about the technology. Sun was closing in with SPARC, and with the 386i. Jobs's machine was good, really good, but no competition for Apple in the foreseeable future. It was the company itself, or how it felt, that was getting to people.

"You know, I think that all of this is about the twenty-first-century stuff."

John Sculley's role had changed from technology guru to business visionary. He had distributed copies of his speeches on "new wave" companies to senior managers. His announced agenda was to make Apple the first of the twenty-first-century companies. The two men felt that Sculley wanted more: that his ambition was for national recognition of how he had led and shaped the company. Surely that boiled down to more than creating a competitive environment like the one within Pepsi.

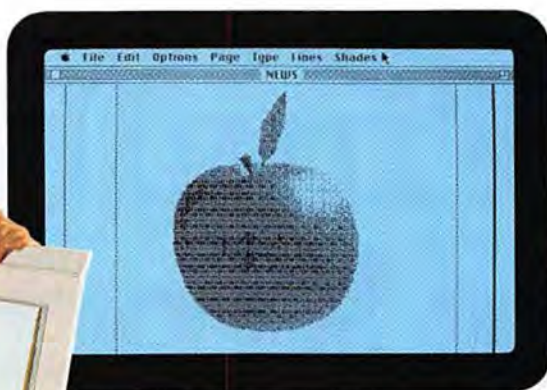
"Yep. You're right. I have the feeling that the next year will be more difficult than ever."

They stood up together and walked out to face gray industrial carpeting, fluorescent lighting, and a sea of gray blue cubicles.

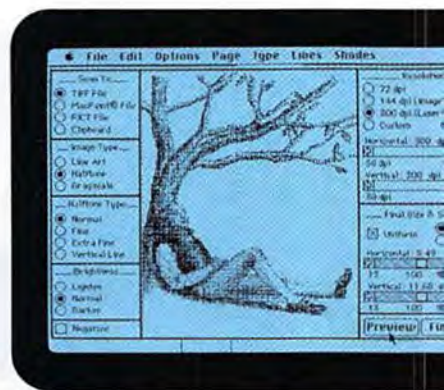
One of the video games from the old Mac building on Bandle Drive sat forlornly to one side. The games were still around but no one seemed to play them anymore. It would feel strange standing there playing a game with everyone so busy. The baby grand that Jobs kept in the lobby there had been nice. Every so often someone would sit down and play. You had to wonder if anyone would do that again either. □

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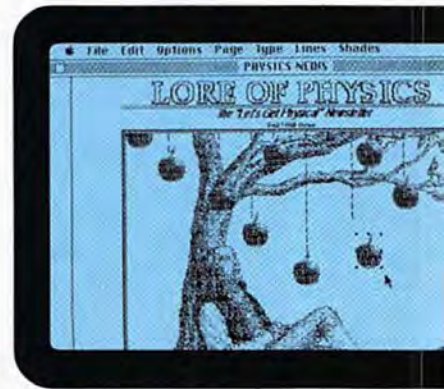
Scan. In less than 30 seconds, your image is transferred from the HP ScanJet scanner to your Macintosh screen.



Preview Scan. To add another image without leaving your application software, pull down the scanning desk accessory and begin with Preview Scan from the menu.



Edit/Paint. Bring in DeskPaint to touch up your images. Menus and point-click commands make it easy.



Place. Bring in your mast-head from memory, place the scanned images wherever you want, copy and place multiple images, key in text, wrap, enlarge or shrink to fit.

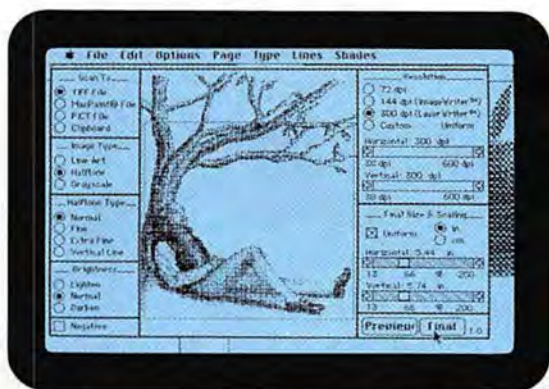
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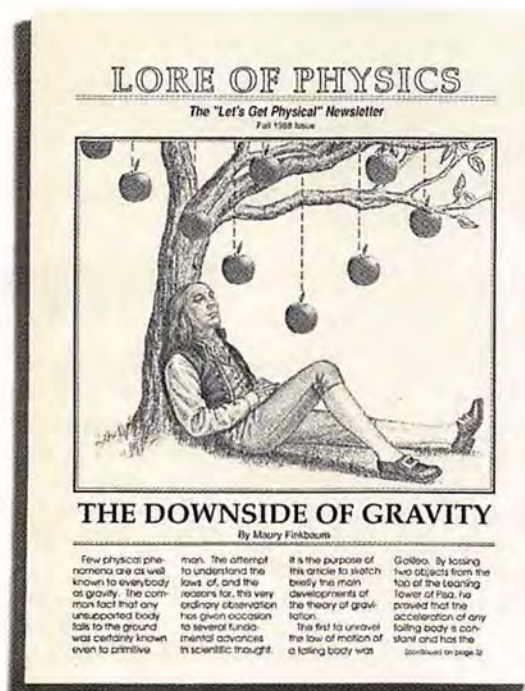
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Hewlett Packard DeskJet	300 DPI	\$995
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Who's Minding the Store?

When it comes to selling software and peripherals, Apple dealers have been upstaged by independent, Mac-only stores

One day I needed a SCSI terminator. Never mind what that is, or what it's for—I needed it. The question was, where would I find it? To those not versed in the dynamics of the Apple world, the logical place to look for a piece of equipment for the Macintosh is an official dealer and service center certified by Apple Computer. In reality, this route leads to phone calls consisting of many rings, a few busy signals, interminable periods on hold, occasionally with annoying selections from soft-rock radio stations, and ultimately a conversation with an authorized salesperson who has no idea what SCSI means, let alone the concept of SCSI terminator. (Wasn't that a film with Arnold Schwarzenegger?) Perhaps this is not so in your community, but in mine, New York, New York, this is generally the pathetic case. Fortunately I had an alternative: a store devoted exclusively to Macintosh software, hardware, and support.

I'd first read of the place late in 1986, in advertisements in the local user group's house organ. It was called Mac Emporium and though at the time the name was misleading (far from a deluxe emporium, the operation was being run out of the owner's apartment), within a few months the business found itself a location and became what I had hoped it would be—something of a Big Apple equivalent to the legendary ComputerWare.

ComputerWare, Palo Alto's main nerdo tourist attraction, is a store that services Mac owners like no other. Those who visited its original location, a 400-square-foot cubbyhole in a yuppie mall-ette, often left in wonderment. If they left at all. "They ac-



tually stock lots of Mac software," people used to whisper in awed tones, astonished that someone had the daring and vision to actually sell a reasonable selection of Macintosh products in a store! Such was the virtual impoverishment of the world of Apple retailing, where the dealer has always held the high hand.

But ComputerWare was only the first of a new wave of retailers serving Macintosh owners. Mac-only stores have emerged to fill a void in the marketplace.

There is no umbrella organization of these Mac-only stores, just informal relationships between some of them. And their association with Apple Computer is remote or nonexistent. They seem to prefer relationships with customers.

SCSI Business

Case in point is my quest for the SCSI terminator. I strolled the ten blocks to the Mac Emporium, on the second floor 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.

KANSAS CITY

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fountains
than Rome
and more
boulevards
than Paris:
Kansas City
will surprise
you with its
diversity,
hustle, and
charm

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ARCHITECTURE A visitor to Kansas City can't help but be struck by the contrast between old and new, with the building boom of the last few years inserting steel skyscrapers next to century-old storefronts. But building booms are nothing new here, and the city sports an unusual



array of fine 19th- and early-20th-century buildings. A casual walk through town reveals the architectural evidence of 130 years of vigorous growth. The highlight, especially for history buffs, is Westport, a lovingly restored trading village that was a major outfitting center for westbound travelers in the 1850s. Also of special interest is Country Club Plaza. Built in the 1920s and famous as the nation's first shopping center, it's a startling sight in the middle of a large Midwestern city: a collection of sumptuous buildings modeled after those in Seville, Spain, interspersed with modern architecture.

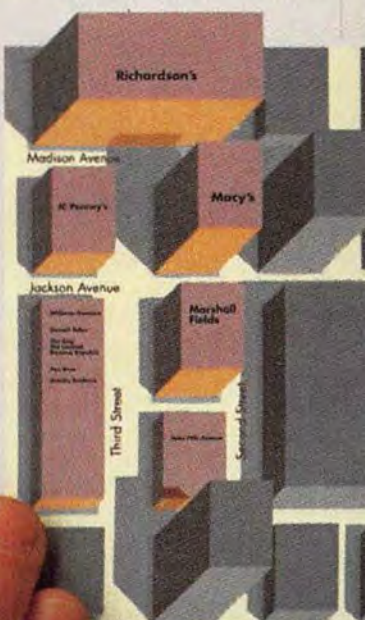


The area's best example of late-19th-century Victorian architecture is some 10 miles from downtown, but worth the trip. It's in Independence, and it's the former home of President Harry S. Truman. Now under the stewardship of the National Park Service, the house is open to the public. And while you're in Independence, stop in the Truman Library for a



look at the huge mural by Thomas Hart Benton in the lobby, entitled "Independence and the Opening of the West."

SHOPPING The star of Kansas City shopping is the Crown Center, an 85-acre "city within a city" built by Hallmark Cards. Crown Center offers 90 shops, department stores, and restaurants of every



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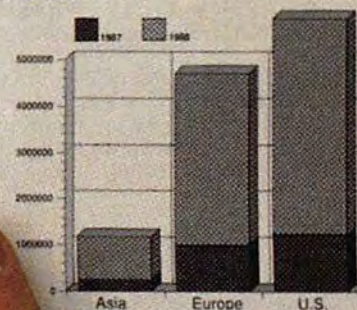
	Three Months Ending		Six Months Ending	
	MARCH 31, 1988	MARCH 31, 1987	MARCH 31, 1988	MARCH 31, 1987
SALES				
U.S.	4,657,770	1,223,138	8,766,900	2,185,070
Europe	3,726,216	978,510	7,013,520	1,748,056
Asia	931,553	244,627	1,753,380	437,014
Net Sales	9,315,539	2,446,275	17,533,800	4,370,140
OPERATING EXPENSES				
Cost of sales	2,081,761	201,003	3,823,581	363,980
Selling, general, and administrative	3,644,439	971,806	6,959,683	1,690,362
Research and development	465,495	148,153	896,671	262,891
Income from operations	3,123,844	1,125,313	5,853,865	2,052,907
Equity in loss of K.C. operations	(158,915)		(218,134)	
Interest income	73,473	53,578	108,171	62,413
Income before federal income taxes	3,038,402	1,178,891	5,743,902	2,115,320
Provision for federal income taxes	1,135,000	511,000	2,175,000	911,000
Net income	1,903,402	667,891	3,568,902	1,204,320
Net income per share of common stock	\$0.17	\$0.06	\$0.31	\$0.11

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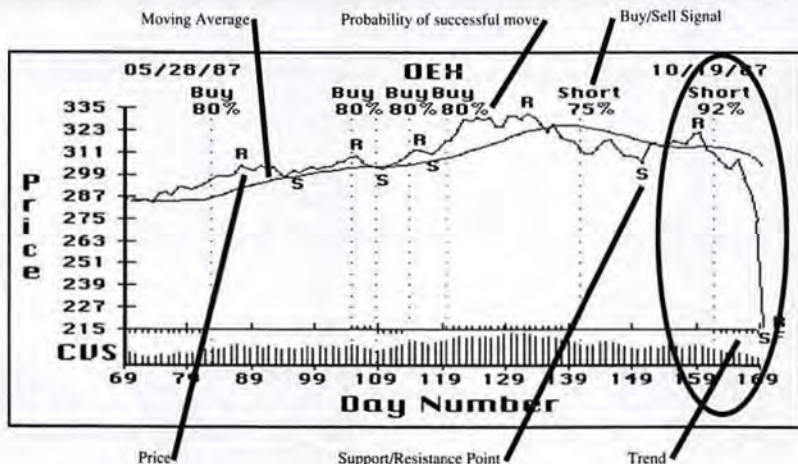
*Offer good in U.S. and Canada only. The PC demo disk requires an IBM PS/2, PC AT, or compatible with EGA or VGA card and color monitor. The Macintosh demo disk requires an Apple Macintosh 512K Enhanced Plus, SE, or II; at least 1 MB RAM; Apple System file 4.1 or higher; Finder 5.5 or higher.

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Steven Levy

a commercial building on Twenty-third Street, conveniently located within a stone's throw of my agent's office, as well as a pickle-throw away from an urban Burger King. I entered the two-room store: the larger room displayed some of the better Mac software, and the bay-windowed second room housed several Mac IIs loaded with programs available for demonstration and test-run purposes.

Unlike the interminable wait required at Apple dealerships, where a customer is often given the impression that he or she would do better to return to the street, I was able to belly up to the counter instantly. I stated my problem to a salesperson whose experience on the Mac seemed extensive. The bad news was that no SCSI terminators were in at that moment. But after some cogitation, the salesperson determined that among the store's supply of in-house equipment there was a terminator currently unused. They would lend it to me until I could purchase one.

Thus I was given a gift I never would have received had it not been for the phenomenon of the Mac-only store. The gift was not the terminator—I eventually wound up buying one, though I still have no idea why I needed it. No, what I got was more valuable, and it was something unavailable at many Apple dealers, and increasingly from Apple Computer itself.

I was treated like a human being.

The Emporium Has No Close

The experience of Larry Reich seems typical of Mac-only store owners. An even-tempered young man whose family had long been involved in the retail trade, Reich had a small advertising agency. Some of his clients were in the software industry. And, of course, Reich was a Macintosh enthusiast as well as a member of the New York Macintosh User Group. A friend who worked for a distributor suggested that Reich sell products to people at NYMUG, and thus was a business launched. He delivered his products directly to his customers and even performed some on-the-spot memory upgrades. For new business, he relied on word-of-mouth and ads in NYMUG's *Mac Street Journal*; then he took out an ad in the *New York Times*, and things took off. By spring 1987 the Mac Emporium was in its current location, and it now employs ten people. Increasingly, it finds its customers among the corporate

(continues)

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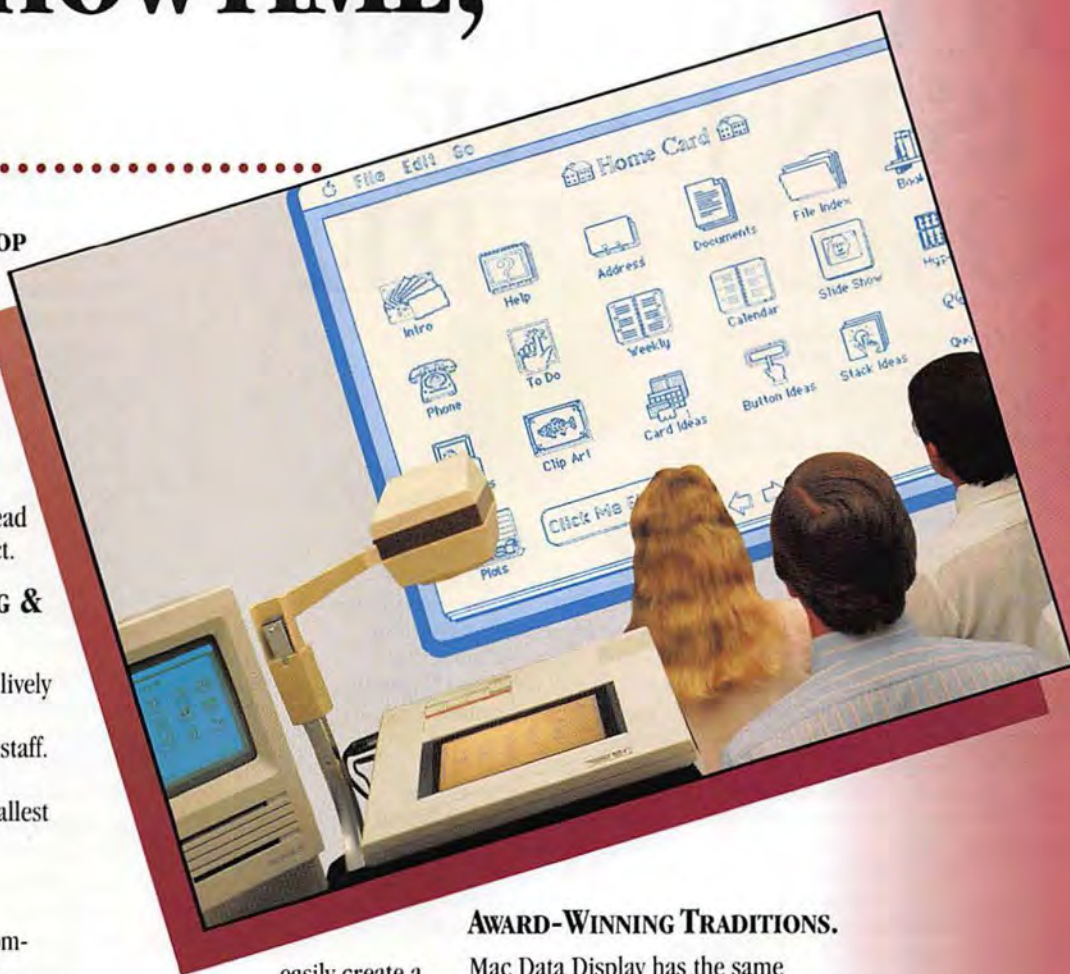
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Circle 28 on reader service card

Steven Levy

elite, including such behemoths as Citibank and Merrill Lynch. The business, Reich says cautiously, is profitable.

Still, other Mac-only stores are way ahead of him. For instance, ComputerWare, which originally germinated in the mind of a 16-year-old toiling in a software store, is now a major retailer with a thriving mail-order business, an international marketing effort, a giant presence at computer shows, and sumptuous new headquarters a few blocks from its original location. MacOrchard, one of several Mac-only stores in Berkeley, was begun by two fugitives from the marketing department of Pacific Bell. The retail store has moved from stocking more than 100 products initially to more than 1000 today. Raul DeArriz began Mac Corner in Gaithersburg, Maryland, as a self-described "Mac nut" who returned from the 1985 Macworld Expo in San Francisco to begin selling upgrades and software to members of the D.C. area's hot user group Apple Pi. Now Mac Corner occupies a substantial portion of a business park and is beginning to garner lucrative federal government contracts to supply Mac software and peripherals to Uncle Sam.

But though each Mac-only store is unique, and each operation has designed its growth paths to suit its particular area and clientele, all of them share a central premise. ComputerWare president Roger Reed puts it succinctly: "We provide service, pure and simple." Unlike many Apple dealerships, the Mac-only stores welcome Macintosh users seeking spelling checkers, hard drives, databases, and cables, and will spend time helping users make the right purchases. They actually concentrate on devising ways to lure people into their stores, and to establish a relationship with their customers. When I first began talking to the owners and managers of these establishments, I thought that a big issue would be why Apple was not offering—or begging—they to be dealerships. I was surprised that none of them seemed particularly eager to attain dealership status. Finally I realized why not. Though on occasion the Mac-only proprietors I spoke to have briefly thought of petitioning for dealership status—and found Apple a brick wall—none of them really finds it necessary. They all have thrived without being dealers—they're doing quite well, thank you. And indeed, the Mac-only stores owe their very existence to the imperious de-

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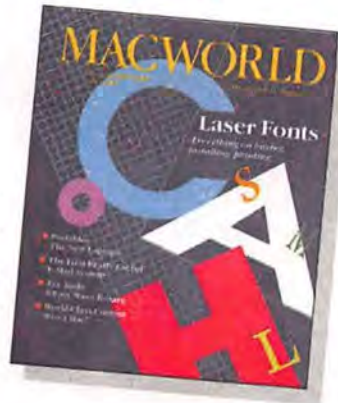
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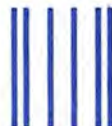
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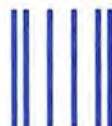
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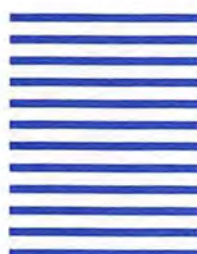
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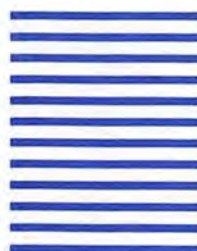
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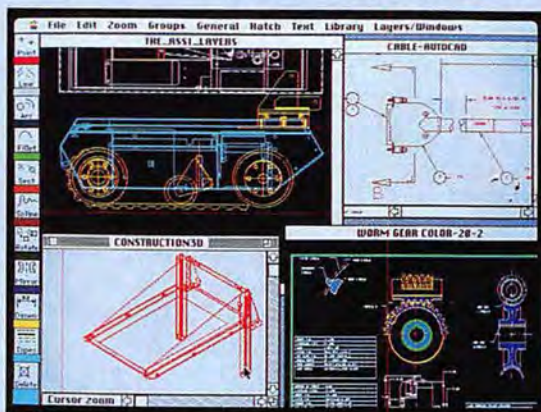
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Circle 209 on reader service card

Steven Levy

meanor and shoddy support of most places where people buy their Macintoshes.

"The dealers are cranking out the Macs," says Margret Leventhal, president and cofounder of MacOrchard. "When a customer buys an SE, it's the last time they go to the Apple dealer."

Larry Reich explains one reason this is so. "When you go to an authorized Apple dealer, they ask if you have an appointment," he says. "The very fact that we answer our phones wins us customers."

When the phones are answered at these stores, you can count on the person on the other end of the line being a Mac expert. Chances are there's someone in the store who knows how to answer your question.

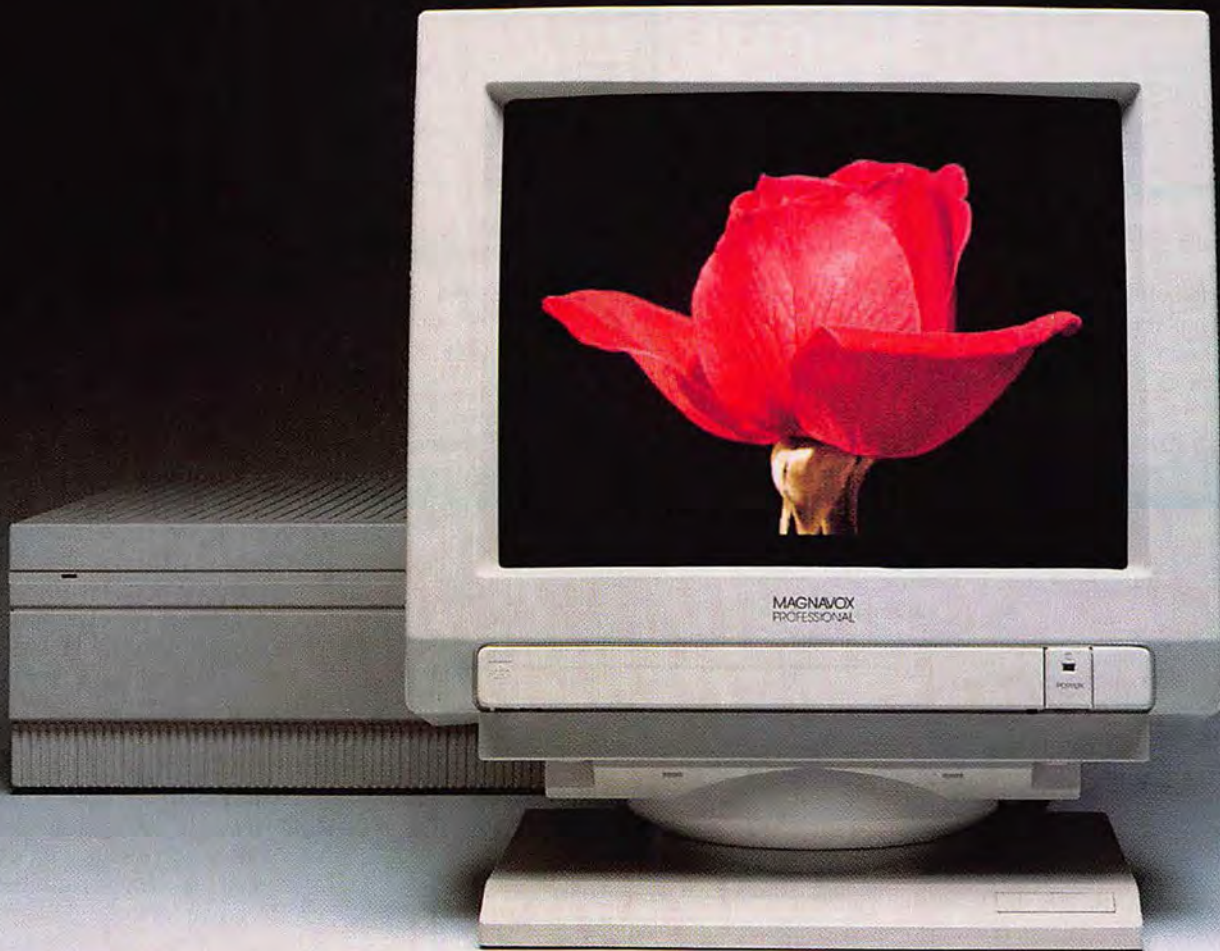
And not uncommonly, the answer will save you money. Margret Leventhal tells of her salespeople persuading would-be buyers of \$300 software packages that a \$99 product will do just as well. One customer told her that on three visits to the store, salespeople listened to her description of how she planned to use a piece of software, and concluded that she didn't need it. Some would consider this a form of retailing blasphemy. Leventhal sees it as building loyalty: "The customer will have a Macintosh for several years," she notes, figuring that someone who buys useless software is bound to feel taken—and someone who is spared that unhappy experience will trust the salesperson who recommends something really useful.

Another advantage the Mac-only stores have is a wide selection of software on hand, most of it ready to be demo'd. The stores with more street traffic—particularly those in California, where visiting the Mac-only store is the hacker equivalent of hanging out in the shopping mall—have mind-blowingly extensive software selections. Instead of making a quick decision in a dealership, or sending off to a mail-order house for an unknown quantity, buyers can get hands-on evaluation. Many Mac-only stores supplement this with regular showcases where software publishers or outside experts put the programs through their paces. And since the Mac-only stores know that their buyers are aware of the deep discounts available by mail, they cut significant dollars off list price.

(continues)

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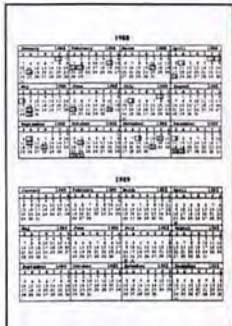
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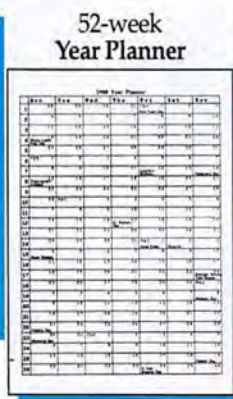
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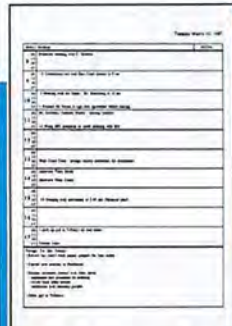
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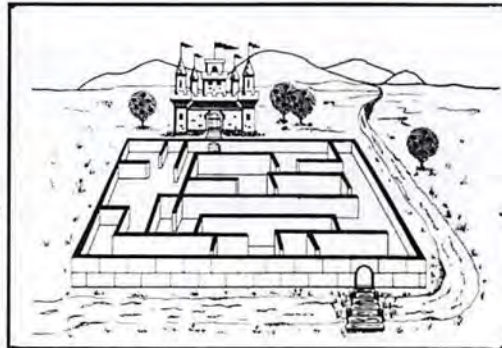
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Steven Levy

Where Was Apple?

Service, good selection, competitive pricing—really, this sort of stuff is not blindingly original. Tom Peters, the author who shouts business platitudes while working the Excellence trail, would find it elementary. The Mac-only stores have perceived a vacuum in the market and exploited it. A classic success story, right?

Well, only in part. Look at it another way, and the clear superiority of these Mac-only stores exposes a major flaw in Apple strategic thinking. And that's a threat to all Mac owners.

Think of it this way: buying a Macintosh is a first step toward the visionary computing path on which Apple wants us to embark. Just as important is a supply of the software and peripherals that make our Macs perform for us. Apple is doing a good job in getting companies to write programs and manufacture hardware to work for the Mac—it just doesn't seem to worry about how we buy them. *Some* Apple dealers conscientiously serve their customers after the machine is purchased, but most don't. Why has it taken a group of gutsy entrepreneurs, working without any official Apple support whatsoever, to finally provide Macintosh customers with an adequate pipeline to useful solutions once the computer is purchased? And now that more Mac-only stores are emerging, why hasn't Apple assigned an evangelist to help them, and encourage more of them? (At the very least, why doesn't Apple sell its parts to Mac-only stores that provide repair services?)

Perhaps Apple's new division of user support will address these questions. And maybe they will tell us why it took 11 years to set up a user-support division.

Meanwhile, let's be thankful the Mac-only stores exist. Ask your user group which one is near you. If there's not one nearby, and you're looking for a new job, maybe you should start one yourself. It doesn't seem to take much capital to get going, just a belief in the Macintosh, a knowledge of what's out there in the marketplace, and an understanding that customers well served are bound to return. It doesn't seem like much, but people will regard it as a miracle.

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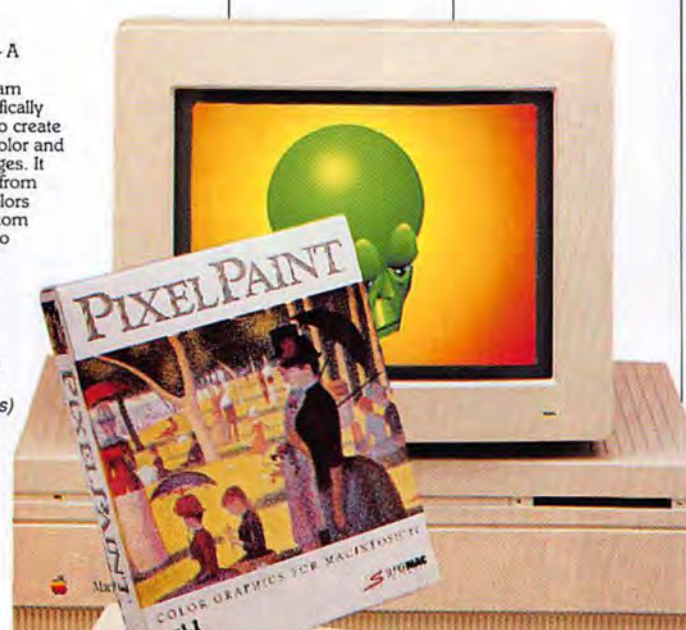
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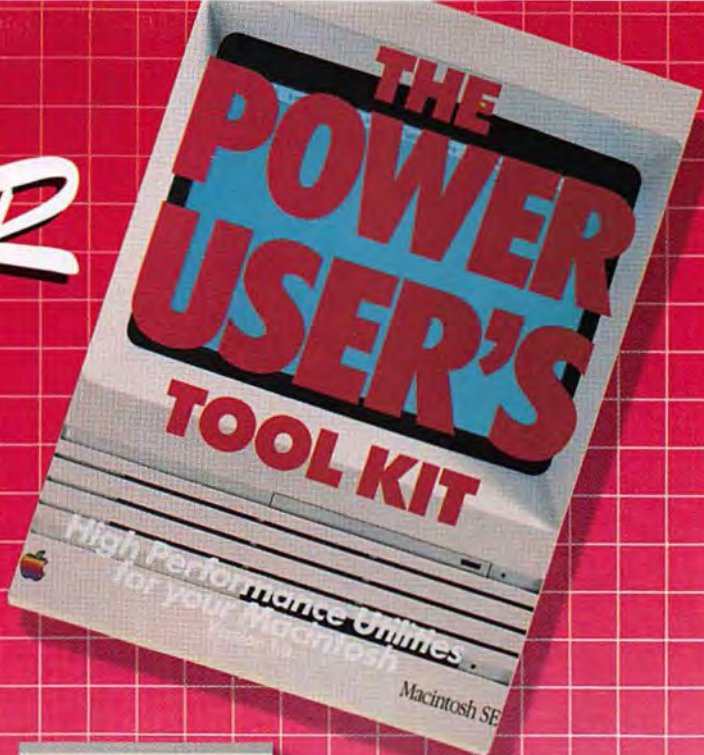
FREE CATALOG

But that's not all. You'll also receive the brand new MacWarehouse catalog. We've added hundreds of new products and updated all the information from our previous catalogs to bring you the latest answers to your questions about compatibility, copy protection, and features. The catalog will be included with your order, or you can mail us the coupon below for your free copy.

Take a look at the MacWarehouse specials and call us with your order to receive your free catalog and **THE POWER USER'S TOOL KIT.**

New 800K Drive (Cutting Edge) —

The Cutting Edge 800K disk drive's attractive styling, quiet performance, and high-tech reliability make it the most popular floppy drive on the market. The drive uses ASIC technology to reduce the number of parts, increasing reliability and reducing weight. The drive features an LED light which indicates disk access. A hinged door, covering the disk insertion slot, keeps the mechanism clean and makes periodic cleaning and maintenance unnecessary. The drive uses standard Apple formatting routines and supports the Macintosh's standard software eject features but provides its own manual eject mechanism as well. One year warranty (disk drives) **\$175.**

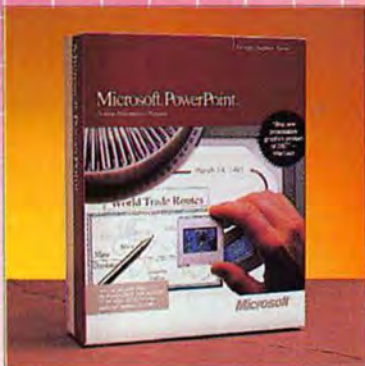


DTP Advisor (Broderbund)

— This ultimate training and scheduling tool is both a graphic arts tutor and a great project management system. Designed as a HyperCard application that shows you how to get fast professional desktop publishing results. (desktop publishing) **\$49.**

PowerPoint 2.0 (Microsoft) —

Presentation graphics for power users. PowerPoint generates a wide variety of graphics, keeps them organized, and provides a consistent style for each presentation. You can create 35mm slides, overhead transparencies, flipcharts, audience handouts, and even your own notes. PowerPoint gets your point across with style and polish. (business) **\$249.**



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ThunderScan 4.0

Converts your ImageWriter into a scanner with special effects such as rotation, linescreens, captions, and frames of various sizes. It is packaged complete for Mac 512K, 512KE, Plus, and SE. (input/output) \$199.

Acknowledge

Bring power, automation, and speed to telecommunications with the Macintosh communications solution from SuperMac. Puts a Macintosh interface on all communications, including remote services and mainframes. (communications) \$349.

Illustrator 88

A professional-level graphics program that contains unique and powerful drawing techniques — autotrace, air-brushing, shading, masking, blending, color separations, and printing. (desktop publishing) \$319.

Management Graphics

Easy Slider 1.0	105.
MicroIllusions	179.
Photon Paint	179.
MicroMaps	
MacAtlas Pro (MacDraw format)	129.
Olduvai	
Post-Art II	Call.
Silicon Beach	
Digital Darkroom or Super 3D	ea 159.
SuperPaint 1.1	79.
Solutions	
Curator (graphics management)	79.
SuperMac	
PixelPaint	209.
Symmetry	
PictureBase 1.2	58.
T/Maker	
ClickArt Business or Publications	28.
ClickArt EPS Illustrations	75.
Zedcor	
DeskPaint 2.0	69.

DESKTOP PUBLISHING PRODUCTS

Adobe	
Illustrator 88	319.



Aztec C (Manx Software)

Includes Aztec Shell, Compiler, 68000 Macro Assembler, Overlay Linker, Librarian, Run Time Libraries, Profiler, Full Macintosh Toolbox Interface, and Portable C Library Interface. (language) \$75.

Aldus	
PageMaker 3.0	399.
Broderbund	
DTP Advisor	49.
Letraset	
Image Studio or Ready, Set, Go! 4 ..	279.
ReadySetShow	189.
Olduvai	
Read-It! 2.0 (OCR)	199.
Springboard	
Springboard Publisher	114.
Target	
Scoop	SPECIAL 189.

NETWORKING PRODUCTS

Connect Inc.	
MacNet	43.
Farallon	
PhoneNET	Call.
Timbuktu 2.0.1	81.
Nuvotech	
TurboNET	ea 27.
SuperMac	
Network DiskFit	199.
TOPS	
TOPS 2.0	159.

Fonts

Adobe	
Fonts (various volumes)	Call.
Altsys	
Fontastic Plus 2.0	54.
Olduvai	
Art-Fonts	59.
Postcraft	
Laser FX	115.

CAD/CAM

Graphsoft	
MiniCad 4.0	375.

HyperTools #1 & #2 (Softworks)

Give stacks the one-two punch... HyperTools #1 is for creating stacks, creating scripts automatically and extending the capabilities of HyperCard. HyperTools #2 adds versatility to personal and commercial stackware for data entry, visual presentation of data, and field formatting. Each includes 16 tools and the latest version of HyperCard. (hyperware) \$65. each



Includes Aztec Shell, Compiler, 68000 Macro Assembler, Overlay Linker, Librarian, Run Time Libraries, Profiler, Full Macintosh Toolbox Interface, and Portable C Library Interface. (language) \$75.

Monogram

Business Sense	279.
Dollars & Sense	81.
ShopKeeper Software	
Bill-It 1.06	99.
Softview	
MacInTax	Call.
TaxView Planner	49.
Survivor	
MacMoney 3.02	62.

STATISTICAL ANALYSIS

Abacus Concepts	
StatView II (req. Mac II, or Plus/SE w/68881 co-processor)	369.
StatView SE+Graphics	230.
BrainPower	
StatView 512+ (requires 512k)	175.
D2 Software	
MacSpin 2.0	155.
Odesta	
Data Desk Professional	295.
Select Micro Systems, Inc.	
Exstatix	219.

MUSIC AND SOUND

Code	
MacDrums	35.
Electronic Arts	
Deluxe Music Construction 2.0	61.
Farallon Computing	
MacRecorder (records sound)	145.
Great Wave	
ConcertWare + MIDI 4.0	79.
Impulse	
Impulse Audio Digitizer w/SoundWave	149.



Wedge XL 45 Plus

Cutting Edge's 45MB compact wedge-shaped hard disk drive. Plugs directly into your Mac's SCSI port and is pre-formatted for immediate use. Extra quiet fan with excellent cooling capabilities. (disk drives) \$829.

Innovative Data

MacDraft 1.2a (power drafting)	155.
Dreams	318.
Micro CAD/CAM	
MGMStation (professional CAD)	Call.

FINANCIAL AND ACCOUNTING SOFTWARE

Aatrix	
Payroll 3.01	99.
Bedford	
Simply Accounting	219.
Chang	
Rags to Riches 3 Pak	289.
Intuit	
Quicken	35.
MECA	
Managing Your Money	129.

Icon-It! (Olduvai)

Think of Icon-It! as "HyperCard-like" buttons for any application that lets you customize your work environment. Select menu items, DAs, fonts, FKEYs, and even macros from one of Icon-It!'s custom-designed icons. Over 65 predesigned icon bars are included, or you can create your own with the built-in editor. (utilities) \$40.



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DATABASE SOFTWARE

Acius	
4th Dimension	489.
Ashton-Tate	
dBase Mac	295.
Borland	
Reflex Plus	165.
Clarix	
FileMaker II	239.
Fox Software	
FoxBASE+Mac	209.
Odesta	
Double Helix II	339.
GeoQuery	299.
Park Row Incorporated	
Publish or Perish	21.
Personal Bibliographic	
Pro-Cite	199.
Software Discoveries	
Record Holder Plus	45.

BUSINESS SOFTWARE

Ashton-Tate	
Full Impact	249.
Bravo	
MacCalc	79.
BreakThrough Productions	
Market Master	185.
Clarix	
MacProject II	395.



QuickMail™ (CE Software, Inc.) — This is revolutionary. Not only better on Local Area Networks, but accesses Wide Area services (CompuServe, MCI Mail, INET, GENie, etc.), other operating systems (AUX, etc.) and from remote locations. (communications) \$175.

Cognition Technology

MacSMARTS 3.02	135.
Cricket	
Cricket Graph (advanced graphing)	119.
Cricket Presents	289.
MicroPlanning International	
MicroPlanner Plus	445.
Microsoft	
Excel 1.5	249.
PowerPoint 2.0	Call.
Works 1.1 (integrated software)	189.
nView Corporation	
MacViewFrame	1299.
North Edge Software	
Timeslips III (time/expense tracking)	119.
Satori	
Bulk Mailer 3.2	79.
Select Micro Systems	
FlowMaster	369.
Shana Enterprises	
FastForms! Construction Kit	89.
Softview	
FormSet	59.
MacInUse	42.
Symantec	
More II	Call.



HyperAnimator (Bright Star) — Add life to your HyperCard stacks using animated images synchronized with sound. A breakthrough in animation technology — HyperAnimator lets you create life-like talking images on screen. Combine the spirit of animation with the power of the Mac... for fun, entertainment, education, and desktop presentations. (hyperware) \$85.

WORD PROCESSORS AND OUTLINERS

Ashton-Tate	
FullWrite Professional	269.
Clarix	
MacWrite 5.0	105.
Microsoft	
Word 4 (updated word processor)	249.
Write 1.0 (new word processor)	113.
Niles & Associates	
End Note	85.
Paragon	
Qued/M	109.
Symmetry	
Acta Advantage w/DA	65.
T/Maker	
WriteNow 2.0 (word processor)	109.
WordPerfect Corp.	
WordPerfect	185.

SPELLING CHECKERS

Aegis	
Doug Clapp's Word Tools	42.
A.L.P.	
MacProof 3.0	115.
Deneba Software	
Spelling Coach 3.0	54.
Spelling Coach Pro	109.
Electronic Arts	
Thunder (spelling checker)	30.
Microlytics	
Word Finder (synonym finder)	35.
Sensible Software	
Sensible Grammar	55.

Working Software
Spellswell 2.0 (spelling checker) 45.

GRAPHICS

3G Graphics	
Images w/Impact	
Graphics & Symbols 1	59.
New Business Clip Art	65.
Aba Software	
Draw It Again Sam 2.0	79.
GraphistPaint (B&W)	Call.
GraphistPaint II	375.
Aldus	
Freehand	349.
Broderbund	
Drawing Table	79.
PosterMaker Plus	38.
Print Shop (cards and more)	36.
VideoWorks II	175.
CE Software	
CalendarMaker	28.
Clarix	
MacDraw II 2.0	329.
MacPaint 2.0	105.
Cricket	
Cricket Draw	169.
Cricket Paint	99.
Pict-O-Graph (color on the Mac II)	105.
Deneba	
Canvas 2.0	169.
Dream Maker	
Cliptures, Vol. 1 Business Images	97.
MacGallery	29.
Dubi-Click	
Wet Paint - Both Volumes	45.
Electronic Arts	
Studio/8	319.

WriteNow 2.0

This fast, powerful, easy to learn word processor includes 100,000 word spelling dictionary, mail merge, 4 editable columns on a page, and instant repagination. (word processor) \$109.

SuperPaint 1.1

This high-powered paint program features three levels of magnification, lets you edit images at 300 dots per inch for incredible detail, and gives the ability to draw shapes larger than your screen. (graphics) \$79.

Suitcase

Font and desk accessory



Suitcase 2.0

Packed with power, control, and flexibility — this font and desk accessory removes limitations on the number of fonts or DA's you can have. (utilities) \$44.

Symantec Utilities for Macintosh

A set of six utility programs... from crashed disk and deleted file recovery to hard disk partitioning and optimization. Easy to use with powerful protection for your valuable data. (utilities) \$59.

Red Ryder 10.3

One of the most powerful and flexible telecommunications programs available for the Mac. Supports full text selection and Clipboard and works with nearly every file transfer mode known. (communications) \$55.

MacMoney 3.02

This versatile, powerful and intuitive accounting package from Survivor Software is a full double-entry personal bookkeeping system and financial planning tool. Integrates with MacInTax. (finance) \$62.

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Opcode Systems
Music Mouse 39.
Passport Designs
Master Tracks Pro 259.
NoteWriter 169.

EDUCATIONAL/ PERSONAL

Bright Star Technology
Alphabet Blocks 32.
Talking Tiles 75.
Broderbund
Calculus 60.
Davidson
Math Blaster 27.
Speed Reader II 39.
Great Wave
Kids Time 26.
Learning Company
Reader Rabbit 33.
Mindscape
Perfect Score S.A.T. 46.
Palantir
MacType 31.

QuickKeys™ (CE Software, Inc.) — In seconds, you can designate keystrokes to save hours doing routine tasks. MacUser's "Eddy" award—Five Mouse Rating—New York Mac Users Group "Product of the Year"—MacGuide "Golden Gavel" award. "QuickKeys is right up there with sliced bread, the Great Pyramids of Cheops, and other wonders"—Byte Magazine. (utilities) \$54.



Simon & Schuster
Typing Tutor IV 35.

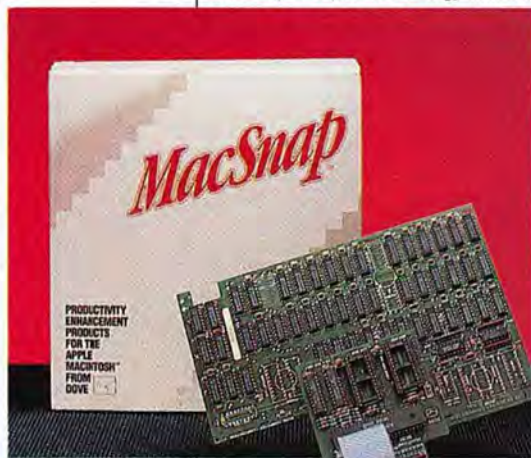
GAMES

Activision
Shanghai (strategy) 24.
Artworx
BRIDGE 5.0 22.
GrailQuest xx
Broderbund
Ancient Art of War At Sea 27.
Shufflepuck Cafe 22.

On Cue (Icom Simulations) — An easy-to-use utility that lets you move from one program to another — instantly! Now with a single click of the mouse, you can go from application to application, from document to document. Lets you work smoothly, quickly, and efficiently. (utilities) \$36.

Where in the World is Carmen San Diego 25.

MacSnap 548S (Dove) — This quality upgrade expands a 512K Mac (if it has the new 128K ROMs) to two megabytes. Includes SCSI interface and external SCSI plug. Easy installation. (disk drives) \$599.



Bullseye
Ferrari Grand Prix (racing) 32.
P51 Mustang 32.
Centron Software, Inc.
BlackJack Ace 27.
Crapsmaster or Roulette 27.
Ciasa
Handwriting Analyst 29.
Electronic Arts
Chessmaster 2000 (deluxe chess) ... 29.
Patton vs. Rommel (strategy) 15.
Scrabble 27.
Starfleet I: The War Begins 37.
Chuck Yeager Adv. Flight Trainer 32.
Epyx
Sub Battle Simulator 24.
Greene
Crystal Quest II 27.
Infocom
Leather Goddess of Phobos 24.
Micro Sports
MSFL Pro League Football 32.
Mindscape
Balance of Power, Deja Vu - ea 30.
Shadowgate, Uninvited - ea 30.
PBI
Strategic Conquest Plus 46.
PCAI
Road Racer Call.
Practical Computer
MacCourses 32.
MacGolf 2.0, MacRacquetball - ... ea 35.
Primera
Smash Hit Racquetball II 22.
Sierra On-Line
Leisure Suit Larry 23.
Silicon Beach
Apache Strike, Dark Castle - ea 27.
Beyond Dark Castle 27.
Simon & Schuster
Star Trek: Kobayashi Alternative 24.
Spectrum HoloByte
Falcon, Gato - ea 26.
PT109 26.

Solitaire Royale 20.
Tetris 23.

DISK DRIVES/ MEMORY UPGRADES

1 MEG SIMMS Call.
AST
Mac286 Co-Processor (Mac II) 1079.
CMS
CMS TapeStack 60 Meg Call.
MacStack 20 Meg 569.
MacStack 40 Meg 789.
MacStack 60 Meg 849.
Cutting Edge
800K Disk Drive "NEW" 175.
Wedge XL 30 Plus 629.
Wedge XL 45 Plus 829.
XL 30 Internal 505.
XL 45 Internal 645.
Dayna Communications
DaynaFile single 360K (5 1/4") 529.
Dove
MacSnap 2SE 455.
MacSnap SCSI Interface Port 129.
MacSnap 524 (512k to 1 meg) 299.

Works 1.1

Offers a solid, easy-to-use selection of standard "flat file" manager functions while integrating the most-needed office applications: spreadsheet, database, word processor, and terminal software. (business) \$189.



Microsoft Excel 1.5

Customize your needs with this powerful and popular spreadsheet, business graphics, and database program. Includes 44 additional new worksheet functions. (business) \$249.

TOPS 2.0

This versatile server software networks computers with different operating systems, and you can access it any time, from any application. Supports Macs, MS-DOS compatibles, and UNIX. (networking) \$159.

EMAC 20D

From Everex — this fast, reliable, and portable 20 MB hard disk drive comes complete with SCSI interface, cables, terminator, and full one year manufacturer's warranty. (disk drives) \$520.

MacSnap 524S 379.
MacSnap 548 (512k to 2 meg) 559.
MacSnap 548S 599.
MacSnap Plus 2 439.
MacSnap 1024 Call.
Memory Expansion Board Call.
MaraThon 020 Accelerator 585.
Everex
EMAC 20D (hard drive) 520.
EMAC 20D Deluxe (0 footprint) 585.
EMAC 40D Deluxe (0 footprint) 995.
EMAC 60T (tape backup) 895.
EMAC FS-102 2495.
Impact 40 MB Hard Drive Call.
Impact 66 MB Hard Drive 999.
PCPC
MacBottom HD21 (SCSI) Call for
MacBottom HD32 (SCSI) special
MacBottom HD45 (SCSI) 859.
MacBottom HD21 w/Modem 779.

BlackJack Ace (Centron)

Become a Master of BlackJack! Teaches card counting and the basic/advanced strategies needed to give you the skill and knowledge to practically eliminate the house advantage. (entertainment) \$27.



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MSFL: Pro League Football

Professional football league simulation puts you in the middle of the "real" action... including all aspects from weather conditions to the coin toss. Features 42 past Super Bowl teams and Stats Keeper 1.0. (entertainment) \$32.

Word 4.0

Microsoft's latest version of the best-selling document processing program. Complete WYSIWYG editing; powerful customizing features; enhanced tables support; automatic repagination; and two-way file compatibility. (word processors) \$249.



NEW Turbo Mouse

Retire your mouse and replace it with the new Turbo Mouse from Kensington. With the mouse ball on top, it's quicker, quieter, and easier to use. Advanced button features include a Click Lock. (input/output) \$109.

Dark Castle

Outstanding action game integrates RealSound with superb animation and spectacular graphics. Four levels of play that are challenging, and addictive. (entertainment) \$27.

FoxBASE+Mac This Macintosh database system lets you create custom icons, user-defined buttons, and multiple windows. Contains proper Mac interface - compatible with Ashton-Tate's dBASE Mac. (database) \$209.

MacBottom HD32 w/Modem	829.
MacBottom HD45 w/Modem	1029.
WSI (With SCSI Interface)	269.
Peripheral Land, Inc.	
Infinity Turbo 40 Meg	1299.
PL 30 Meg Turbo Drive	819.
PL 50 Meg Turbo Drive	919.



Fanny Mac QT (Mobius Products) — Safe, effective cooling for your Mac with low-profile, ultra-quiet fan. Reduces internal operating temperatures. Includes built-in surge protector. (accessories) \$65.

MODEMS

Abaton	
InterFax 12/48	Call.
Best Data Products	
SmartOne 2400/1200	169.
Everex	
EMAC 2400	225.
Hayes	
Smartmodem 1200	299.
Smartmodem 2400	449.
Smartmodem 9600 (V series)	985.
Migent	
Pocket Modem (ext. 300/1200 baud)	115.
Prometheus	
Promodem 2400	309.
Shiva	
NetModem 1200	359.
Supra	
Supra Modem 2400	149.
US Robotics	
Courier 1200 Modem	199.
Courier 2400 Modem	349.

BLANK MEDIA

B.A.S.F.	
DS/DD (box of 10)	16.
Goldstar	
DS/DD (box of 10)	15.
Sony	
DS/DD (box of 10)	18.
SS/DD (box of 10)	13.

INPUT/OUTPUT

Abaton	
ProPoint	89.
Asher Engineering	
Turbo Trackball (512/Plus or SE/II)	69.
Cutting Edge	
CE-105 ADB Keyboard	125.
DataDesk	
Mac 101 Keyboard	139.
Kensington	
New Turbo Mouse	109.
Koala	
MacVision (digitizer)	Call.
Mouse Systems	
A+ Mouse (512, Plus)	65.
A+ Mouse ADB (SE, II)	85.
New Image	
MacScan (feed-thru)	1189.
MacScan (flatbed)	1749.
Seikosha America	
Seikosha Printer (dot-matrix)	238.
Summagraphics	
Bit Pad Plus	335.

ArchiText™ (Brainpower) — An exceptionally versatile text retrieval, management, and presentation package that combines Boolean searching and Hypertext abilities. Incorporates a separate read-only application for free viewer distribution. (hyperware) \$182.

ThunderWare

ThunderScan 4.0 (incl. Powerport) . 199.

ACCESSORIES

Computer Friends, Inc.

MacInker/Black Ink	3.
MacInker (IW & IW II)	41.
Ergotron	
MacTilt or MacTilt SE	68.



New Business Clip

Art (3G Graphics) — Create professional publications and presentations with over 150 sharp, contemporary PostScript images. Contains computers, occupational and public symbols, icons, people, hands, communication, aerospace, money, business phrases, transportation, and more! (graphics) \$65.

Mouse Cleaner 360	15.
The Muzzle (for the SE)	62.
I/O Designs	
ImageWare II Carrying Case	49.
ImageWriter LQ Ribbon	Call.
IW II Ribbons-Black or Color	5.
MacinWare Plus Carrying Case	69.
MacinWare SE Carrying Case	79.
Ribbon for Seikosha - Black	6.
Kalmar	
Rolltop Cabinets (45, 90, or 135 disks)	Call.
Kensington	
Anti-Glare Filter	33.
Apple Security Kit	34.
Disk Drive Cleaning Kit	20.
Mac II Monitor Cable Extension Kit	37.
Mac II Stand	20.
MasterPiece Mac II	105.
Modem/FAX Protector 20	25.
PowerTree SurgeProtectors	Call.
Printer Stand	16.
System Saver	64.
Super Base	34.
Mobius Products	
Fanny Mac QT	65.
Omnium Corporation	
Mac Desktop Workstation	75.
Orange Micro	
Grappler L/Q	92.
Polaroid	
Circular Polarizing Filter	35.
Targus, Ltd.	
Deluxe Plus/SE-XKB Case (black)	69.
ImageWriter II Case (black)	49.
Mac Plus/SE Case (black)	59.

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Swivel 3D goes where no program has gone before.



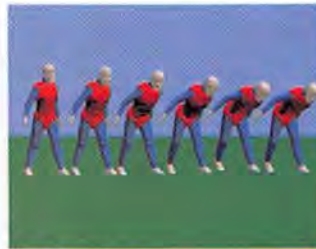
Product Design

Use Swivel 3D to conceptualize and visualize complex products with moving parts.



Presentation Graphics

Add a new dimension to your business presentations quickly and easily.



Animation

Create animation sequences using Swivel 3D's Tweening command.



Computer Illustration

Let your creativity run wild by drawing unique 3D illustrations.

Introducing Swivel 3D. The program with the speed and power to create masterpieces in color 3D.

Swivel 3D is the fastest color, three-dimensional drawing/modeling program for the Macintosh®. It is also the first program to feature *Linking*. Linking allows you to quickly build models with parts that swivel. Your models can have switches, knobs, hinges, wheels or even more complex joints for building arms and legs that move naturally.

The best tool for unlocking your imagination.

Swivel 3D is an essential graphics tool for preparing business and slide presentations, graphics, illustrations, product designs and animation. Using the scrapbook, you can easily move images to programs such as Adobe Illustrator™, ImageStudio™, PowerPoint™, Cricket Presents, MacDraw™, SuperPaint™, PixelPaint™ and many others. Images can be saved in two formats: PICT, or Draw type images; and bit-map, or Paint type images.



The beginning of 3D animation right at your fingertips.

Swivel 3D also provides an incremental animation command (*Tweening*) which can save an animation sequence of Paint files. Animation can be easily created using HyperCard stacks or with animation packages like VideoWorks.

Start creating today.

Because Swivel 3D uses standard Macintosh commands and contains a library of pre-drawn images, you can begin creating in 3D right away.

For more information see your local computer dealer or call Paracomp at 415-543-3848 and see just how far you can go with 3D. Suggested retail price is \$395.00.

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Insights on PageMaker 3.0

Tips from the pros for the Mac's most popular desktop publishing package

by Keith Baumann

PageMaker 3.0's combination of new features, new dialog boxes, hierarchical menus, and color are enough to send even the most experienced PageMaker users running for the reference manual. This collection of tips and techniques suggested by professional PageMaker users won't replace your documentation, but it may guide you through the maze of new features and hasten your proficiency with the program.

The upgrade to PageMaker 3.0, the most significant one since the program was first introduced in 1985, includes features like automatic text flow, irregular text wrap, and support for spot color that users have been clamoring for. But there's a hitch—if you've been getting by without a hard disk you'll need to upgrade your Mac system before you can take advantage of the new PageMaker.

Special thanks to Susan Barton of Personal Training Systems, publisher of Page-Tutor training audiocassettes, and to power users Bruce Charonnat and Evelyn Spire for contributing tips they've learned the hard way.

Sweeping Up Screen Dirt

If you edit text heavily after placing it in PageMaker, you may notice fragments of type or other strange symbols scattered on the page. To eliminate this screen dirt, force a screen redraw by changing the page view or reselecting the same view from the Page menu (or by using the keyboard equivalent).

Graphic designer Keith Baumann exchanged his X-acto knife and triangle for a Macintosh three years ago. Formerly with Macintosh Today, he now works as technical designer at Publish!



Avoiding Hit and Runs

Under MultiFinder, PageMaker may quit unexpectedly due to a shortage of memory. That means you lose any work you haven't saved. To avoid this trouble, highlight the PageMaker icon on the desktop before you begin work and select Get Info from the File menu (or press **⌘-I**). In the Get Info dialog box, increase the application's suggested memory allotment. An extra 75K should decrease the likelihood of your hitting the memory limit, but if you have plenty of room in memory, give PageMaker a bigger margin for error. Some tasks, such as placing a large encapsulated PostScript file or other very large files, may

require more than the extra 75K. In any case, save often in case PageMaker does quit unexpectedly.

Basic Navigation

As an alternative to moving around in a window by using the scroll bars, you can press the Option key and drag the grabber hand to reach a location on the page. If you hold down the Shift key too, you can limit the grabber's motion to vertical and horizontal only.

(continues)

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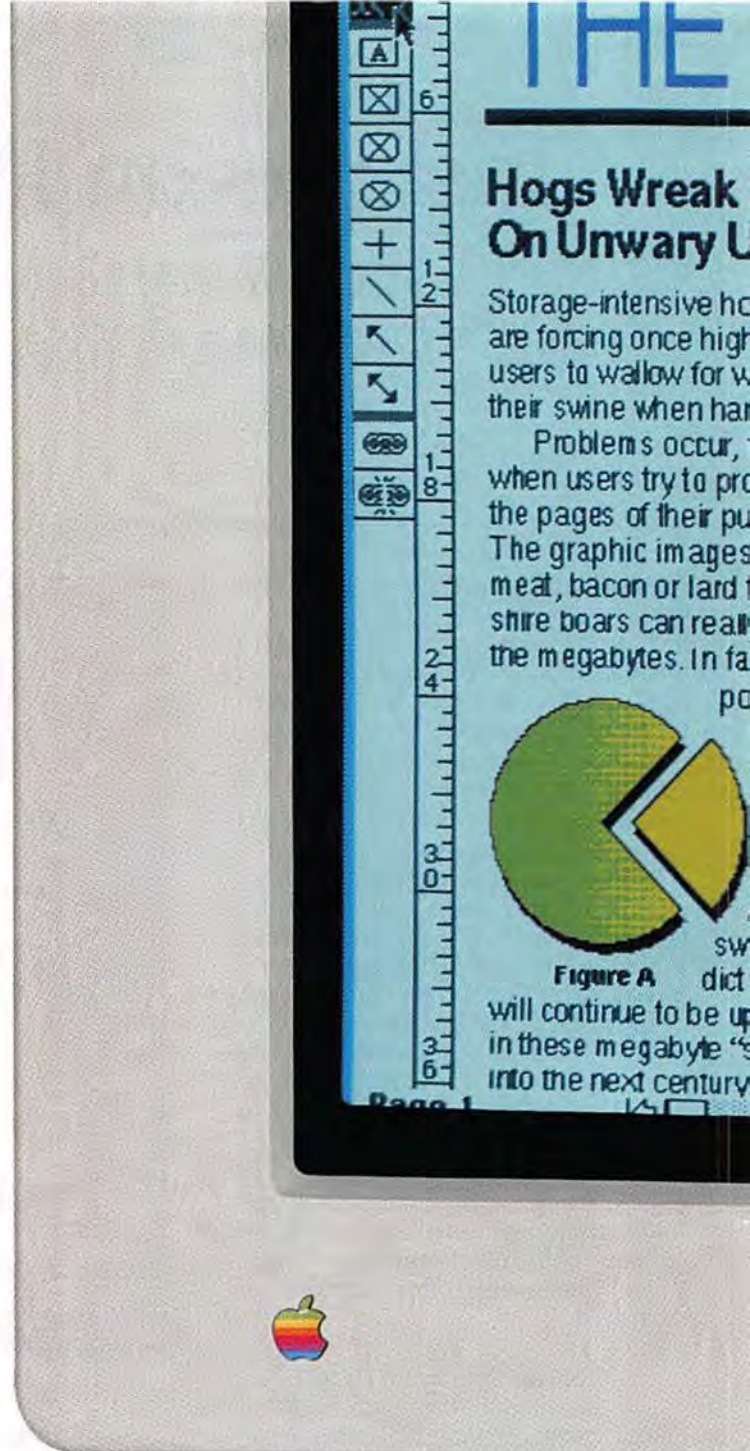
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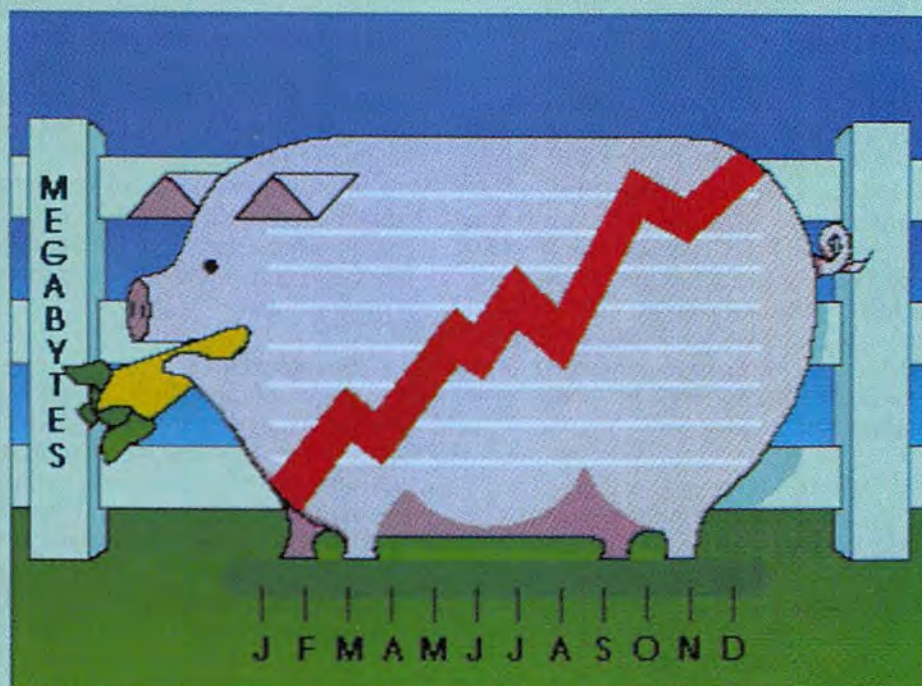
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How To/Insights

Shortcuts for Changing Views

Several keyboard shortcuts allow quick changes between screen views of your work. Press both the Option and \mathbb{H} keys while clicking the mouse to toggle between the Fit In Window and Actual Size views. Press the Shift, Option, and \mathbb{H} keys to switch between the Actual Size and 200 percent views. (The position of the pointer when you switch views determines what part of the page goes to the center of the screen.) To view the entire work area, hold down the Shift key while choosing Fit In Window. To return to the regular Fit In Window view, choose Fit In Window again, with no keys held down.

Macro View

If you select the 200 percent view from the Page menu while holding down the Shift key, PageMaker displays the page at 400 percent.

Kern, Baby, Kern

PageMaker 3.0 provides more control than previous versions over how tightly to space words and the letters within words. To manually add or delete space between letters in very small increments— $1/48$ of an em space—place the cursor in the space, hold down the \mathbb{H} key, and backspace to shorten the space. Hold down the \mathbb{H} and Shift keys and backspace to add space. To

control the spacing in the preselected pairs of characters (or *autokerning pairs*) of the font you're working with, choose Paragraph from the Type menu and specify the point size at which you want the autokerning to take over—usually it's used for headline-size type.

Designers who want to kern letter pairs not included in the font's autokerning set can turn to a program like Fontastic Plus 2.0 to edit or add kern pairs for any PostScript font.

Spacing Out

For fine-tuning the word spacing and letter spacing of an entire story, select Spacing from the Type menu. In the Spacing Attributes dialog box, enter values for the minimum, maximum, and desired spacing between both words and letters (see "About Space"). The values establish the range PageMaker must work within when determining word and letter spacing. The values used here are percentages of the font's built-in spacing. Entering less than 100 percent desired word spacing closes up the text, and more than 100 percent opens it up. Normal letter spacing is 0 percent; increasing the value opens up letter spacing, while decreasing the value tightens it.

(continues)

About Space

With PageMaker you can adjust the spacing between words and between letters in text by using the Spacing attributes dialog box. Sample output shows three lines of 18-point Palatino type with varying letter spacing. Example 2 corresponds to the dialog box shown.

Spacing attributes				OK
Word space:		Letter space:		Cancel
Minimum	50 %	Minimum	-5 %	
Desired	100 %	Desired	0 %	
Maximum	200 %	Maximum	25 %	
Hyphenation zone:		3 picas		
Auto leading:		120 % of point size		
Leading method:		<input checked="" type="radio"/> Proportional <input type="radio"/> Top of caps		

Example 1 - minimum: -25, desired: -10, maximum -5

Letter spacing may be controlled by using the

Example 2 - minimum: -5, desired: -0, maximum 25

Letter spacing may be controlled by using the

Example 3 - minimum: 0, desired: 25, maximum 35

Letter spacing may be controlled by using the



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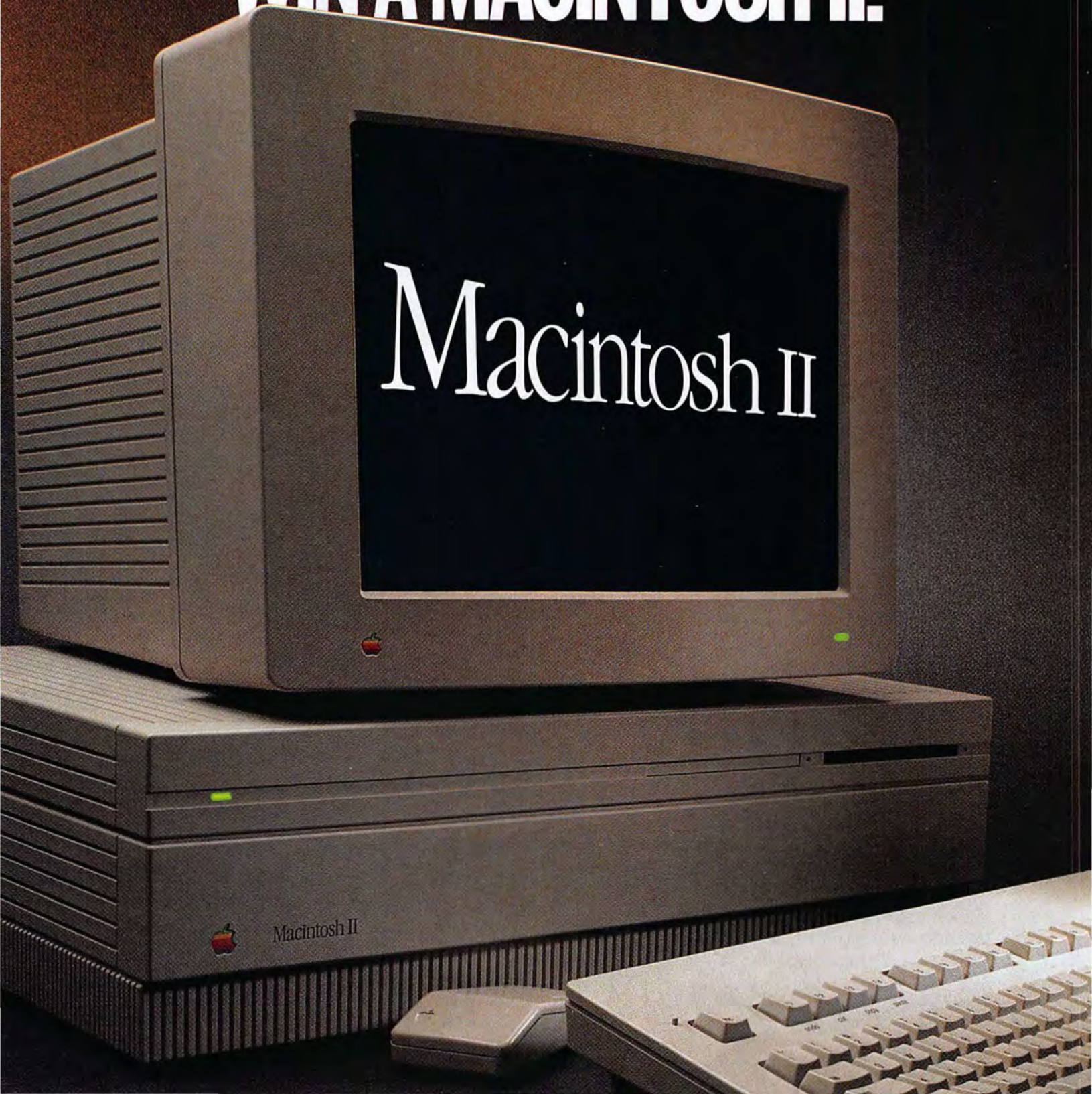
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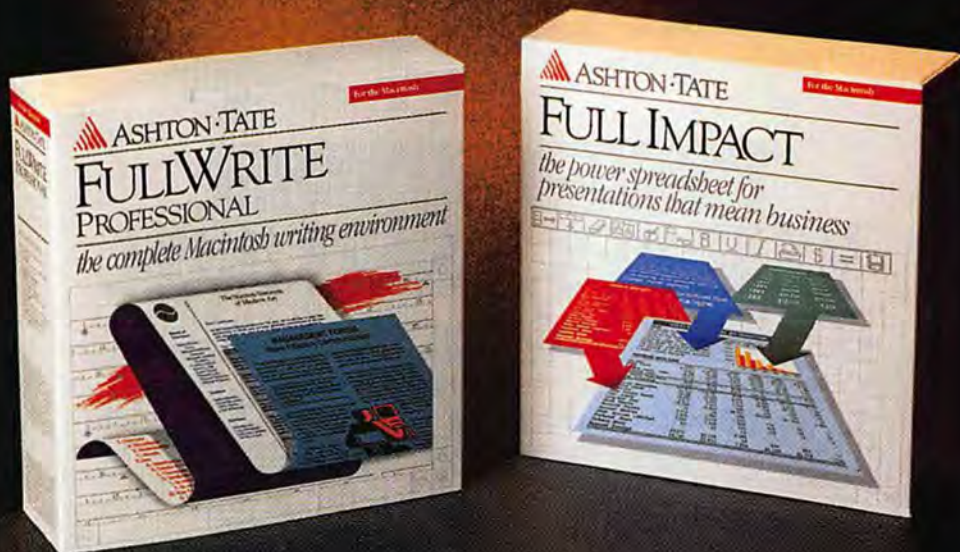


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How To/Insights

The Old Wraparound

In the Text Wrap dialog box reached through the Options menu, PageMaker 3.0 offers three ways to wrap text around an object, but you can't click to select the irregular wrap icon. Don't be dismayed, though; that icon highlights automatically once you start reshaping the boundary around a graphic object on the page. Whenever you're defining wraps, make sure to select the appropriate Text Flow icon from the same dialog box.

When wrapping text around a rectangular object, you define boundaries for each of the four sides either by typing numbers in the Text Wrap dialog box or by using the pointer tool to grab a boundary line and move it. If you click on a boundary line you move the entire line; if you click on an intersection point you move a corner of the boundary. If you want all the graphics in a document to have the same amount of space around them, fill out the Text Wrap dialog box before placing any graphics in the document.

Irregular Wraps

Creating custom text wraps around irregularly shaped objects takes a little more work, since you must define the boundary shape with the pointer tool. First select the graphic, select Text Wrap from the Options menu, and choose the irregular wrap icon; then begin to define the text boundary by adjusting the lines and points that surround the graphic (see "Wraparound"). To add and manipulate a point, double-click anywhere on a line. To delete a point, drag it over another point. If you have already placed text on the page, the text rewraps every time you change the boundary shape. On deadline that could be an interminable waste of time, but there's a way around it: hold the spacebar down to delay the rewrap while you tinker with the boundary.

Saving Space

A document grows in size as you work on it. Deleting text, graphics, or even pages doesn't necessarily reduce a file's size. Instead use Save As from the File menu to compress a file to its smallest possible size.

Placing Text at Your Own Pace

When placing a long story, a plus sign appears in the lower windowshade handle to let you know there is additional text to

(continues)

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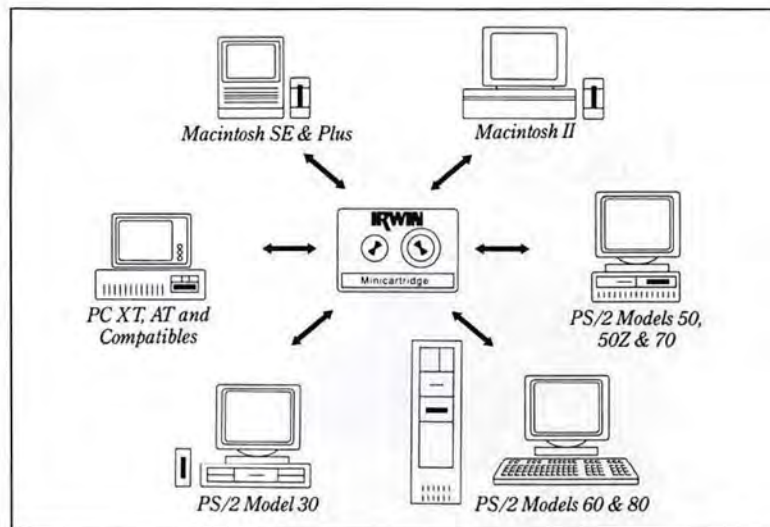
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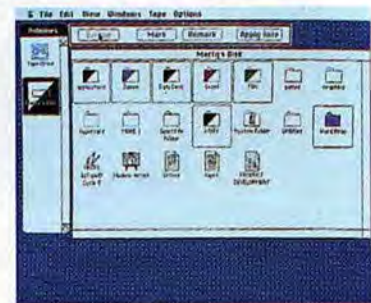
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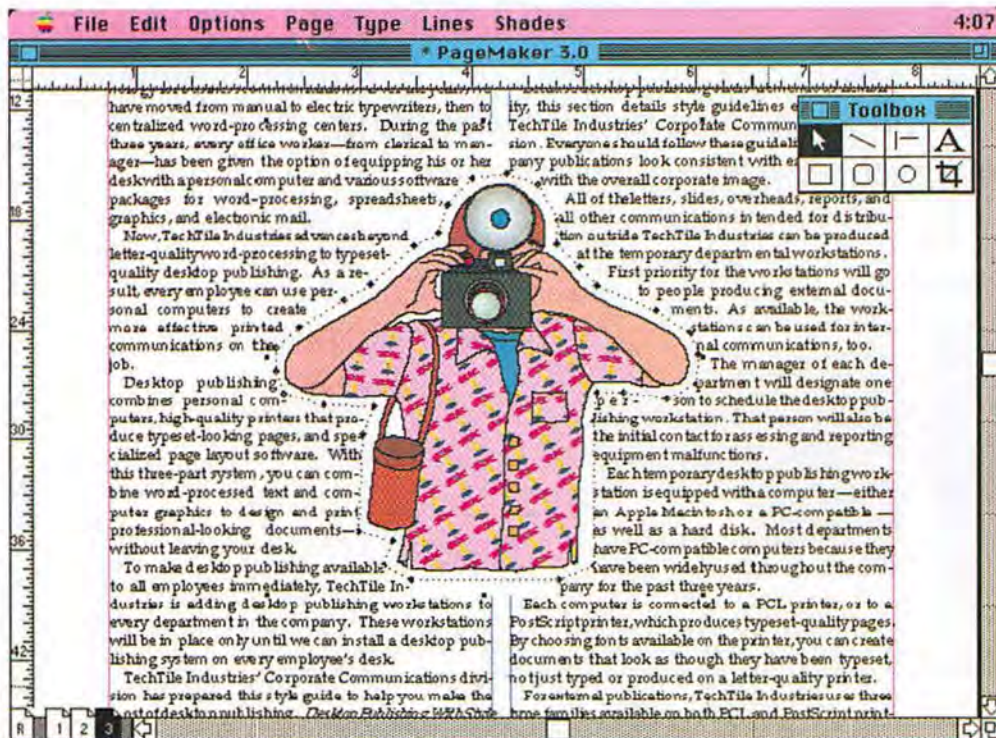
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How To/Insights



Wraparound

You can fine-tune irregular text wraps by adding and manipulating the anchor points that define the text-wrap boundary.

place. You can temporarily interrupt the placement process by clicking on the pointer tool. When you're ready to continue, use the pointer tool to click on the plus sign on the lower windowshade handle and continue placing the story.

A Word on Style

PageMaker's new style sheet feature easily formats text as it is imported or after a document has been placed to accommodate an evolving design. To use this feature, you must place style *name tags* surrounded by angle brackets (</>) in the word processing document itself. Just type the name of a format (for example, < subhead #1 > at the beginning of the paragraph it covers. As you place the text, any imported name tag that matches a PageMaker style name takes on PageMaker's definition of that style. After placing text, you can reformat the document automatically by redefining the styles that name tags are based on.

Of course, you can still take advantage of style sheets for headlines, subheads, and so forth established within a word processor. PageMaker imports a word processing document's styles if you choose the Retain Format option when you place the docu-

ment. All imported style names appear in the style palette with an asterisk (*) to differentiate them from PageMaker styles.

A Shortcut to Style

To quickly edit a style, make sure you have the style palette window open, and then press the ⌘ key while selecting the style to display the Edit Style dialog box.

Changing All Caps

When preparing copy that you want in capital letters, select the All Caps style from the menu rather than just typing with the Caps Lock key engaged. All Caps you can undo easily, but you can only change capital letters specified from the keyboard to lowercase by retyping the text. And then reproofreading it.

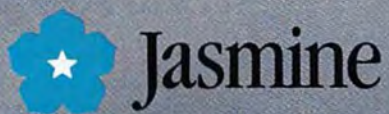
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(continues)



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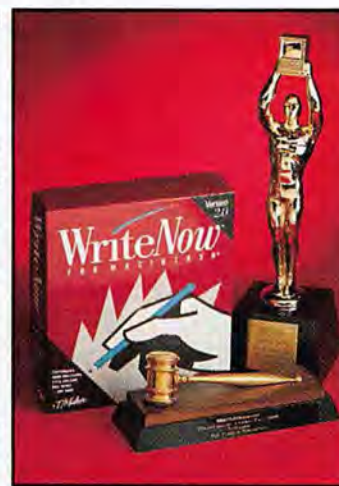
Aatrix Software Aatrix Payroll V3.0	115.	Insight Expert GL, AR, or AP	479.
Aatrix Payroll Plus	169.	MECA Managing Your Money	129.
Bedford Software Simply Accounting	219.	Migent In House Accountant	119.
Chang Labs		Monogram Business Sense	279.
New Enhanced Version III Modules!		Dollars & Sense 4.0	81.
Rags to Riches 3-Pak 3.1 (GL/AR/AP)	289.	North Edge Software Timeslips III	119.
Rags to Riches GL, AR, or AP	120.	Peachtree Back To Basics Professional	
Dac Software Dac-Easy Light	45.	(GL/AR/AP/INV)	159.
Intuit Quicken	35.	Survivor Software	
Layered Insight One Write	185.	MacMoney 3.0 (Enhanced Ver.)	Special 62.

Networking Software & Hardware

CE Software Quick Mail	169.	Net Serial X232	309.
Infosphere		NetBridge	309.
MacServe (Network Software)	158.	SuperMac Software Acknowledge	349.
LaCle Silverserver	99.	Multi-User SuperLaserSpool	199.
Microsoft Microsoft Mail 1-4 users	195.	Symantec InBox-MacConnection	79.
Nuovotech		InBox-Starter Kit V2.0	
TurboNet 128/512k or TurboNet Plus	27.	(3 Personal Connections)	199.
Olduvai Software Clip Share	109.	TOPS	
Font Sharer	149.	Tops 2.0, Tops FlashCard or Net Print	119.
Shiva NetModem V1200	359.	Tops Repeater	129.
NetModem V2400	479.	Tops Teleconnector Din8 or DB9	39.

WriteNow 2.0 by T/Maker

WriteNow 2.0 is the long-awaited update of the easy-to-use, easy-to-learn, powerful word processor from T/Maker. The features added to this award-winning word processor include a 100,000 word dictionary and spellchecker, WYSIWYG multiple columns and graphics support, an unlimited number of open documents, and counts for characters, words, and paragraphs. The folks at T/Maker have turned WriteNow 2.0 into a powerful business tool with mail merge and increased operating speed that puts the competition to shame. WriteNow 2.0 is the solution for your word processing needs.



WriteNow 2.0 105.

Communications Software

Compuserve		Hayes Smartcom II 3.0	88.
Compuserve Starter Kit	24.	Peripherals Computers & Supplies	
Grolier On Line Encyclopedia	32.	VersaTerm	69.
Compuserve Navigator	45.	VersaTerm-Pro	199.
DataViz MacLink Plus with Cable	145.	Software Ventures	
Dow Jones Desktop Express	95.	Microphone II (Includes Glue)	225.
Freesoft Red Ryder V10.3	55.	Traveling Software LAP-LINK	85.

Utility Software

ALSoft Disk Express	35.	Olduvai Software Icon-It! or MultiClip	39.
Font/DA Juggler Plus	42.	Read-It! TS (For ThunderScan)	79.
Berkeley System Design Stepping Out II	54.	Read-It! O.C.R. 2.0	
Beyond Inc. Fore Runner	32.	(For Image Scanners)	Special 199.
CE Software		PCPC HFS Back-Up	28.
QuickKeys (Macro Program)	54.	SuperMac Software SuperSpool 5.0	54.
Central Point Software		SuperLaserSpool 2.0	82.
Copy II Mac (Includes MacTools)	20.	DiskFit 1.4	54.
PC Tools Deluxe Mac	49.	Sentinel 2.0	155.
Emerald City Software LaserTalk	187.	Symantec MacSQZ!	49.
Fifth Generation Systems Suitecase 2.0	49.	Symantec Utilities for Mac (S.U.M.)	59.
FastBack For The Macintosh	54.	Williams & Macias Disk Finder	29.
Power Station	37.	myDiskLabeler w/Color	31.
Infosphere Liaison	129.	myDiskLabeler w/LaserWriter Option	34.
Microlytics, Inc. GOfier	45.	Working Software/MediaGenic	
Microseeds Redux	65.	Findswell 2.0 (Document Finder)	36.

DataDesk Professional by Odesta

DataDesk Professional is the data analysis package that lets you see, explore, and understand the meaning of your information. Even if you're not a computer expert or math wizard, **DataDesk Professional's** icon-based point and click user interface lets you easily create histograms, bar charts, scatterplots, boxplots, and rotating plots. You can use **DataDesk Professional** with data you import from databases and spreadsheets, and export charts and plots to desktop publishing and word processing packages to add life, and information to your reports and presentations. **DataDesk Professional** brings the power of statistical vision to your Macintosh.



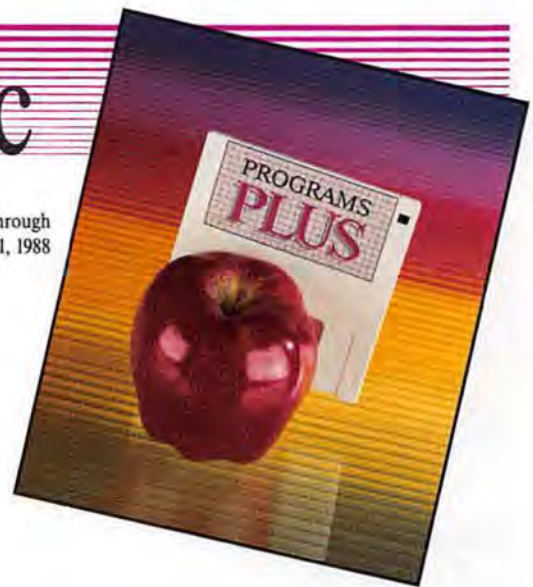
DataDesk Professional 295.

to Polish Up Your Mac

Game Software

Access World Class Leader Board Golf	34.	Firepower	16.
Accolade Hard Ball	23.	Universal Military Simulator	30.
4th & Inches	24.	Might and Magic	37.
Artworx Bridge 5.0	22.	Sky Travel	45.
Avalon Hill Mac Pro Football	30.	Microsoft Flight Simulator 1.02	32.
Baudville Award Maker Plus	29.	Micro Sports MSFL Pro Draft	26.
Broderbund Ancient Art of War		MSFL Pro League Football	
or Ancient Art of War at Sea	27.	or 500 Great Teams	32.
ShufflePuck Cafe or Ultima III	24.	Miles Computing Inc. Down Hill Racer	24.
Poster Maker Plus	39.	Harrier Strike Mission II	
Bullseye Software Ferrari Grand Prix	32.	or The Fool's Errand	27.
P51 Mustang Flight Simulator	Special 32.	Mindscape Balance of Power 1990,	
Centron BlackJack Ace	Special 28.	Crossword Magic or Citadel	30.
Crapsmaster or Roulette Master	28.	Deja Vu: A Nightmare Comes True	30.
Electronic Arts Ogre	20.	King Of Chicago or Shadowgate	30.
ChessMaster 2000	28.	Defender of the Crown, Colony	
Chuck Yeager Flight Simulator		or The Uninvited	30.
or Life & Death	36.	Practical Computer Applications	
Starfleet I	37.	MacGolf or Lunar Rescue	35.
Scrabble	27.	MacCourses	34.
One-On-One, Pinball Construction Set,		Road Racer	45.
Seven Cities of Gold, SkyFox, or		Mac Golf Classics	59.
Patton vs Rommel	15.	Primera Smash Hit Racquetball II	21.
EPYX Sub Battle Simulator	30.	Sierra On-Line Leisure Suit Larry	23.
Greene, Inc. Crystal Quest	27.	Space Quest or Space Quest II	30.
Crystal Quest w/ Critter Editor	42.	Police Quest	30.
Hayden Software Sargon IV	29.	Silicon Beach Software	
H.J.C. Software, Inc.		Dark Castle or Apache Strike	27.
Air Traffic Control Simulator	35.	Beyond Dark Castle	27.
Infinity Software, LTD.		Sir-Tech Mac Wizardry	35.
Go or Grand Slam Tennis	27.	Sphere, Inc. Tetris	23.
Infocom Leather Goddesses of Phobos	24.	GATO, Orbiter, Falcon, or Pt-109	26.
Beyond Zork, Zork Trilogy or QuaterStaff	30.	Solitaire Royale	19.
Hitchhiker's Guide to The Galaxy	18.	Studio Zero Orbital Mech	35.
Zork Zero, Show Gun or Journey	42.	XOR Software NFL Challenge	64.
MediaGenie Shanghai or Jinxter	24.	Pro Challenge or Basketball Challenge	30.

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Read-It!!! O.C.R. is the fully trainable, software only, optical character recognition solution. Use **Read-It!!! O.C.R.** with any scanner, including ThunderScan, to input books, magazines, reports or any other text document you desire into your Mac. **Read-It!!! O.C.R.** converts scanned documents into editable text that you can place in your word processor, database, or desktop publishing package. **Read-It!!! O.C.R.** requires a MacPlus (or later) with 1 megabyte of RAM. **Read-It!!! O.C.R.** now offers speech drivers for many popular scanners and EasyLearn, the super fast way to teach **Read-It!!! O.C.R.** new fonts.



Read-It!!! O.C.R. 199.

Blank Media

Single Sided 3 1/2" Diskettes		Sony 3 1/2" DS/DD Disks (box of 10)	18.
Bulk (Sony) 3 1/2" SS/DD Disks (10)	12.	Fuji 3 1/2" DS/DD Disks (box of 10)	19.
Sony 3 1/2" SS/DD Disks (box of 10)	13.	Maxell 3 1/2" DS/DD Disks (box of 10)	20.
Double Sided 3 1/2" Diskettes		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.
Centech 3 1/2" DS/DD Color Disks (10)	19.		

Languages

Borland Turbo Pascal	65.	Microsoft Microsoft Quick Basic	74.
Turbo Pascal Tutor	45.	Smethers & Barnes Prototyper	74.
Consulair Mac 68000 Dev. System	59.	Symantec Lightspeed C	95.
Mainstay V.I.P. 2.5		Lightspeed Pascal	65.
(Visual Interactive Programming)	109.	T.M.L. TML Pascal II (Includes MPW)	79.
Manx Aztec C	69.	TML Source Code Library II	49.
Aztec MPW C or SDB	105.	Zedcore ZBasic 5.0	119.

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Desk Accessory Programs

Affinity Microsystems		Greene, Inc. HyperDialer	26.
Tempo II	89.	QuickDex 1.4A	32.
AffiniFile	46.	Imagine Software	
Beyond Inc. Menu Fonts 2	32.	Multi-User Appointment Diary	
Borland SideKick V2.0	59.	with Smart Alarms	85.
CE Software DiskTop 3.0	28.	Smart Alarms & Appointment Diary	35.
Deneba Software		Mainstay Think'n Time	61.
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.

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.

Graphics Software

3G Graphics Images with Impact!	59.	Laserware Laserpaint Color II	359.
ABA Software Draw It Again Sam 2.0	89.	Letraset ImageStudio 1.5	279.
Graphist Paint II	295.	Ready Set Show	189.
Adobe Systems Adobe Illustrator 88	325.	Macromind Videoworks II	118.
Adobe Fonts (Various volumes)	Call	Videoworks II Accelerator	125.
Aldus Freehand	379.	Videoworks II Driver for Hypercard	60.
Altys Corp. FONtastic Plus 2.0	59.	Micro Illusions Photon Paint	179.
Fontographer 2.2	239.	Micro CAD/CAM MGMStation	685.
Ashton Tate Full Paint	69.	Micro: Maps	
Broderbund Print Shop	36.	MacAtlas Paint 2.0 (MacPaint Format)	45.
Casadyware Fluent Fonts 2.0 (2-Disk Set)	26.	MacAtlas Hyper Atlas	64.
Fluent Laser Fonts Vol. 1-22 (ea)	45.	MacAtlas Professional	
CE Software Calendar Maker 3.0	28.	(PICT) MacDraw Version)	129.
Clarix MacPaint 2.0	119.	Microsoft Microsoft PowerPoint 2.0	249.
MacDraw II 2.0	309.	Olduvai Software	
Cricket Software Cricket Draw	169.	Post-ART II (4-Disk Set) or ArtFonts	59.
Cricket Paint	129.	Silicon Beach Software	
Cricket Graph	119.	SuperPaint 2.0	109.
Cricket Presents	289.	Digital Darkroom	159.
Deneba Software Canvas DA 2.0	75.	Super 3D	159.
Canvas 2.0 (Includes Desk Accessory)	169.	Super 3D Enhanced (Mac II)	249.
Dream Maker MacGallery		Solutions International	
(Hypercard or Paint)	29.	The Curator (Catalog Your Art)	79.
Cliptures	97.	Springboard Certificate Maker	24.
Dubl-Click Software		Works of Art Assortment,	
World Class Fonts: Various Vol. 1-6 (ea)	45.	Holiday, or Education	32.
WetPaint: Various Vol. 1-16 (ea)	45.	Springboard Publisher	119.
Electronic Arts Studio 8 (MacII)	309.	SuperMac Software Pixel Paint	209.
Enzan-Hoshigumi USA		Symmetry	
MacCalligraphy 2.0	109.	Picture Base & Wet Paint Bundle	95.
Japanese Clip Art	Call	T/Maker Click Art Letters I, Letters II,	
Foundation Publishing Comic People	25.	Personal Graphics, Effects,	
Comic Strip Factory	45.	Business Image, or Holidays (each)	28.
Graphsoft Mini Cad 4.0	375.	Christian Images	35.
Innovative Data Design Dreams	315.	Click Art EPS Illustrations	75.
MacDraft 1.2B	149.	Zedcor DeskPaint 2.0	69.

MacMoney by Survivor Software

MacMoney is the user-friendly money management program for the Mac at home or in business. **MacMoney** features easy point and click transaction entry, up to 200 categories of every type of income and expense, many useful report and graph formats, plus loan and retirement planning functions. **MacMoney** prints information on ImageWriters and LaserWriters, plus lets you export your data to spreadsheets, word processors, and tax programs. Let **MacMoney** help you solve your cash management problems now.



MacMoney 62.

Disk Drives/Hard Disks/Upgrades

Applied Engineering		MacSnap 548 (512K to 2MB)	599.
MacRAMS (1 MB SIMMS Mac+, SE, II)	489.	MacSnap 548E (512E to 2MB)	Special 585.
AST Research		MacSnap 548S	
Mac286 Co-Processor (Mac II)	Call	(512E to 2MB w/SCSI)	Special 649.
Central Point		MacSnap Plus 2 (MacPlus to	
Central Point 800K External Drive	185.	2MB Non Expandable)	Special 475.
CMS		MacSnap 2SE or	
Compact Series SC30 (Mac+/SE/II)	649.	1024 Option (1 MB Acc.	
Compact Series SC45 (Mac+/SE/II)	859.	or MacII Memory Exp.)	Special 475.
SDSeries MacStack SD20 (Mac+/SE/II)	569.	SCSI Interface/Port	129.
SDSeries MacStack SD60 (Mac+/SE/II)	849.	MacSnap Toolkit (torx driver,	
PRO-SE Series 30SE/1 or 30SE/R	535.	opener & grounding set)	15.
Cutting Edge Cutting Edge 800k Drive	175.	Everex Emac 20D (20Mg Hard Disk)	520.
Cutting Edge Wedge XL 30		Emac 20 Deluxe	585.
Plus SCSI Hard Drive	629.	Personal Computer Peripherals	
Cutting Edge Wedge XL 45		Beige or Platinum Color. Optional	
Plus SCSI Hard Drive	829.	Built-In Modems Available.	
Cutting Edge XL 30 Internal Hard Drive	505.	MacBottom HD-21	
Cutting Edge XL 45 Internal Hard Drive	645.	(20+MB SCSI Hard Disk)	659.
Dove Computer Corporation		MacBottom HD-32 (32MB SCSI HD)	699.
68020 Accelerator Boards for Mac SE		MacBottom HD-45 (45MB SCSI HD)	859.
MSE 1 (16 Mhz)	585.	MacBottom HD-70 (70MB	
MSE 2 (16 Mhz w/1MB)	1059.	SCSI Hard Disk) Plat only	999.
MSE 3 (16 Mhz w/Math Co-processor)	779.	Rodime Rodime 20 Plus Ext.	629.
MSE 4 (16 Mhz w/1MB & Math Chip)	1255.	Rodime 45 Plus (Ext. 45MB SCSI)	939.
MacSnap 524 (512K to 1MB)	325.	Rodime 450RX (Int. 45MB Mac SE/II)	829.
MacSnap 524E (512E to 1MB)	Special 265.	Rodime 100 Plus (Ext. 100MB SCSI)	1169.
MacSnap 524S		Rodime 140 Plus (Ext. 140MB SCSI)	1319.
(512E to 1MB w/SCSI)	Special 409.	Rodime 1000 RX (Int. 100MB MacII)	1045.

C•A•T by Chang Laboratories



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Educational/Creative Software

Barron's Barron's SAT	35.	Venture's Business Simulator	47.
Bible Research The Word (KJV or NIV)	165.	Deluxe Music Construction Set V2.0	61.
Bogas Productions Studio Session	49.	Isi Byte/Electronic Arts	
Super Studio Session	79.	Kid Talk, Speller Bee,	
Bright Star Technology		First Shapes, or Math Talk	32.
Alphabet Blocks	32.	Great Wave Software KidsTime	26.
Broderbund Jam Session	30.	Learning Company	
Sensei Geometry, Calculus or Physics	60.	Reader Rabbit	33.
Type!	31.	Mindscape Perfect Score SAT	
Where in the World is Carmen San Diego?	25.	w/The Perfect College	46.
Coda Mac Drums	35.	Nordic	
Davidson & Associates Speed Reader II	39.	MacKids Educational Programs (each)	28.
Math Blaster or Word Attack!	27.	Simon & Schuster	
Electronic Arts Mavis Beacon Typing	36.	Typing Tutor IV	35.

DataBase Management

Acus 4th Dimension	529.	Reports for Hypercard	59.
4D Runtime	245.	Focal Point & Business Class Bundle	55.
Apple Computer HyperCard	44.	City To City	30.
Ashton Tate dBASE Mac 1.0	295.	Microsoft Microsoft File	119.
Blythe Software Omnis 3 Plus/Express	275.	Nordic HyperCONTROL	42.
Borland Reflex Plus	165.	Odesta Double Helix II	339.
Claris FileMaker II	Call	GeoQuery	295.
Ducsoft, Inc. Applications & Routines for 4th Dimension Vol. 1	86.	DataDesk Professional	Special 295.
Fox Software Fox Base Plus	214.	Park Row Incorporated	
Fox Base Unlimited	259.	Publish or Perish	28.
Ideaform Hyper Book Maker	31.	ProVUE Development OverVUE 2.1E	149.
MediaGenic Focal Point II	95.	Software Discoveries RecordHolderPlus	45.
		Telegraphics Hypertutor	29.

Blackjack Ace by Centron Software



Blackjack Ace by Centron Software brings the fast-paced suspense filled action of one of Vegas' most popular card games to your Mac. Play against the computer or with up to three people — you choose the stakes and the number of decks. **Blackjack Ace** helps you keep track of the deck with any one of three different counting systems, and its manual features tips on strategy and money management. Feel the excitement of Vegas without risking a fortune. Get **Blackjack Ace** today!

Blackjack Ace 28.

Business Software

Abacus Concepts StatView II (Mac+, SE, II w/68020 & 68881)	369.	Mainstay	
StatView SE+ Graphics	229.	Capture	42.
Access Technology Trapeze 2.1	159.	Mac Flow 2.0 or Mac Schedule	115.
Ashton Tate Full Impact	249.	Meta Software Design/2.0	199.
Borland Eureka! The Solver	129.	Micro Planning Software	
BrainPower ArchiText	185.	Micro Planner 6.0	349.
StatView 512 Plus	175.	Microsoft Microsoft Excel 1.5	249.
Math View Professional	145.	Microsoft Works 1.1 with Spellswell	189.
DataScan	119.	Satori Software	
Bravo Technologies MacCalc	79.	Bulk Mailer 3.2	79.
Chang Laboratories		Bulk Mailer Plus	195.
C.A.T. Contacts*Activities*Time	Special 229.	Components GL	385.
Claris MacProject II	395.	Legal Billing	369.
Cognition Technology MacSMARTS	335.	Project Billing	439.
D2 Software MacSpin 2.0	189.	Select Micro Systems, Inc.	
Informix Software, Inc. Wingz	349.	Exstatix or MapMaker	219.
Legisoft/Nolo Press WillMaker 3.0	35.	Shana Enterprises	
Lundeen & Associates		Fast Forms	89.
WorksPlus Commands	60.	Synex Mac Envelope 4.0	59.
MacroPac International		Mac Invoice	32.
101 Macros For Excel	44.	Systat Systat 3.2	
		(Specify MacPlus, SE or Mac II)	459.

Word Processors & Desktop Publishing

Access Technology Mind Write 2.0	95.	Microsoft Microsoft Word 4.0	249.
Mind Write Express	149.	Postcraft International, Inc.	
Allan Bonadio Associates		Laser FX	115.
Expressionist 2.0	79.	Quark, Inc. QuarkXPress V2.0	499.
Aldus Corporation		Silicon Beach Software	
PageMaker 3.0	475.	Silicon Press	41.
Ashton Tate		Symantec More II	Call
FullWrite Professional	275.	Symmetry Acta V2.0	42.
Claris MacWrite 5.0	119.	T/Maker Company	
Letraset Ready, Set, Go! 4.5	279.	WriteNow V2.0	Special 105.
Letra Studio	369.	Word Perfect Corporation	
LetraFonts (Various Vol. 1-45 ea.)	69.	Word Perfect	185.

Spelling & Grammar Checkers

Aegis Development		Electronic Arts Thunder! 1.23	30.
Doug Clapp's Word Tools	42.	Lundeen & Associates	
A.L.P. Systems		WorksPlus Spell 1.1	46.
MacProof 3.0	115.	Microlytics, Inc.	
Deneba Software		Word Finder (Synonym Finder)	35.
Coach Merriam Webster's Thesaurus 2.0	36.	Sensible Software Sensible Grammar	55.
Spelling Coach 3.0		Working Software/MediaGenic	
(Webster's/Medical/Legal/Hyphenation)	54.	Spellswell 2.0	42.
Spelling Coach 3.0 Professional	105.	Lookup (Makes Spelling Suggestions)	29.

Accessories

Abaton ProPoint (ADB Mouse for Mac SE & Mac II)	99.	Tilt/Swivel	22.
Asher Engineering		Apple Security Kit	34.
Turbo Trackball (Mac & Mac+ or Mac SE & Mac II)	69.	Antiglare Polarizing Filter	33.
CH Products		Modem/Fax Protector 10	15.
Mach IV Plus: Quad or ADB	65.	Modem/Fax Protector 20	29.
Mirage: Quad or ADB		Power Tree Surge Suppressors (10, 20, or 50)	Call
(Turns Joystick Into Mouse)	39.	Printer Muffler Stand (80 & 132)	21.
Curtis Manufacturing		Printer Muffler 80	43.
Emerald-Surge Suppressor-SP-2	36.	System Saver Mac (Beige or Platinum)	64.
Ruby-Surge Suppressor-SPF-2	55.	Super Base	34.
Cutting Edge Cutting Edge EADB-105 Keyboard (Mac SE & Mac II)	135.	System Saver SE	59.
DataDesk		Masterpiece Mac II	105.
MAC-101 Keyboard/Beige (128k/512k & MacPlus)	139.	New Turbo Mouse (Reg. or ADB)	119.
MAC-101 ADB Keyboard/Platinum (Mac SE & Mac II)	139.	Mobius Fanny Mac QT (Beige or Plat.)	65.
Ergotron Mousecleaner 360°	15.	Mouse Systems A+ Mouse (MacPlus)	65.
MacTilt or MacTilt SE (Platinum Color)	68.	A+ ADB Mouse (Mac SE/Mac II)	85.
Farallon MacRecorder Sound System (Mac SE or Mac II)	145.	Moustrak MousePad 7"x9" Size	8.
Impulse Audio Digitizer w/soundware	149.	MousePad 9"x11" Size	9.
I/O Design Mac Luggage in Navy		Orange Micro Grappler C/Mac/GS	84.
Macinware Plus Carrying Case	64.	Grappler L/Q	98.
Macinware SE Carrying Case	76.	Ribbons	
Imageware II Carrying Case	49.	Available in Black, Blue, Brown, Green, Orange, Purple, Red, Yellow, Silver & Gold	
HDware	54.	ImageWriter Ribbon	4.
Kalmar Designs		ImageWriter Black 6-pack	20.
Teakwood Roll-Top Disk Cases:		ImageWriter Rainbow Pack (6 Colors)	20.
Micro Cabinet (holds 45 disks)	14.	ImageWriter II-Four Color Ribbon	9.
Double Micro Cabinet (holds 90 disks)	23.	ImageWriter LQ Black	17.
Triple Micro Cabinet (holds 135 disks)	32.	ImageWriter LQ Four Color	20.
Kensington External Disk Drive Cover	8.	Seikosha Ribbon Black	6.
Extra Long ADB Keyboard Cable	25.	Silicon Comforts MacChimney (Very Effective Cardboard Laminate Convection Cooling Device)	16.
Macintosh II Stand	20.	Smith & Bellows	
Macintosh II Monitor Extension Cable	33.	Mahogany Disk Case (holds 96)	30.
Mouse Pocket (Reg. or ADB)	8.	Sopris Softworks	
Mouseway (Mousepad)	8.	High Trek Carry Cases - Platinum Gray, Navy	
ImageWriter or ImageWriter II Cover	9.	ImageWriter II Case	49.
Macintosh Plus/SE Dust Cover	9.	Macintosh Plus, SE w/Standard Kybd	59.
Macintosh SE w/extended Kybd Cover	9.	Macintosh SE & Extended Kybd Case	69.
Mouse Cleaning Kit w/Pocket	17.	Targus (Canada)	
Disk Drive Cleaning Kit	20.	ImageWriter II Carry Case Blk.	45.
		Macintosh Plus Carry Case Blk.	59.
		Deluxe MacPlus-XKB Blk.	65.



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How To/Insights

A Guide Line Tour

Setting up a custom vertical ruler keyed to your text's leading lets you create ruler guides that ease alignment between columns.



with typed elements moves with text during editing. Type the en dashes once and then copy them to produce whatever length rule you need. Experiment with different point sizes for different line weights.

Do-It-Yourself Grids

To augment PageMaker's vertical and horizontal rulers, you can create up to 40 ruler guides per page to help you position elements precisely. Start by selecting Preferences from the Edit menu. In the dialog box that appears, select Custom for the vertical ruler and type in the amount of leading you've specified for the body copy. Then reset the ruler's zero point to the baseline of the first line of type on the page. Select Snap to rulers from the Options menu to position ruler guides that snap to the custom tick marks, to make baseline alignment between columns fast and easy (see "A Guide Line Tour").

Working with Overlapped Objects

When several items overlap on a page—text above a graphic and on top of lines, all superimposed on a set of gridlines, for example—it may be difficult to select the underlying objects. Press the \mathbb{H} key while clicking on the stack of objects to choose them one at a time from the top layer down. Use the Shift and \mathbb{H} keys together to select a group of overlapping objects.

Help Is at Hand

If while using the program, you find yourself in need of assistance but hate to thumb through bulky manuals, PageMaker's on-line help screens may be just what the doctor ordered. To access help files, first install the Guidance desk accessory using the Apple Font/DA Mover. Keep the help files in the same folder as the PageMaker application. Once Guidance is installed, you can select it from the Apple menu anytime you're working within PageMaker, to have it display the Help dialog box.

Color Me Confused

The dimension of color can open up new ways of working with PageMaker, but at the same time it may cause confusion. For example, if you're drawing boxes but nothing shows up, check the default color. If the color is set to Paper, your efforts are invisible.

Also, for speedier operation, add color elements at the end of the page-makeup process and work with the monitor set to black and white until you must see the color on screen.

Other Tips?

If you've found a shortcut or undocumented trick that's not mentioned here, share it with other Macworld readers by sending it to Quick Tips, Macworld, 501 Second St., San Francisco, CA 94107. □

See Where to Buy for contact information.

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Macworld News

by Ann Garrison

68030 at Last



As Apple's products president Jean-Louis Gassée is often wont to say, you build a great product by taking a decent one, then incrementally improving it until you get it right. Apple, adopting Honda Motors' approach and applying it to personal computer design, has introduced the next tweak in the Mac II's design. At the heart of the new model is the Motorola 68030 CPU running at 16MHz and the 68882 floating-point coprocessor.

Although the 030 model runs at the same clock speed as the current 68020 CPUs, product manager Mark Orr estimates that the 030-equipped Mac II will run from 10 to 15 percent faster than the existing models because of the improved architecture of the 030 chip—the CPU itself contains separate areas of very fast memory for both data and instructions, and runs with one less wait state. The 68882-equipped Mac IIs will offer up to twice the floating-point math performance of previous Mac II models using the 68881.

Because the 030 contains a Paged Memory Management Unit (PMMU) on the chip, the new systems will support virtual memory and true multitasking as soon as the new Macintosh operating system software is released. Until then only the A/UX operating system will be able to take advantage of the 68030's memory-



Apple product managers Fred Benz (left) and Mark Orr worked on the new, faster Mac II with the 68030 CPU and the 68882 floating-point coprocessor.

management functions. Apple will now ship all A/UX systems on the new machine, and will offer an upgrade for current registered A/UX owners.

Apple will also offer a new 1.4 megabyte floppy disk drive; this new piece of equipment is as significant as the CPU upgrades. The new super drive can read both 720K and 1.4MB MS-DOS-formatted floppies as well as 400K, 800K, or 1.4MB Mac disks. Used in conjunction with version 1.1 of the Apple File Exchange software, this drive can read, write, and format either MS-DOS or Mac operating system floppies.

The new Mac II will come with the 68030, 68882, 4MB of RAM, and the 1.4MB floppy drive. Users can add an internal 80MB hard disk drive as an option. Current Mac II owners can upgrade in one of three ways: by purchasing the new 1.4MB floppy drive and the associated controller chip, by buying the new logic board, or by adding the Motorola 68851 PMMU chip. The price of the new machines should fall within 15 percent of the cost of a Mac II with 4MB RAM and an 80MB hard drive.

—David Usbijima

Video Snapshots



Desktop video professionals can now choose from a number of freeze-frame boards or frame grabbers to fill a previous gap in their hardware needs. These video boards allow you to capture snapshots of video images from live video signals, cameras, or video recording devices such as VCRs. The images can be saved in several Macintosh formats, including PICT2, 24-bit TIFF, and EPS.

Desktop video pioneers are using frame grabbers to edit; to add titles and graphic elements to training or demonstration tapes; to import 24-bit color images for desktop publishing and desktop presentations; and to do four-color separations, medical imaging, and CAD/CAM work.

Computer Friends' Color Freeze-24 offers complete import and export capabilities between the Mac and video, when used with the company's TV Producer graphics-export board. The TV Producer may have been the first video board capable of exporting Mac files as standard American television video signals (NTSC), and it now supports European video (PAL) as well. The Color Freeze-24 retails for \$1990, including software.

Data Translation's new Color Capture board offers both import and export capability for

(continues)

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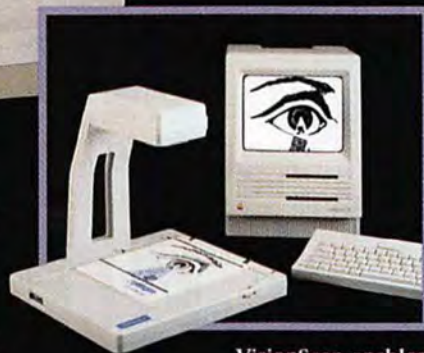
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color images. This board is unusual and distinctly nonstandard for the Mac in that it captures a 16-bit image. It offers better color imagery than the 8-bit boards of some competitors, saves images in less space, and redraws in less time than 24-bit competitors. You must currently use PhotoMac from Avalon Development Group to control the board, but Data Translation hopes to release its own software soon. Retail prices are \$2595 for the Color Capture board, and \$695 for PhotoMac, or \$3190 for the two together.

such as Apple's, to run a monitor. AST's own stand-alone software package, ReView, bundled with the NuView board, gives considerable editing control, including edge enhancement, blurring, brightness, and contrast. With this board you can digitize images in the background under MultiFinder.

RasterOps is now shipping its 24-bit TrueCapture frame grabber for \$2495. It already supports chunky-style video imaging, and it is the standard Apple is expected to adopt with 32-bit Color QuickDraw in the next release of the Macin-



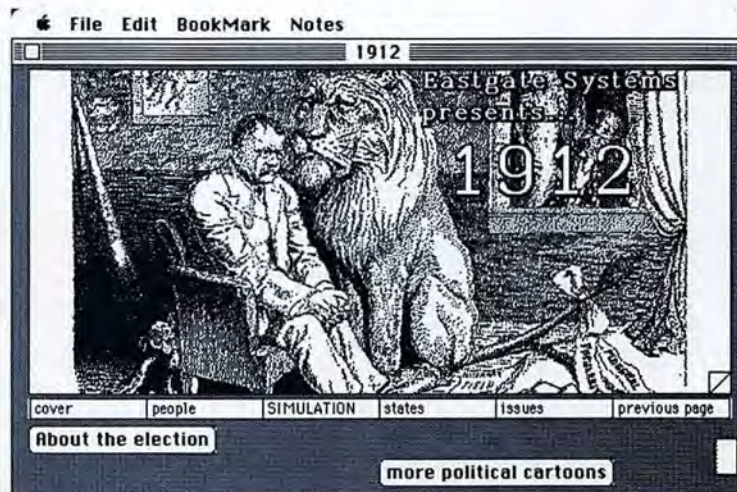
Roger Vass, RasterOps director of international sales, uses a video frame grabber to capture a video image on a Mac.

Also shipping is Color Space II from Mass Micro Systems, at \$1995, an 8-bit video board that can be used alone or with other standard video boards. It accepts input and gives output as RGB, NTSC, or PAL signals. The software included with the board gives considerable editing control, and offers many special effects. VideoWorks II comes bundled with the product.

AST plans to begin shipping its \$2099 NuView board in the first quarter of 1989. It will capture 24-bit color images from any RGB source. A separate converter (available from AST for \$699) is necessary to accept an NTSC signal. The NuView board must be used in conjunction with another video board,

tosh operating system. TrueCapture works with either of the RasterOps 24-bit video boards to give a complete import/export system for 24-bit color images.

Truevision's NuVista board was easily the most spectacular one demonstrated at the show, but its \$6000 price was more than twice that of any other board there. Considered by some to be a video studio on a board, the NuVista contains Texas Instrument's programmable TMS34010 video chip and 4MB of video RAM. At the Expo, exhibitors created a panel of 32 frozen frames and panned through them all as one giant virtual screen. The board supports Mac monitors,



With The Election of 1912, you can journey back through political hyperspace and ponder this century's early debates on poverty, race relations, women's suffrage, unions, trusts, and monopolies.

with up to 32 bits per pixel, at any resolution the monitor supports.

For further information, contact RasterOps, in Cupertino, California, at 408/446-4090; Computer Friends, in Portland, Oregon, at 503/626-2291; Mass Micro Systems, in Sunnyvale, California, at 408/522-1200; Truevision in Indianapolis, Indiana, at 800/858-8783; AST Research, in Irvine, California, at 714/863-1333; or Data Translation, in Marlborough, Massachusetts, at 617/481-3700.

—Scott Beamer

HYPERCARD

HyperCard Election 1912



In 1912 Theodore Roosevelt, William Howard Taft, and Woodrow Wilson vied for the American presidency in what was one of the most intriguing presidential campaigns in United States history. It was a halcyon year for American politics; with the industrial revolution running smoothly on its own steam, citizens finally had time to puzzle over poverty, race relations, women's suffrage, unions, and the forma-


tion of trusts and monopolies. And politicians like Woodrow Wilson weren't mincing many words. "You know what happens to you when you are the servant of a corporation?" he asked Americans. "Your individuality is swallowed up in the individuality and purpose of a great organization." Wilson became the 28th president, as Democrats took both houses of Congress by storm.

So what's all this have to do with the Mac? Plenty. Eastgate Systems has recently captured the essential moments of the 1912 election in a hypertext application that enables you not only to study the election but to participate in it as well.

In The Election of 1912, you navigate a web of text and graphics, gleaning the pivotal facts on the key players and issues. In addition to buttons, the standard hypertext information links, 1912 offers bookmarks and thumb tabs to guide you. The program also features margin notes, with full text-editing capabilities, and breadcrumbs—a trail of markers through political hyperspace.

Once you have sufficient knowledge of 1912's political climate, you can use the pro-

(continues)



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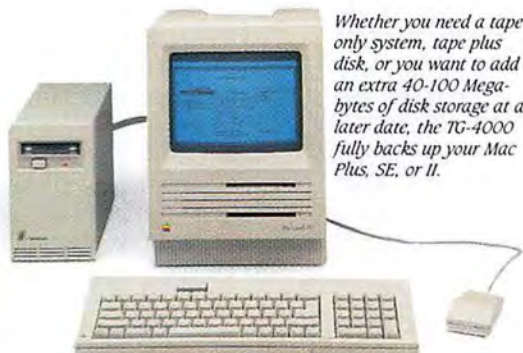
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gram's election simulation mode to plot campaign strategy for Theodore Roosevelt. You can travel, hold meetings, deliver speeches, take polls, and send mail to such political heavyweights as William Randolph Hearst, Jane Addams, and Booker T. Washington. Now and then, they even reply.

The Election of 1912 is a lesson in history, in politics, and in the value of hypertext as an educational tool. It also makes the electoral process far more accessible than network television has managed to do. For further information, contact Eastgate Systems in Cambridge, Massachusetts, at 617/924-9044.—William Freais

Macs on the Frontiers of Physics



For years, astronomers have studied the brightness variations of quasars, the most distant known objects in the universe, to learn about their energy sources. Recently, these observations have proved invaluable in studying the smallest clouds ever observed in our own galaxy.

The clouds were discovered in 1987 by Dr. Ralph Fiedler, a radio astronomer at the Naval Research Laboratory in Washington, D.C., when he noted unusual variations in the brightness of three quasars over a nine-year period. He concluded that the variations were caused by many unusually small, cloudlike structures within our galaxy that occasionally drift through an astronomer's line of sight. Fiedler estimates that the size of the cloudlike structures is roughly equal to the distance between the sun and the earth and, surprisingly, that they could be more common than the stars in



Dr. Ralph Fiedler used a Mac Plus and an SE to analyze the data obtained with this radio telescope in Green Bank, West Virginia.

our galaxy. While the distance between the sun and the earth may sound like an immense expanse, the clouds have avoided discovery till now because they are so small on the scale of the universe.

Fiedler used the National Radio Astronomy Observatory's radio telescope in Green Bank, West Virginia, to search for more of the clouds. The computer-controlled telescope is 300 feet in diameter and can be rotated only in a north-to-south direction. Fiedler developed a MacFORTH scheduling program to generate ASCII files that would enable the controlling computer to position the telescope correctly in time to record each quasar as the earth rotated the telescope across the quasar's position in the sky.

Fiedler designed another MacFORTH program to be used with a Mac Plus and an SE for reducing and analyzing his 240,000 data recordings. At the end of the observation period he reran the entire data set on a Mac II.

For further details concerning Fiedler's study and analysis, see the December 1987 issue of *Astronomy Magazine*.
—Bernard Urban

Give Mac a Brain



Neural networks—machines modeled on the brain—were touted as the future of computing at the second annual Institute of Electrical and Electronic

Engineers (IEEE) International Conference on Neural Networks (ICNN), held in July in San Diego.

Why all the hoopla? Neural networks don't require programming. They are biologically inspired systems that learn the solution to a problem by example.

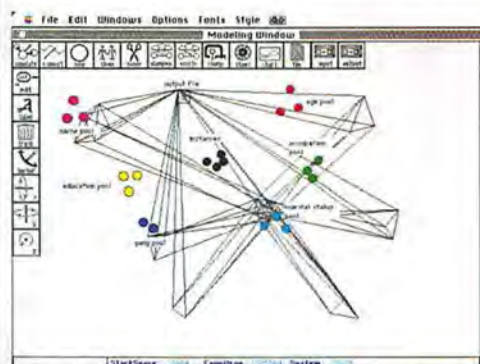
The power of neural networks was recently demonstrated by Associated Dynamics president Cleveland Donnelly. With the help of Levco's coprocessor board that includes a transputer chip, Donnelly trained neural networks to identify arrhythmic heart disorders from EKG traces. This diagnostic task normally requires a doctor's interpretive eye, but Donnelly input examples of EKG traces, and the computer learned to recognize them.

Three new software packages for getting started with neural networks on the Macintosh were unveiled at this year's ICNN: Cognitive Software's Cognitron, Neuronic's HyperBrain, and Martingale Research's Syspro. All three run on a Macintosh Plus, SE, or Mac II; an accelerator board can greatly increase their speed.

The Cognitron (\$350) is a neural-network construction kit sporting a 17-icon toolbox. It lets you view any kind of neural network in pulsating action by virtue of a three-dimensional simulation window.

HyperBrain is a newer version of the stand-alone program MacBrain (\$400 for each). This

(continues)



Cognitive Software's Cognitron is one of three new neural network programs for the Macintosh Plus, SE, and II.



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Biomedical technician David Reams (left) and Associated Dynamics president Cleveland Donnelly demonstrate a neural network trained to identify arrhythmic heart disorders.




HyperCard version of MacBrain simplifies the construction of neural networks for HyperCard stack builders.

Syspro is a developer-oriented package that comes in several versions, including a full-scale simulator (\$1250).

For an easy introduction to neural networks, read my book *Cognizers: Neural Networks and Machines That Think* (John Wiley & Sons, 1988). For the seminal studies of neural networks, read *Neurocomputing: Foundations of Research* (MIT Press). For more information, call Cognitive Software in Indianapolis, Indiana, 317/924-9988; Neuronics in Cambridge, Massachusetts, 617/577-1202; Martingale Research in Allen, Texas, 214/422-4570.—*R. Colin Johnson*

NYU Students on Macs

 Journalism students at New York University will soon have an electronic newsroom that's the envy of all but a few major national newspapers.

Each lab consists of 20 Mac SEs, a Mac II with an 80MB hard disk (for use as a file server and for access to news services), four ImageWriters, and a LaserWriter.

The labs also feature a custom HyperCard front end written by Gale Wylie, an assistant

professor of journalism at the University of Texas and a leading expert in the field of computer education. His package seamlessly integrates a number of leading productivity programs and the communications software that is at the heart of the NYU system.

The lab's Macs are the first to feature online access to the Associated Press wire service. The connecting software was developed specifically for the NYU project. Electronic-mail capabilities will allow students and faculty to communicate with each other, while remote access to the network will allow the faculty to download lectures, reading assignments, or other materials. Facilities for communications with other segments of the university (a database containing information on reference materials in the library and CD ROM reference volumes) are currently being installed.



NYU student Avi Levy uses one of the Macs in the university's state-of-the-art electronic newsroom.

The Mac labs will allow students to research a story, search and read the wire services, and then write copy, all without leaving their workstation. Copy editing and layout will also be done on the Mac. The end result? The experience of working on an ultramodern daily newspaper. The students also hope to launch an NYU news service, to market their work throughout the East Coast.

—*Philippe Krakowsky*

Apple Pushes A/UX toward UNIX Standards

 POSIX—the UNIX-based application-program interface standard, developed under the auspices of the Institute of Electrical and Electronics Engineers (IEEE)—is expected to be dubbed a federal information processing standard by the National Bureau of Standards (NBS) sometime this fall. That will make POSIX a requirement for all UNIX-based computer systems procured by the government.

Apple has already released a version of the A/UX operating


system that complies with draft 12 of POSIX; that's good news for A/UX users in the federal government. In addition, Apple will continue to make A/UX comply with the POSIX standard as it evolves.

Apple is also providing an X-Window product for A/UX. Developed at MIT, the X-Window System has become an industry standard for displaying multiple applications on networked computers. Apple's X-Window kit will make it easier for software vendors to port applications from other UNIX systems—for example Sun Microsystems computers—to Macs running A/UX.

X-Window 11.2 should be available before the end of the year from authorized A/UX dealers; the kit will include X-Window execution software, display managers, and user and programmer documentation.

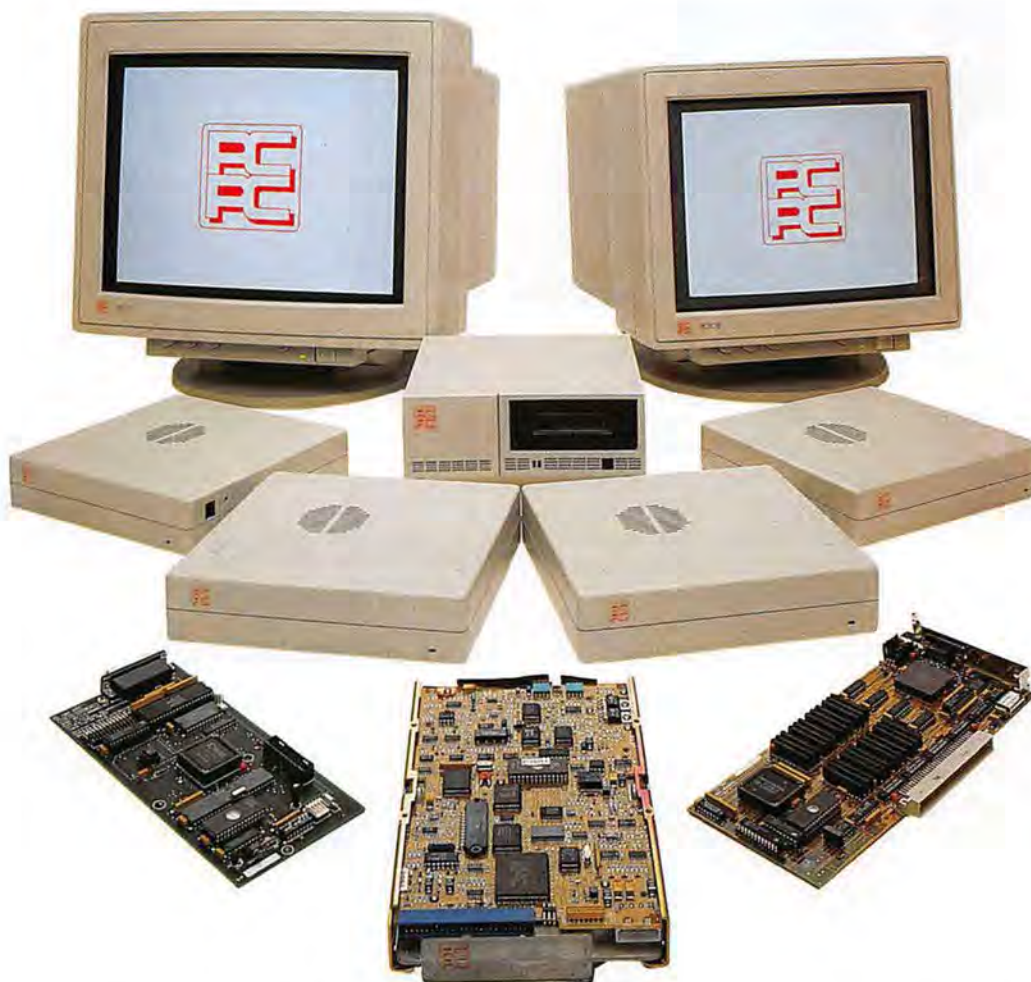
For further information, call Apple Computer at 408/996-1010 —*Brita Meng*

Macintosh Holograms

 Don Cottrell, a physics professor at San Diego State University, has found that the Macintosh's excellent graphic capabilities make it an ideal tool for machine-vision research. His FFTVision software creates holograms, which serve as filters for visual pattern recognition.

The input is a two-dimensional array, which may be a MacDraw-style drawing, a video image, or text from the Clipboard. A fast Fourier transform processes the image, smearing the information in each bit of the 128-by-128 array across the screen to produce the characteristic moiré pattern of holo-

(continues)



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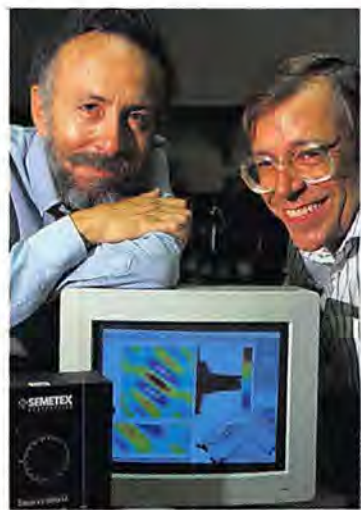
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gram film. Further processing emulates the ghostly image created by a laser shining through a hologram. The system simulates an optical test bench, rapidly and inexpensively.



Physics professors Don Cottrell (left) and Jeff Davis show their hologram-creation software.

A string of scientific papers has already spun off from the constantly improving software, and Cottrell has obtained experimental results so quickly that he can't predict the direction his research will take even three months from now.

While the present package is of interest only to advanced scientific research departments, the long-term possibilities include wordless databases of graphic information for recognizing patterns ranging from fingerprints to the genetic code. Ultimately, machine vision technology will apply the computer's speed and accuracy at processing numerical data to anything that can be portrayed as a graphic image.

With a partner, Jeff Davis, Cottrell has formed Manhasset Software to produce and market the package. It sells for \$950 and is distributed by Semetex, 3445 Rashiwa St., Torrance, CA 90505; 213/539-0201.—Toni Michael

Advanced Color



As illustrated in the 3-minute, 15-second animated film, *Pencil Test*, Apple's Advanced Technology Group has developed specifications for the use of 24-bit color that will take the Mac II into new application areas such as film and video production, high-end prepress publishing, and advertising design. Known as 32-bit QuickDraw, the new color capabilities will be built into next month's revision of the Mac system software. Users who configure a Mac II with a 24- or 32-bit color add-in board will have access to more than 16 million colors on screen at the same time.

Third-party hardware and software developers have been given the 32-bit QuickDraw specifications, and companies such as RasterOps, SuperMac Technology, and Truevision have already demonstrated color add-in boards that fit into the Mac II's NuBus slots. Theo-

companies are expected to officially release their new color boards next month at Macworld Expo when 32-bit color QuickDraw will be available to end users.

The development of these boards is still controversial, because the 32-bit QuickDraw specs were not released until last April, and developers of advanced color boards and software were without technical standards from Apple for 13 months after the Mac II's introduction. Last summer RasterOps went ahead and developed its own standard of 24-bit color for the Mac rather than waiting for Apple. (Its True Color 24-bit board is the only one now shipping, and its new board will comply with the Apple standard.)

Although the new color standard is called 32-bit QuickDraw, 24-bit color is all that is displayed. Eight bits remain empty, although Apple claims that it will make use of them in the future. In the meantime,



Notice a difference? One side is 24-bit color, the other 8-bit. The new Mac system software includes 32-bit QuickDraw, which offers lifelike color to users who configure their Mac IIs with 24-bit color add-in boards.

retically, these color boards will support 24-bit color for applications that comply with 32-bit QuickDraw. The add-in boards from SuperMac, RasterOps, and Truevision are expected to cost at least \$5000 each. Adding a high-resolution color monitor could bring the cost of 24-bit color to \$10,000 for hardware alone. All three

Truevision has filled the 8 empty bits with video effects on its soon to be released NuVista 32-bit color board.

Apple's chunky, as opposed to chunky planar, standard will allow hardware and software that comply with 32-bit QuickDraw to run without modification. Apple's goal is to create

a situation where all 32-bit QuickDraw software works with all 32-bit QuickDraw cards. The standard also increases the drawing speed for 24-bit images by storing large color images as contiguous 24-bit-per-pixel information. One operation is used to examine each pixel.

For further information, contact Apple Computer in Cupertino, California, at 408/996-1010, RasterOps in Cupertino, California, at 408/446-4090, SuperMac Technology in Mountain View, California, at 415/964-8884, and Truevision in Indianapolis, Indiana, at 317/841-0332.—Abby Christopher

Mac Dialing MS-DOS



Macintosh users now have some new ways to reach out and touch someone, even if that someone uses an MS-DOS machine: an MS-DOS client for Microsoft Mail, Symantec's completely redesigned InBox, and Dayna Communications' DaynaMail.

Microsoft's \$125 MS-DOS client program lets IBM PC users on an AppleTalk network send and receive messages from Macs. The program's character-based Windows interface gives it a different look-and-feel from the Mac, despite its ability to swap messages and attached files. A background task notifies you that mail is waiting, but you can't access the mail from within an application, as you can in the program's Mac counterpart. Microsoft hopes to give OS/2 users mail access from within an application in a new version of the Microsoft Mail package. MS-DOS client was slated to ship in October.

(continues)

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Circle 296 on reader service card

InBox 3.0 offers a modified message-filing structure, which includes the ability to organize mail in outline form by user-defined topics. Messages can be written in any font, style, and size, and the package can be used on a distributed network like TOPS, a file server-based network like AppleShare, or with its own mail server. It should be available by the end of the year.

DaynaMail, based on the MHS mail standard used in Novell networks, will run on both Macs and MS-DOS machines and will unite them in a single mail system. DaynaMail shares some of the basic features of Microsoft Mail and can also attach several files to a single message. (Microsoft Mail currently has a one-file limit.) DaynaMail also runs without a central mail server, which Mail requires, but Dayna said it will eventually offer a server-based system that could run in the background on an AppleShare file server. DaynaMail's Mac version is due out by the end of 1988; the MS-DOS version, by early 1989.

With the many mail packages hitting store shelves—including QuickMail from CE Software and a package promised by Oracle—the next issue for mail users revolves around integrating mail and applications, since users spend so much time in their applications. Microsoft plans to include mail commands in the next version of Word and hints that all its packages will include such commands eventually.

While some vendors, like Symantec, also see this integration as crucial, others think that standards for multiple enclosures are more important than settling on a standard interface between applications and mail systems.

To those vendors who favor the idea of a standard application interface, the next question is who will provide it? A lot of fingers point to Apple as the

logical decision-maker, but others think it more likely the standard will emerge as a de facto market decision or an agreement among the major mail vendors. For further information, contact Microsoft Corporation in Redmond, Washington, at 206/882-8080; Dayna Communications in Salt Lake City, Utah, at 801/531-0203; and Symantec Corporation in Cupertino, California, at 408/253-9600.—Rory J. O'Connor

Harvard Graphics



Software Publishing Corporation, the industry leader for business presentation software on the IBM PC, intends to introduce an improved Macintosh version of its desktop presentation product, Harvard Graphics, in the second quarter of 1989. The company will develop the product jointly with another California corporation, 3-D Graphics, developer of two respected products, Perspective and Boeing Graph. Product emphasis will be on color 3-D analytical graphics for the general needs of business users.

Software Publishing is coming into an already crowded and volatile market, where Cricket Software's Cricket Presents, Microsoft's PowerPoint, Letraset's ReadySetShow, and a new version of Symantec's MORE are already shipping. Others are due out soon, in-



GCC Technology's new portable printer can be slipped right into the Mac carrying case and taken to Timbuktu.

SETH HENICK

cluding Aldus Persuasion and Zenographics' PIXIE. However, Software Publishing believes that as the business community accepts the Macintosh, positive recognition of the Harvard Graphics name will pay off.

For further information, contact Software Publishing Corporation in Mountain View, California, at 415/962-8910, or 3-D Graphics in Pacific Palisades, California, at 213/459-7949.

—Scott Beamer

High- and Low-End Printers



The printer spectrum was recently boosted at both the high and low ends: Jasmine introduced a desktop PostScript-compatible device and GCC Technology introduced a 3-pound portable printer.

The GCC portable, the WriteMove, is a Macintosh version of the Diconix 150 ink-jet printer sold mainly in the MS-DOS market. GCC has added its QuickDraw imaging technology, which it used in the Personal Laser Printer (PLP) intro-

duced last year. Like the PLP, the \$699 WriteMove uses outline fonts from Bitstream and comes with six font families: Times, Helvetica, Symbol, Courier, Swiss Narrow, and Zapf Calligraphic. It prints with a resolution of 192 dots per inch (dpi).

Measuring 2 by 6.5 by 10.8 inches, WriteMove can be carried alone or in a Mac carrying case and can even run on five rechargeable batteries cleverly located inside the printer platen.

At the other end of the scale, hard disk drive maker Jasmine entered the printer market with a 300-dpi device based on an alternative to laser technology—the liquid-crystal shutter (LCS). The DirectPrint is manufactured by Qume; this printer uses an engine from Casio and a RISC-based, 4MIPS processor from Weitek. DirectPrint uses a PostScript clone, but Jasmine intends to subject the unit to Adobe's compatibility tests before releasing it in October.

Unlike laser printers, which use a moving laser beam to energize a photo-sensitive printing drum, the LCS technology uses an array of liquid crystals—like those in a portable computer screen—to admit or block light to the drum. According to Jasmine the technology has fewer moving parts than a laser printer and is therefore more reliable.

The company will charge about \$4000 for the printer; Jasmine expects DirectPrint to compete with Apple's Laser-

(continues)

The Mac version of Harvard Graphics, a business presentation package, improves on the popular IBM PC version.

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Writer IINTX and to appeal to work groups and small-to-medium-sized companies. However, Jasmine acknowledged that, unlike the NTX, the DirectPrint doesn't come with a SCSI port for attaching a hard disk drive, and adding one would require a major redesign. The printer's paper tray holds only about 50 sheets, no more than the original LaserWriter. Nonetheless Jasmine thinks it can take between 10 percent and 20 percent of the laser-class market with DirectPrint.

For more information, contact GCC Technology in Waltham, Massachusetts, at 617/890-0880; Jasmine Technologies in San Francisco, California, at 415/282-1111. —Rory O'Connor

1MB upgrade, based on 256-kilobit DRAM chips, jumped to \$499, but the biggest boost came in the 4MB kits, which now cost \$2399. The kits use scarce 1-megabit DRAM chips, but Apple says that in spite of the scarcity, it can deliver as many as 10,000 kits during the last four months of 1988. —Rory J. O'Connor

New Paint, New Color



Professional color paint software that approaches the capabilities of dedicated color systems such as the \$200,000 Quantel Paintbox is now available for the Mac II. SuperMac's Pixel-



Bert Monroy painted this scene with PixelPaint Professional.

Paint Professional provides access to an advanced color-palette system that incorporates standard Pantone colors. The software's Color Picker enables you to search for Pantone colors without referring to a

book of color samples. With a dithering feature, you can manipulate colors and develop smooth blends from just a few colors.

The program supports the simultaneous display of 256 colors or 8-bit color video, and includes a scanning module for use with 24-bit color scanners. PixelPaint Professional also provides spot color separation keyed to Pantone colors with screen angling and undercolor removal capabilities.

The 24-bit color images are converted to 8-bit color when scanned, but according to SuperMac the quality remains the same. Prescanning a 24-bit image creates a histogram of the image, and intelligence built into the software determines what colors it includes. Based

(continues)

Mac II 4/40



Memory-hungry enthusiasts can now buy a Mac II preconfigured with 4MB of memory and an internal 40MB hard disk drive—all for a list price of \$8069, without keyboard or display. The Macintosh 4/40 is aimed at buyers who want to combine memory-greedy programs like HyperCard and MultiFinder.

Rumor has it that a similarly beefed-up SE, with 2MB of RAM and a 40MB internal hard disk, will also debut, but so far all we have is an acknowledg-



ment from Apple's products president Jean-Louis Gassée that there is "a need for an SE with more memory."

Although Apple has increased the availability of memory upgrades for the Mac, it has also kicked up prices. A

Your Best Stacks



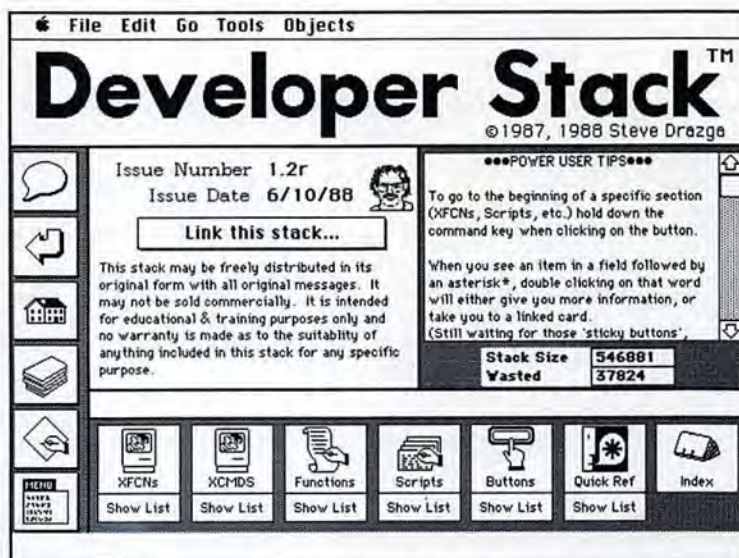
Developer Stack by Steve Drazga is my pick this month. It's a compilation of utilities useful for anyone building a HyperCard stack. I have seen other stacks that are also compilations of scripts and commands, but none is as well done as Steve's, which has a large number of external commands (XCMDs) and scripts that you can easily include in any stack you're writing. When you open the stack, a top card with buttons appears that lets you select from menus of external functions (XFCNs), XCMD's, scripts, and buttons, all of which you can add to your stack.

Selecting one of the buttons gets you a list of items for another selection, and selecting one of those items gets you a card that has two large scrolling fields, with full credit given to the original author in one

field and full documentation of the item in the other. A resource mover is included for painlessly moving these items to your own stack. This shareware stack is definitely one to download, especially if you want to do any scripting. It is

available on my BBS at 408/253-3926 or on Portal at 408/725-0561.

Please keep sending your best stacks to me c/o News Editor, *Macworld*, for consideration. —Bob "Laserman" Murrow



Steve Drazga's *Developer Stack* includes a large number of XCMDs and scripts that you can easily include in any stack you're writing.

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A scene painted with PixelPaint Professional, which approaches the capabilities of high-end color systems.

on this data, PixelPaint Professional creates a specific palette for each image so that only the colors needed to modify, edit, and manipulate it are available. Without the histogram feature, more colors would be needed for effects such as airbrushing or color separation.

SuperMac has also introduced the Spectrum/8 Series II, a new version of its 8-bit color board, which includes the Virtual Desktop, a means of scaling a desktop's size through software. The software bundled with the Spectrum/8 Series II will drive standard size monitors including the Apple 13-inch RGB monitor and SuperMac's large-screen color monitors. Hardware pan and zoom features are built into the board, and a "home" function provides the user with a constant point of reference when panning and zooming. Virtual Desktop sizes supported by the Spectrum/8 Series II software include: 640 by 480, 1024 by 768, 1024 by 1536, 2048 by 1536, and 4096 by 1536 pixels. The board operates in 1-, 2-, 4-, and 8-bit modes at resolutions of 640 by 480 and 1024 by 768 pixels; at 1024-by-1536 resolution in 1-, 2-, and 4-bit modes; and at 2048-by-1536 and 4096-by-1536 resolution in 1-bit mode. The

\$1895 Spectrum/8 Series II board comes bundled with PixelPaint version 1.1, an upgrade including speed enhancements and networking support. PixelPaint Professional software is \$595.

For further information, call SuperMac Technology, 415/964-8884. —Abby Christopher

HYPERCARD

New Directions for HyperCard



When John Sculley addressed the August Macworld Expo, he showed a series of flashy videos featuring computers that haven't been invented yet. He described HyperCard as a step in the direction of a future technology that he calls Knowledge Navigator, but the path from present to future is still unclear.

In contrast to Knowledge Navigator's fantastic feats on film, HyperCard's power is grounded in working hardware and software. The next major release of HyperCard is expected to offer multiple, resiz-

able on-screen cards—a mere detail to a visionary like Sculley, but the outcome of long and difficult coding by HyperCard developers Bill Atkinson and Dan Winkler.

Ironically, while Sculley's address attempted to highlight Apple technology, his heavy reliance on film was evidence that Macintosh graphics animations remain primitively slow and choppy. HyperTalk, in particular, lacks the execution speed that even Mac users get with more-focused applications.

Speed has become HyperCard's major challenge. The program's astounding flexibility has given rise to a new breed of lightweight programmers, a group whose only real stigma is stacks that don't run nearly as fast as the compiled programs of their Pascal, C, and assembly counterparts. Dan Winkler, the talented young author of HyperTalk, has a couple of hundred thousand stack authors waiting for him to rev up HyperCard's engine.

The direction of HyperCard remains in the hands of Atkinson and Winkler (Apple is HyperCard's publisher, but not its creator). As of yet, the Finder and systems software designers at Apple have not implemented any of the creative aspects of HyperCard in Apple's machines (for example, the Finder could certainly benefit from a HyperTalk-like scripting language).

—Scott Kronick

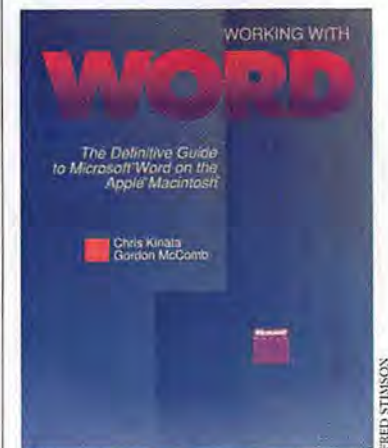
More Words on Word



Two recently released books on Microsoft Word are squaring off for a championship bout. In one corner, weighing in at a relatively lithe 578 pages, is *Working with Word* by Chris Kinata and Gordon McComb, published by Microsoft Press. In the

other corner is Michael A. Fischer's hefty *Microsoft Word for the Macintosh: The Complete Reference*, published by Osborne/McGraw-Hill.

The authors of *Working with Word* made use of their access to the program's development team to create a highly readable, enlightening book. It offers beginners the basics and also contains discussions and interesting examples of advanced features throughout the text. The authors include useful hints on document design elements (for example, "too many [character] attributes can spoil the brew"). They even describe how they created the book using Word.



Working with Word's authors explain how they created the book *working with Word*.

Working with Word's detailed chapter summaries, introduction to PostScript, "blueprints" for advanced documents, and occasional explanations of how things work behind the scenes are additional pluses. This is an elegant companion volume to the program's more homely manual.

Tipping the scales at nearly 1000 pages, *Microsoft Word for the Macintosh: The Complete Reference* seems to describe every Word feature, function, and command. An excellent table of contents and index will

(continues)

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But unless you found your 7th-grade grammar lessons entertaining, you'll soon tire of Fischer's extraordinarily elementary explanations and plodding prose. The book's very completeness is also its undoing. It goes too far, burdening you with esoteric examples; two paragraphs explain the consequences of numbering your first footnote above Word's upper range of 32767.



Microsoft Word for the Macintosh seems to describe every Word feature and function.

It's also poorly designed and overlaid with screen-dumps (even the most elementary dialogue boxes are often repeated). *Working with Word* wins this bookshelf brawl with a KO in the first round. —Jeff Merron

The High Price of RAM

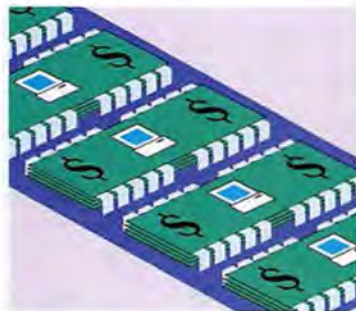


Apple's recent price hikes on Mac memory upgrades have brought the problem of DRAM shortages into sharp relief. While 256 kilobit DRAM chips are in ready supply, the larger, 1 megabit devices most in demand by Mac II owners are likely to stay in short supply through the first part of 1989.

A three-headed monster is keeping those chips out of buyers' hands: trade sanctions imposed by the United States against Japan, which supplies the bulk of the chips; too few production lines dedicated to chip manufacture; and low yields (around 10 to 20 percent good chips per run). The low-profile, surface-mounted chips—the only kind that work in a Mac SE with an add-in board—are in the shortest supply.

Additional demands for 1 megabit DRAM chips are tightening supplies still further. Laser printers, for example, are prodigious memory users. In the case of Jasmine's new DirectPrint unit, for instance, the 3-megabyte memory requirement has been a major obstacle to releasing the printer.

At August's Macworld Expo, you could back order a 1MB Single Inline Memory Module (SIMM) for as low as \$325, but \$400 was a more common price; and Dove Computer Corporation, one of the largest suppliers next to Apple, said it would match Apple's 4MB price of around \$600 per SIMM.



Some vendors predict DRAM chip shortfalls as late as the third quarter of 1989. In the meantime, most vendors are advising buyers who can't afford 1MB SIMMs to settle for a more modest upgrade with 256K chips until the shortage eases. If you have time for bargain hunting, the key word is caution: you can find deals, but there are some questionable chips on the market. —Rory J. O'Connor



Architect Sandy Barker of Barker Associates in Mountain View, California, uses Claris's new CAD package.

CAD from Claris



Claris Corporation, Apple Computer's applications software spin-off has expanded its stable of existing Mac products with a two-dimensional color CAD package. Claris CAD is based largely on the core engine and user interface of MacDraw II, which Claris says lets users quickly create basic drawings for later enhancement. The package is aimed at a variety of drafting professionals, including engineers, architects, mechanical designers, construction engineers, and industrial designers.

Claris divides design packages into three categories of complexity and puts Claris CAD in the most complex category. "MacDraw II is more for the graphic artist," said product manager Anjali Magaña. "We wanted to scale this product to do what workstation CAD can do." The company hopes to undercut its competition with the \$799 price.

Though Claris wants to compete with AutoCAD, experts point out that AutoCAD is a 3-D package, and Claris CAD is 2-D. Claris CAD also lacks the extensive programming features that many say are the key to AutoCAD's success in the MS-DOS world.

Claris CAD can import MacDraw and MacDraw II files and PICT files. It supports a wide variety of printers and plotters—about two dozen—from Apple, Hewlett-Packard, and Houston Instrument. Users who have AutoCAD or workstation-based CAD packages can also import and export IGES and DXF files—two standards used by such products—if they buy an optional \$299 translator package available from Claris.

Claris includes a training videotape with the package and claims that it will let users get "from zero to 80 percent knowledge" in 45 minutes. Release is expected by the end of 1988.

For more information, contact Claris Corporation in Mountain View, California, at 415/960-1500. —Rory J. O'Connor

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2039	Winter Games	15.
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Greene, Inc. ... CP		
2268	Crystal Quest 2.2C	26.
4119	Crystal Quest w/Critter Editor 2.2C	42.
Infinity Software ... CP		
2518	GO	27.
2519	Grand Slam Tennis	27.
MacroMind ... NCP		
2772	Mazewars+	31.
MEDIAGENIC ... CP		
1339	Shanghai	24.
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2868	Flight Simulator	32.
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2787	MSFL Pro League Football	32.
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2764	Down Hill Racer	24.
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2750	Trust & Betrayal: Legacy of Siboot	30.
2751	Uninvited	30.
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3110	Strategic Conquest Plus 1.3	35.
PCAI ... NCP		
4212	MacCourses	32.
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Sari (and Jonah) Shifrin
Ann Arbor, MI

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3-D in Perspective

Zoom out for a wide-angle view of the Mac 3-D software market



Wire-Frame



Hidden Lines
Removed



Contour Shaded



Color Shaded
No Polygon Outlines



Color Shaded with
Polygon Outlines



Color Shaded,
Polygon Outlines,
and Shadows

Figure 1

These variations, created in Swivel 3D, illustrate some of the different types of 3-D images.

W

by David L. Peltz

When *Macworld* last looked at 3-D graphics software ("3-D, Take 2," May 1987) the entire market consisted of five software packages. Now the field has expanded to a score of programs, with more expected soon. Some of these programs are aimed at very specific markets, while others have wide applicability.

If you're an engineer, designer, architect, technical illustrator, or artist who needs to create realistic images in three dimensions, choosing the right package from among the wide array of offerings can be a tough call. It will help if you understand a few things about how 3-D programs work generally and if you know, at least in broad terms, the strengths and weaknesses of the currently available Mac packages.

Image Types

Any 3-D image is a projection in two dimensions of an object that has been defined in three-dimensional space. These projections take various forms (Figure 1).

A **wire-frame** image is the easiest type of 3-D image to generate, requiring the least amount of memory and the least processing. Solid lines define the edges and shape of an object, as if wire had been used to model it. All lines are visible, including those that would be hidden if the object were solid.

Hidden-line images look like wire-frame images except that lines that are behind others from the cur-

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rent viewpoint do not show. This eliminates some ambiguity in the image and gives it a solid appearance.

Shaded images can be either in black and white or in color. Surfaces that face a light source appear lighter, and those facing away from the light look darker. Curved surfaces are represented by small, adjoining facets. The more facets used, the better the curves and the more realistic the image.

Ray traces are the most realistic images as well as the most complex and time-consuming to generate. To render a ray tracing, the software shoots rays of light from every light source in a model, and bounces them off of every point in every object to calculate what gray-shade or color that point should be under the given lighting conditions. The more sophisticated algorithms take surface reflectivity, transparency, and texture into their calculations (Figure 2).

Antialiasing is a mathematical process for reducing the stair-stepping that appears on slanted edges of screen images. This isn't a type of image, but an enhancement technique that can be applied to ray traces or shaded renderings.

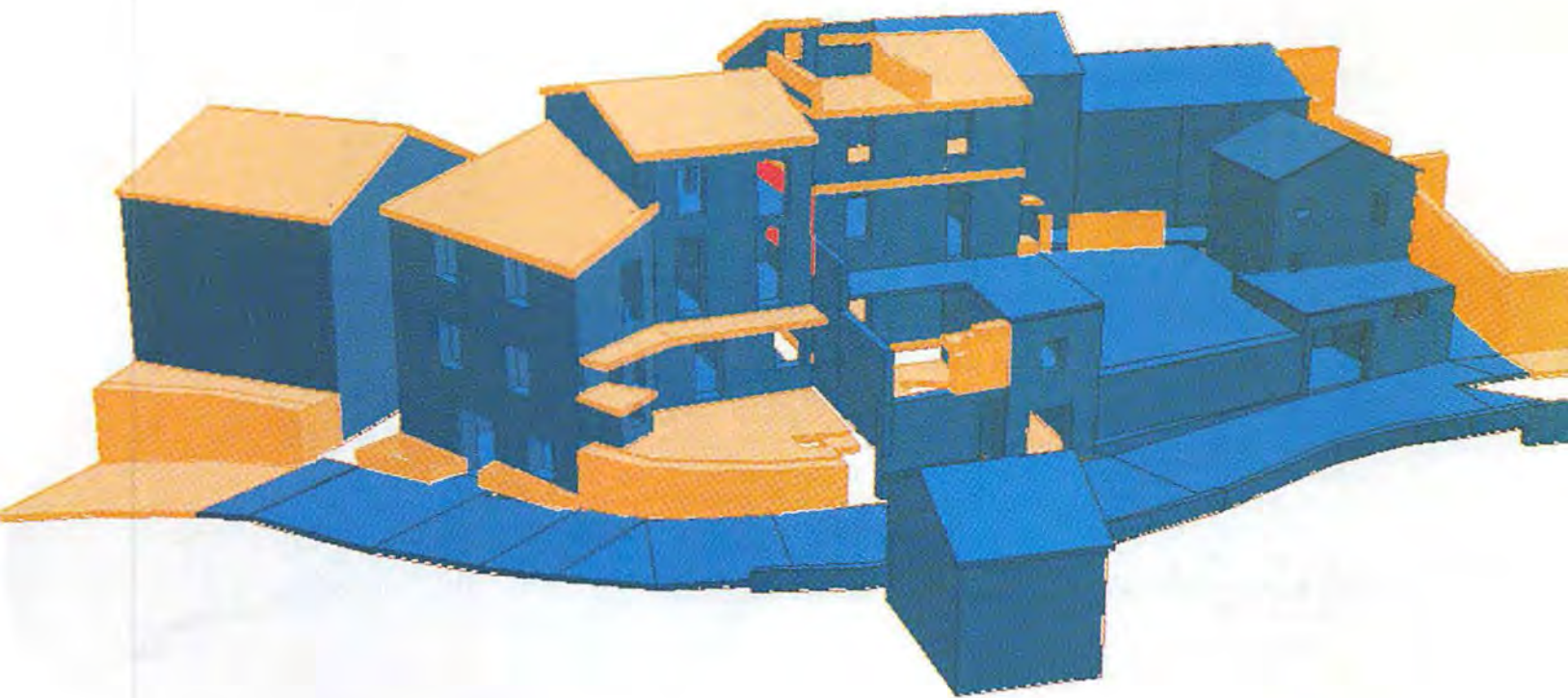
Each image type listed above may be presented in two forms. **Orthogonal** views are those that maintain parallel representations of parallel edges. **Perspective** views use vanishing points; lines converge and everything farther away is shown smaller.

Modeling

The methods different programs offer for creating 3-D models vary considerably. Some are easier to use than others, some provide more accuracy, and some can achieve effects that others can't.

Coordinate or numeric input is the simplest but most tedious form of 3-D object creation. Using the keyboard, you define a line by entering the *x*-, *y*-, and *z*-coordinates of the endpoints, and/or its length. For an arc or circle you enter a center and radius. This method's strength is its accuracy.

3-D Primitives: Rather than deal with 2-D lines one at a time, some products let you create complex objects by taking simple 3-D objects, or *primitives*, such as cones, blocks, cylinders, and spheres, and combining them into more complex shapes. For exam-



It took Archicad nearly 30 minutes to generate this color-shaded rendering of an Italian village, though a monochrome, hidden-line wire frame required only seconds to create. The database contains descriptions of the insides of all buildings—see the red lines visible through some windows.

Figure 2

This ray trace, created in a prerelease version of Byte by Byte's Sculpt-Animate 4D, took eight hours to render on a 4MB Mac II. The image makes use of multiple light sources, antialiasing, and the program's reflectivity and transparency features.



ple, if you add a hemisphere to the base of an inverted cone you'll get something that looks like an ice cream cone. In addition to putting primitives together to create a desired shape, you can sculpt by subtracting negative space from an object. For example, you can subtract a cylinder from a shape to create a hole. Some 3-D software comes with disk libraries of primitives, other programs offer you menus of primitives to choose from. If you are good at visualizing how shapes break down into geometric components, this can be a fast way to work.

Curved 3-D surfaces are used for those objects that do not readily lend themselves to the primitives building-block technique. A modern automobile is a good example: the roof, fenders, and trunk lid are most likely made up of a series of complex curved surfaces. Some 3-D programs enable you to create these complex surfaces by stretching and distorting a 2-D polygon that is displayed as a mesh. In other packages you specify the *x*-, *y*-, and *z*-coordinates of specific points on the surface, and the program then generates a curved mesh connecting them. Both of these techniques take skill and practice to master.

Multiview input allows you to simultaneously view and perform model creation in multiple windows. One window might show a top view, another a side view, and yet a third might show a front or oblique view. If you add a circle to the front view, it shows up as a line on the top and side views. If you add depth to the circle in one window, it becomes a cylinder. Multiview is a popular input method, since it reproduces

the basic 2-D mode in which designers and drafters are trained to work. However, some users find working simultaneously in multiple windows difficult.

3-D Operations

In addition to these basic image-creating methods, defining a desired 3-D shape may require any of an additional series of operations:

Revolving (also known as turning or lathing) is a process whereby you take a 2-D shape consisting of lines or curves and rotate it 360 degrees around an axis to create a 3-D object. For example, if you revolve a rectangle, you get a cylinder.

In **extruding** you numerically extend a 2-D shape in the *z* direction, raising, for example, walls from floor plans, or pushing out cylinders from circles.

Surface sweeping—easier to do than to describe—is a sophisticated operation that simultaneously revolves, rotates, translates, and resizes a 2-D shape in order to create a 3-D object. For example, to create the nautilus shell in Figure 3, you'd start with a small circle. You could then specify that the program connect and copy the circle while simultaneously translating it outward in a circular motion, making each copy larger than the last.

Connecting of cross sections is a special form of combining wherein one 2-D shape is connected to a

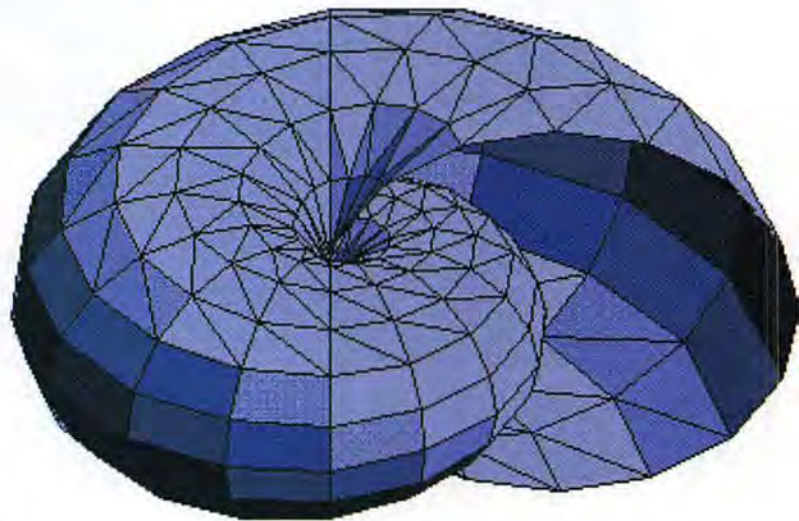


Figure 3

Surface sweeping is one means of creating complex shapes. Super 3D created this nautilus shell by duplicating, enlarging, and rotating a single circle.

different one to form a 3-D object. If you connect a square to a rectangle, you get a 3-D block whose surfaces are not parallel (Figure 4).

Reshaping (also known as stretching or distorting) is a procedure that moves part of an object to change its shape or size. Typically you grab handles or control points on the object and move them to resize that part of the object. Some of these facilities are more sophisticated than others, offering more or less control. Two products, Easy3D and Pro3D, limit stretching to only two directions, x and y .

To **join** is to combine 3-D objects in such a way that they intersect to form more complex shapes than are formed by simply adding primitives together. Calculating the shape of the intersection formed when a rod pierces a cone, for example, is a complex task. Some programs are up to this job, others aren't.

Image Manipulation

Zooming and panning are all you need to move 2-D images around the screen. In the world of 3-D, you need some new tools to move around and get the image you want.

Rotating enables you to look at an object from different angles or viewpoints. You can rotate the object (spinning it on its axis) or the viewpoint (viewer circles the object). The difference between these operations may not be apparent at first: they have the same effect only when an object exists in black space, with no context—no other objects, no light source. If you think of the object in a context, say a room, you can see that the two types of rotation make for different views.

Translating is a fancy term for moving an object in 3-D space—up, down, in, out, left, right. Again, you have two choices: move the object or the viewpoint.

Zooming in 3-D provides more than just the ability to move the viewpoint toward or away from an object (or vice versa). It also can simulate viewing the object through lenses of different focal lengths. This is important in perspective views, as the focal length dramatically affects the size and overall appearance of the object. As with a camera, the wider the lens, the more distorted the lines of the perspective image will appear.

General-Purpose 3-D Products

Now let's turn from features to products, where the taxonomy of 3-D programs comprises some four categories. The biggest category by far is the general. The following packages are stand-alone programs that enable you to define, display, and manipulate images of 3-D objects of nearly any type, shape, or size. The images can be directly printed or exported to graphics, desktop publishing, or other programs.

Easy3D was one of the earliest Macintosh 3-D products. From Enabling Technologies, Easy3D produces shaded, monochrome images. It does not run on a Mac II or under any System beyond 4.0 and Finder 5.5.

Figure 4

By combining a square and a rectangle, Swivel 3D's facility for connecting cross sections created this solid.



Easy3D does not allow numeric input; you create 3-D shapes by sketching them freehand in multiple windows with the mouse. While this technique lacks precision, the program is good for learning about 3-D.

Pro3D is Easy3D's successor. The screen looks exactly the same, but there are big differences between the two programs. On an SE, Pro3D regenerates images twice as fast as Easy3D. Measuring and other numeric facilities have been added, so input can be more precise. Pro3D offers more output format choices, and the shading is more realistic. (Enabling Technologies has announced a line of Pro3D clip art, for those who want 3-D art but don't want to create it.)

Mac3D, from Challenger Software, is a precise, flexible, general-purpose program for creating nearly any type of 3-D object. Its user interface contains 18 3-D primitive icons, eliminating many importing or copy-and-paste operations. You can also add up to 18 icons that represent your own custom shapes.

With Mac3D you can open multiple documents and cut, copy, and paste between them. On a monochrome Mac you can use 8 colors via a menu. On a Mac II the program supports 256 screen colors.

Mac3D enables you to rotate individual objects separately. Extensive lighting controls give you flexibility in image appearance. A nice program, but nothing exciting.

SpaceEdit, a 2-D/3-D design and presentation tool from Abvent, is rich with 3-D drawing and manipulation capabilities. It also rivals CAD programs in capability, including dimensioning and built-in plotter sup-

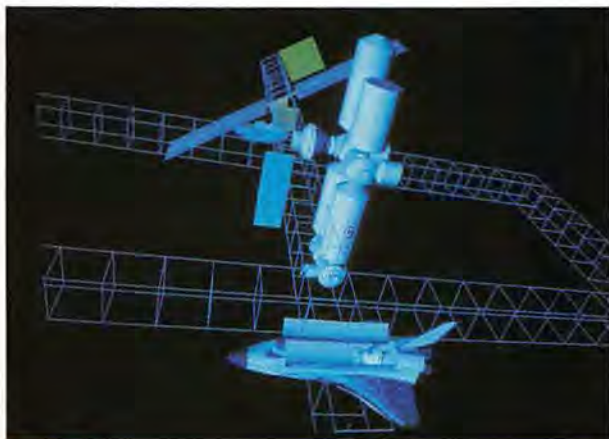


Figure 5

This Super 3D scene is from an animation depicting the workings of NASA's space station.

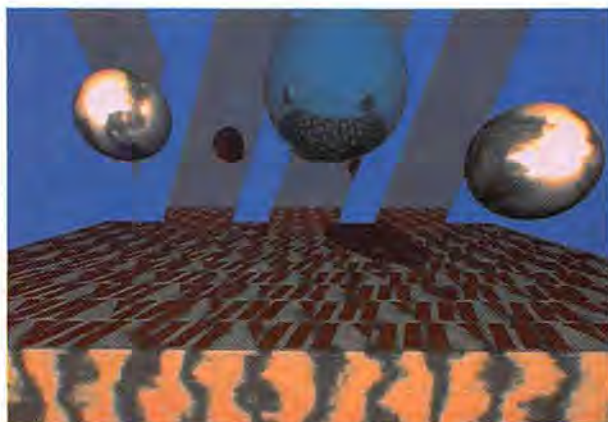


Figure 6

This Dimensions ray trace shows the program's new abilities to create spectral highlights, reflections, and transparent reflections. (Ray trace created by Visual Information.)

port. One feature useful to architects and planners is SpaceEdit's ability to simulate a *heliodonic* view—a perspective view along the axis of the sun according to the season, latitude, and time of day.

To create a model in SpaceEdit, you start with 2-D representations and then give them height or depth. You can work in one or four variable-sized windows. You can describe a fly-through path, and SpaceEdit generates a series of perspectives that follow that path.

This is not a program for the occasional user. Learning its many features takes considerable time and effort. The learning curve isn't made any flatter by a user manual that lacks an index and is sometimes difficult to understand. Additionally, many icons on SpaceEdit's menus are unique and not intuitive to a casual user. But, for those interested in defining precise 3-D models of large or complex objects, the investment of time in learning SpaceEdit will pay off. Like most European software, this French creation is copy protected.

Super 3D, from Silicon Beach Software, offers a lot of power, precision, features, and flexibility, considering its low price. The program is also easy to learn and well documented.

It allows you to create accurate, complex 3-D objects by using any of a wide range of menu choices to transform simple 2-D shapes into solids. You can even select the degree of precision. Super 3D uses two coordinate systems—World (absolute) and Screen (relative)—to enable you to precisely describe the location of objects and the relation of the viewpoint to the objects. You can create files of animation frames in which objects move in relation to the "camera," or vice versa. And you can write text scripts—lists of commands—that describe multiple simultaneous movements. An example might be a scene in which the camera appears to fly by an object while parts of the object move and rotate.

As I write this, the color version of Super 3D is still being beta tested. Prerelease copies and samples indicate that the color renderings will be of excellent quality (Figure 5).

Super 3D is for those who need a lot of easy-to-use power, who can live with images of somewhat lower resolution than those produced by Dimensions, and who can benefit from animation.

Swivel 3D, from Paracomp, is an easy program to learn, and it's very fast. It can quickly generate color and monochrome shaded images of extremely complex makeup.

Swivel 3D offers a unique set of controls that enable you to easily define linkages between parts of an object. On a human figure, for example, you can define the joints so that the head, arms, and legs can move only within realistic limits. On a bicycle, you can specify that the wheels spin, the pedals crank, and the handlebars rotate.

You can use Swivel 3D's *tweening* feature to generate a series of images for an animation. In tweening you create two frames—one that shows where everything is at the beginning of a sequence, one that shows where everything ends up—and the program fills in

Figure 7

To generate perspective views in MacPerspective, you must enter all the x-, y-, and z-axis information numerically and then remove hidden lines one by one. Although this sounds like a lot of work, it's still faster than doing it the old way.



the intervening frames. You must export the sequence to another program, such as VideoWorks II, for viewing.

Creating objects with complex surfaces couldn't be easier; you work in four windows and pull and stretch outlines until you get what you want. Also, only Swivel 3D lets you cast shadows on images. One weakness in the program is the lack of numeric input; you have to eyeball everything.

The documentation is excellent and guides you through every operation. This is one you can learn in a few hours, and it's most useful to people who must visualize the motions of objects with moving parts.

Dimensions, from Visual Information, has the distinction of being the 3-D program that produces the most realistic images—it's also the most expensive of the general 3-D programs.

Not only can Dimensions produce renderings at any resolution—including ultrahigh resolution (4000 by 4000 pixels)—but it's presently the only 3-D product that can take advantage of 24-bit color hardware. It also supports the widest choice of output devices, including all standard Mac printers, color thermal-transfer printers, pen plotters, and 35mm slide makers. Add to this the program's ray-tracing and antialiasing capabilities, and it's easy to see why just about every color monitor maker uses Dimensions images in its ads. The images rival those created on graphics workstations and mainframes (Figure 6).

It takes a significant effort to learn how to use Dimensions properly. A completely revised manual helps, but you're still in for a long training period. And because the calculations for ray-tracing an image are complex and many, don't look for instant generation of these high-quality images. The process can take min-

utes, or hours. On the positive side, a batching facility allows the program to generate multiple-image sequences unattended.

Dimensions is actually three separate programs: Design Dimensions, for object creation; Solid Dimensions, for manipulating the viewpoint and rendering the image; and Animate.

Architectural Products

Architectural programs come in two types or levels of capability: *architectural rendering* programs are visualization tools that enable you to create three-dimensional views of projects but not working drawings. *Integrated architectural design* packages are more like CAD programs; in addition to generating 3-D and orthographic views, they enable you to produce dimensioned working drawings, bills of materials, and cross sections.

MacPerspective, from B. Knick Drafting, is a low-cost package for creating wire frames of architectural projects (Figure 7). A no-frills program, it gives you basic capabilities for inputting and viewing 3-D images.

Accuracy is assured by requiring numeric keyboard input of all coordinates and end points. This can be tedious. However, once input is finished, you can view the project from any angle. To obtain a more realistic image, you must manually remove hidden lines one by one. The finished hidden-line image must then be exported to another program to add shading and fills.

MacPerspective may not be state of the art—its columns in "3-D in Depth" are pretty empty—but it works. The ability to visualize a project, easily generat-

3-D in Depth

	Easy3D	Pro3D	Mac3D	SpaceEdit	Super 3D (B & W)	Super 3D (Color)	Swivel 3D	Dimensions	MiniCad	MacPerspective	Archicad	MacArchitecture
Version	1.01	1.10	2.10	2.20	1.00	0.95	1.00	1.19	4.07	3.2B	3.00	3.5/3.7
Price	\$149	\$349	\$249	\$625	\$295	\$495	\$395	\$2500	\$495	\$219	\$3950	\$1499
Category												
General-purpose	•	•	•	•	•	•	•	•				
CAD-related									•			
Architectural										•	•	•
Runs on												
Mac 512K	•	•	•	•	•	•			•	•		
Mac Plus and SE	•	•	•	•	•	•	•	•	•	•	Not in U.S.	v3.5
Mac II			•	•	•	•	•	•	•	•	•	v3.7
MultiFinder			•		•	•	•	•	•	•	•	•
Object creation												
Numeric input		•	•	•	•	•		•	•	•	•	•
Snap-to grid		•	•	•	•	•	•	•	•	•	•	•
Primitives, icons, menus	•	•	•	•	•	•	•	•	•	•	•	•
Primitives libraries	•	•	•	•	•	•	•	•	•	•	•	•
Multiview input	•	•	•	•	•	•	•	•	•	•	•	•
Number of simultaneous views	1 to 4	1 to 4	1	1 or 4	1 or 4	1 or 4	1 or 4	1 to 16	1 to 4	1	1	1
Open multiple windows			•						•			
Create curved 3-D surfaces							•	•				
Define linkages							•					
Image type												
Orthographic and perspective	•	•	•	•	•	•	•	•	•	•	•	•
Transparent wire frames			•	•	•	•	•	•	•	•	•	•
Hidden-line wire frames			•	•	•	•	•	•	•	•	•	•
Hidden-line contours							•					
Shaded polygons	•	•	•	•	•	•	•	•	•			
Ray traced renderings								•				
Antialiasing								•				
Monochrome shading	•	•	•	•	•	•	•	•	•		•	•
Color shading			•	•	•	•	•	•	•		•	•
Color on Mac II			•	v.2.2	•	•	•	•	•		•	•
Number of colors			8 or 256	256		256	256	16.7 million	256		256	256
3-D manipulations												
Rotate/move entire objects	•	•	•	•	•	•	•	•	•		•	•
Rotate/move object elements				•	•	•	•					
Rotate/move world	•	•			•	•	•	•	•	•	•	•
Rotate camera	•	•	•	•	•	•	•	•	•		•	•
Move camera	•	•	•	•	•	•	•	•	•		•	•
Orbit camera			•									
Zoom	•	•	•	•	•	•	•	•	•	•	•	•
Dolly					•	•		•	•			
Lighting												
Number of light sources	2	2	6	1	4	4	1	1	1		1	1

	Easy3D	Pro3D	Mac3D	SpaceEdit	Super 3D (B & W)	Super 3D (Color)	Swivel 3D	Dimensions	MiniCad	MacPerspective	Archicad	MacArchitriion
Vary intensity	•	•	•	•	•	•	•	•				•
Vary location	•	•	•	•	•	•	•	•	•			•
Create shadows							•					
Sun position				•								•
3-D operations												
Rotate, lathe, turn	•	•	•	•	•	•	•	•	•			
Extrude	•	•	•	•	•	•	•	•	•		•	•
Sweep surface					•	•						
Connect cross sections					•	•	•	•	•			
Reshape, stretch, distort	X & Y only	X & Y only	•		•	•	•	•	•		•	•
Join, combine	•	•	•	•	•	•	•	•			•	•
Animation												
Dynamically rotate/ translate								•				
Create stored multiple frames				•	•	•	•	•				
Playback stored frames				•	•	•		•				
Tweening				•	•	•	•	•				
Text animation scripts					•	•						
Export PICT frames							•					
Image export												
Scrapbook/Clipboard	•	•	•	•	•	•	•	•	•	•	•	•
PICT		•	•		•	•	•	•	•	•	•	•
MacPaint	•	•					•					
PostScript		•										
Encapsulated PostScript (EPS)					•	•				•		
ASCII text files			•		•	•		•	•			
Pen plotter				•				•	•		•	•
Finder screen backgrounds					•	•						
MSC/pal FEM meshes								•				
Export other formats								•				

3-D in Depth

A close examination of the 3-D products currently available for the Macintosh reveals that collectively they have over 200 different features and capabilities. Space limitations prevent listing and describing them all. Use this table as a starting point in your search for a 3-D system.

ing different views until you find the ones you want to render, saves time and effort over manual drawing.

ModelShop, from Paracomp, is a conceptual design and visualization tool for architects and urban planners. (As I write this article, ModelShop is very close to release; that's why I describe it here instead of

in "Where Are We Headed?" However, it's also why the program isn't in the features table.) A surface-oriented object modeler, ModelShop allows you to easily create shaded color renderings of architectural projects (on a Mac II), or even entire cities, and to view them from any angle.

ModelShop enables you to import 2-D data via PICT, SCHEMA, or DXF files and then extrude or rotate the 2-D shapes to make 3-D objects. Finished renderings can be exported in PICT, DXF, or encapsulated PostScript (EPS) format, for use in a variety of other applications.

MacArchitriion and **Archicad** are two fully integrated 2-D/3-D architectural packages from Europe.

Where Are We Headed?

By the time you read this, a number of interesting new 3-D products that were unavailable for testing as I wrote this article will be shipping. In addition, products will continue to roll out at a rapid pace for another year.

At SIGGRAPH in August, Pixar demonstrated its 3-D graphics engine working on a Mac II. The company has also been actively seeking Mac developer support for its RenderMan format.

Plans are afoot to create other standard 3-D file formats, including one tentatively called 3DGF. MacroMind and a few other Mac developers have already announced their inten-

tions to develop new file formats that will lead to greater and easier interchange of 3-D models between different applications.

On the product scene, Klex Software is introducing a product called CompuGraph. It has the ability to rotate complex wire-frame models in real time, and it will be useful to engineers and designers in conceptual design stages.

CAD developer VersaCAD announced that version 2.0 of VersaCAD/Macintosh Edition will include a full 3-D visualization facility that will work in multiple windows and display any mix of isometric, perspective, wire-frame, hidden-line,

and color-shaded renderings. Also new are three HyperCard stacks: Parametric Drafting, Spreadsheet/Database, and Drawing Manager.

At this writing Graphsoft is in beta on MiniCad Plus. This complete rework of MiniCad integrates the 2-D and 3-D functions, and adds macro capability, enhanced color features, and a new spreadsheet/database facility.

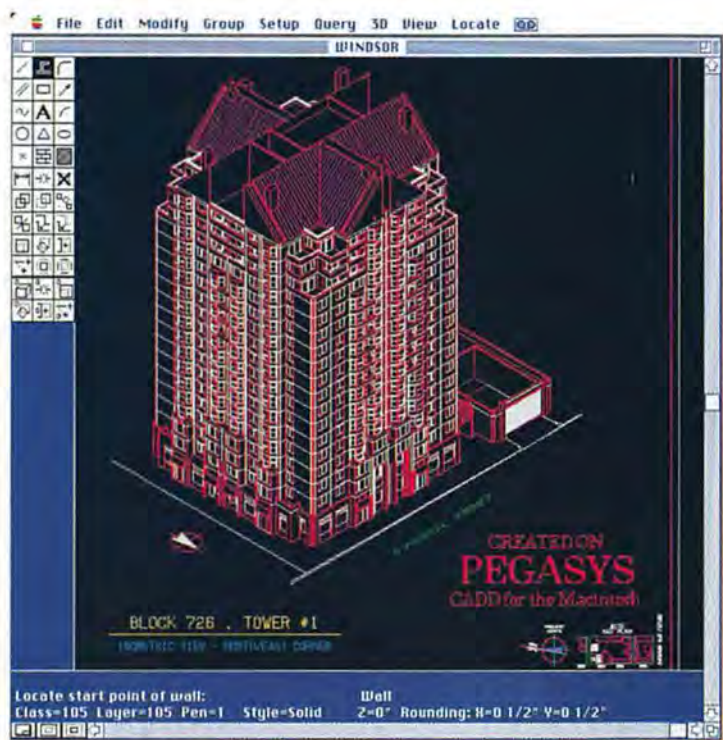
IGC Technology is releasing two 3-D versions of its Pegasys 2-D CAD product: Pegasys II and Pegasys Expert. The latter is designed especially for the Mac II (see "Pegasys Expert").

Infinite Graphics has a full-blown 3-D-CAD and solids-



DynaPerspective

Dynaware's new \$1495 3-D program called DynaPerspective is the first Japanese 3-D software to reach our shores. It was previewed at Macworld Expo and shows great promise.



modeling package—called In-CAD—that's scheduled for release by the end of this year. The program is already available on other platforms.

Autodesk's AutoCAD, Release 10, is a full 3-D-CAD system also due for release late in 1988. It will be available on other platforms in addition to the Mac.

Dimensions developer Visual Information has plans for separating the program's rendering facilities from its model-creation facilities in a way that will allow it to import and use 3-D models created on other applications. Visual Information has also been demonstrating new reflectivity and surface-texturing capabilities.

Abvent plans to release in late 1988 a new 3-D solids mod-

eler/animation package to be called Zoom. Abvent claims that Zoom will do ray tracing, antialiasing, and animations that follow complex paths. The program will display animation in real time.

By the time you read this, Dynaware, a Japanese software developer, will probably have released its DynaPerspective, a \$1495 3-D rendering package with a very intuitive interface. This promising package incorporates many of the best features of other 3-D programs and adds a few of its own (see "DynaPerspective").

At SIGGRAPH, a small Austin, Texas-based company called Byte by Byte was showing the beginnings of a new 3-D program for the Mac II tentatively called Sculpt-Animate 4D. Avail-

Pegasys Expert

When released, Pegasys Expert will enable you to create accurate and detailed architectural and engineering 3-D views like this.

ability is predicted for the end of 1988, and price is projected to be less than \$1500.

If this program becomes a reality, Dimensions is going to have some tough competition. Highlights include the ability to work with up to 24- or even 32-bit color plus DXF file input, RenderMan input, full animation, and ray tracing with reflectivity and transparency. At the show, I saw images supposedly created on a Mac II, playing back on a Mac II in full real-time animation.

VideoWorks II publisher MacroMind is in the process of extending its animation capabilities into the 3-D arena with a product to be called 3D Works. MacroMind showed this product at Macworld Expo in Boston, and while it looks interesting, it's not due for release until sometime down the road.

The field of presentation graphics is reaching out for 3-D capability as well. Software Publishing Corporation, the publishers of the well-known MS-DOS product Harvard Graphics, has announced that it will distribute a Mac product by 3D Graphics, best known for its Perspective presentation graphics and charting packages in the MS-DOS world.

France's Gimeor produced MacArchitron; Archicad, by Graphisoft, comes from Hungary.

In the European software-protection tradition, both products require SCSI port installation of hardware keys. One of the major problems with this type of protection is that it's impossible for developers to know what else you may be installing on your system so as to avoid incompatibilities. When I installed both of these keys on my Mac II, neither program would operate.

Both products allow you to create 3-D models of architectural projects, to view them in 2-D and in 3-D, and to create 3-D perspective views as well as dimensioned 2-D working drawings. Both products give you facilities for automatically generating bills of materials, tables, and other listings.

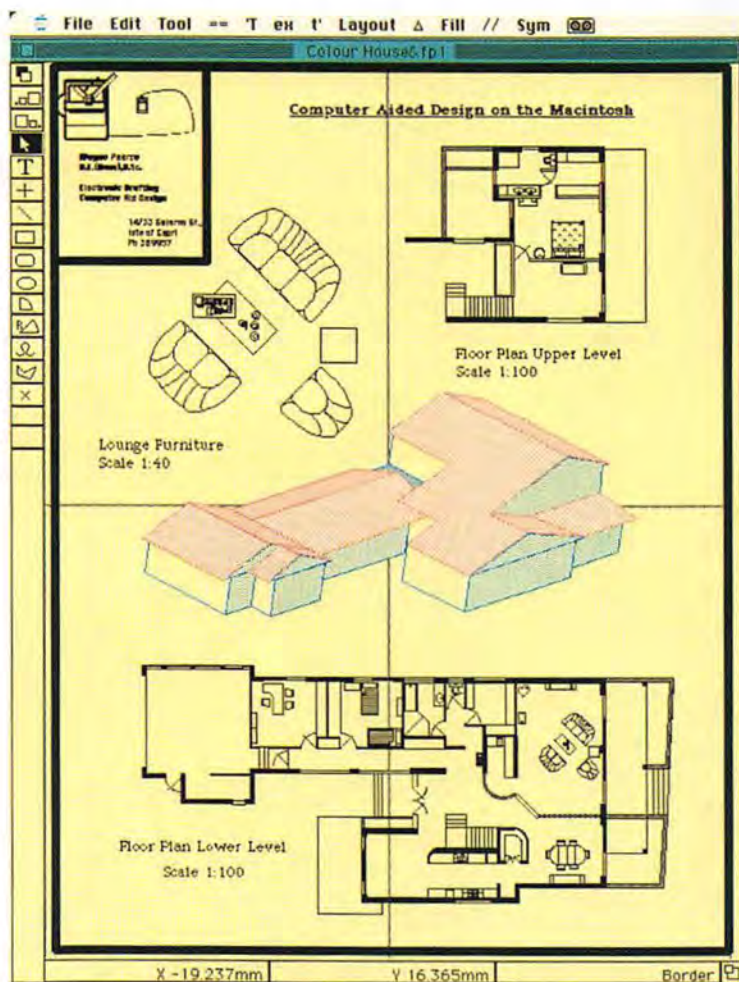


Figure 8

Minicad enables you to combine 2-D drawings with 3-D renderings. The program's 3-D abilities are being extensively refined.

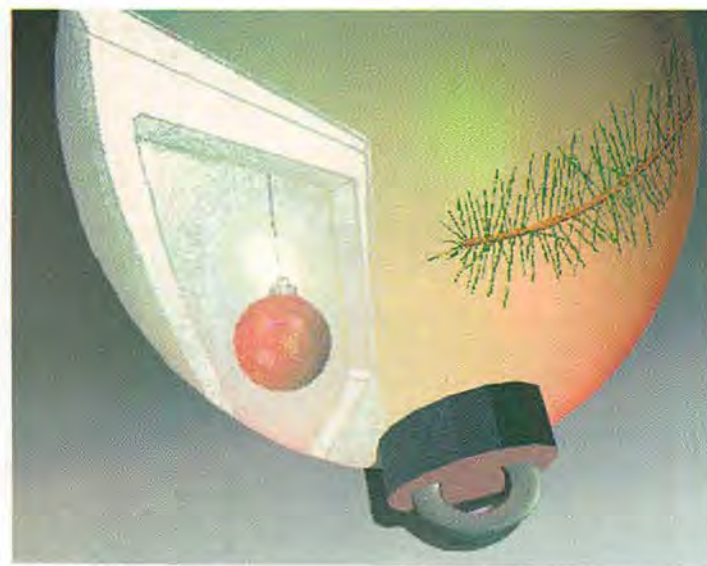
Although similar in design objective, these products differ in implementation. For example, you create models in Archicad by combining floor slabs, walls, roofs, windows, and doors, whereas in MacArchitron you use blocks, openings, frames, inclines, and so forth. I found Archicad easier to learn and somewhat more intuitive. It also produces shaded renderings, and MacArchitron produces outline-only views (see illustration on page 109).

On the other hand, MacArchitron, in addition to being a lot less expensive, has more features. It is faster than Archicad in outline-only 3-D view generation and has the unique ability to switch from one stored view to another without regenerating—a time saver. MacArchitron is also better documented and much better supported in the United States.

Neither of these products is for the occasional user; both require a major time investment to achieve mastery. Professional architects looking for a total Macintosh solution should examine both.

CAD Products

As this article goes to press, at least four CAD-related 3-D products are in beta test phase but have not yet been released (see "Where Are We Headed?"). These programs have built-in 3-D databases and some 3-D object-creation capabilities. They provide the ability to create annotated or dimensioned engineering drawings in 2-D as well as 3-D and they offer some 3-D image manipulation. Until the new offerings come to market, however, MiniCad is the only program in this category.



Strictly Ornamental

MacroMind's Stuart Sharpe employed a video digitizer to simulate reflectivity in this image. Using Macvision, he captured an image of an SE reflected in a pot lid. He then applied this reflection to the Christmas ball in VideoWorks Professional by means of a transparent paste. Sharpe used 3D Works to define the balls and set the three light sources, and Pro3D to create the "collars."

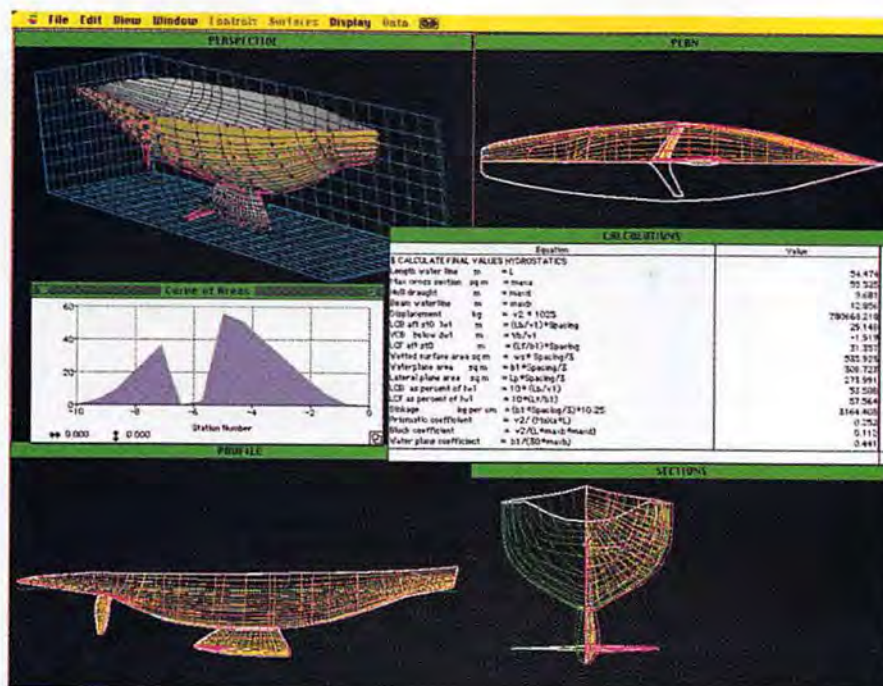


Figure 9

Ahoy, sailing enthusiasts. Recognize a 12-meter yacht when you see one? MacSurf is perhaps the most sophisticated 3-D design product now available for the Mac.

MiniCad, from Diehl Graphsoft, is a complete CAD system with separate 2-D and 3-D editors. It produces fully dimensioned 2-D engineering drawings as well as shaded 3-D perspectives. You can transfer the latter back to the 2-D editor for inclusion in the 2-D drawings (Figure 8).

MiniCad's creation of 3-D views from 2-D plans is relatively straightforward. Compared to the general-purpose 3-D products, MiniCad doesn't have quite as many 3-D facilities. But this lack is more than offset by the numerous 2-D drafting tools it offers.

Special-Purpose Products

These programs do a specific type of work well but are not suited for doing anything else.

Planit, created by England's Microspot and distributed in the United States by CompServCo, is aimed at kitchen designers. It includes on-disk catalogs of kitchen cabinets and accessories from a number of manufacturers.

You can lay out a kitchen with ease and precision by using 2-D plan and elevation views and adding cabinets and appliances where desired. The program then generates a color perspective view that enables clients to visualize what the finished kitchen will look like.

MacSurf, from Graphic Magic of Australia, is distributed in the United States by Chance & Company, designers of the America's Cup yacht *Stars and Stripes*. The program was created for the design of boat hulls by naval architects.

MacSurf is a highly advanced 3-D-CAD, surface-modeling, analytical, and visualization program with many sophisticated features and extremely fast image generation. You can simultaneously display, modify,

and animate multiple color views of a design, including shaded perspectives (Figure 9). And you can plot the design at any scale, including full-size.

More than any other 3-D product to date, MacSurf demonstrates just how far the Macintosh can go to do tasks that were once the domain of mainframes and expensive workstations. It does, however, require the use of a hardware key to operate.

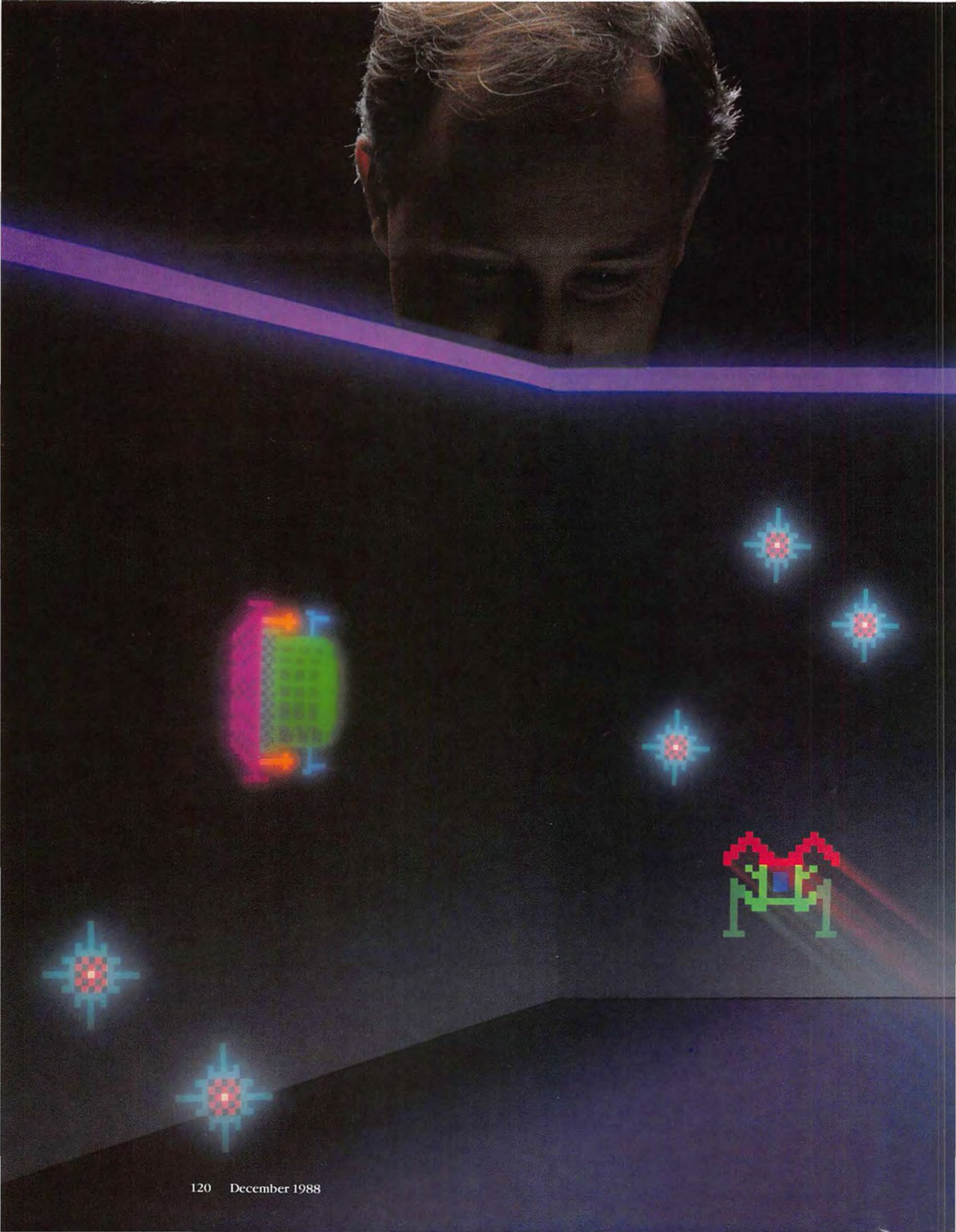
Final Perspective

Collectively the manuals for the products in this article occupy 4 feet of space on my bookshelf, and the software nearly fills an 80MB hard disk. Condensing this mass of material into a single article was a challenge, but hopefully this survey has provided you with some basic information on the range of Macintosh 3-D options now available.

Enhancements and new products over the next year will include 24- and 32-bit color; advanced animation techniques; and the ability to calculate surface texturing, reflectivity, and transparency.

On the hardware side, we've already seen the first deliveries of 24-bit color boards. Graphics acceleration engines for the Mac aren't far behind—a few were previewed in August at SIGGRAPH and Macworld Expo. Combined, these two new types of hardware will give the Mac the means to produce even more realistic 3-D images more rapidly and will help close the narrowing gap between the Macintosh and higher-priced workstations. □

See *Where to Buy* for contact information.



The Game Hall of Fame

W

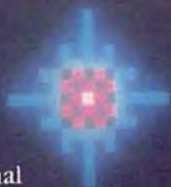
e have bad news and good news about the Macintosh Game Hall of Fame. First the bad news: we have yet to determine a permanent site for the Hall. Things just got out of hand, what with dozens of cities and townships throughout the land pleading their cases as the spiritual birthplace of Mac gaming, and offering free real estate, huge tax breaks, and in some cases—dare we say it?—outright bribes. We can't blame them, because the Game Hall of Fame would be a boon to any tourist industry, and without major pollutants to boot. But we have to draw the line somewhere, and we've reluctantly decided, until conditions change or the bribes get really big, to leave the Hall where it is—in the imaginations of desktop jockeys all over the Macintosh community.

Now for the good news: we are adding another annex this year, to accommodate the games that have come out in the latter part of 1987 and most of 1988. A few folks objected. Their complaint was that the rigid though highly subjective selection process of Hall members should be revised. They say that instead of a game's needing the 100 percent endorsement of the one-voter judging board, maybe there should be something more... democratic. Maybe a poll. Call Yankelovich or the Harris guy.

We dispatched those meddlers without much problem. Listen, we said, if it ain't broke, don't fix it. The Game Hall of Fame is going into its third year. It is now widely known as the final and authoritative word on what is

For the third year running, the best games are inducted into Mac game immortality

by Steven Levy

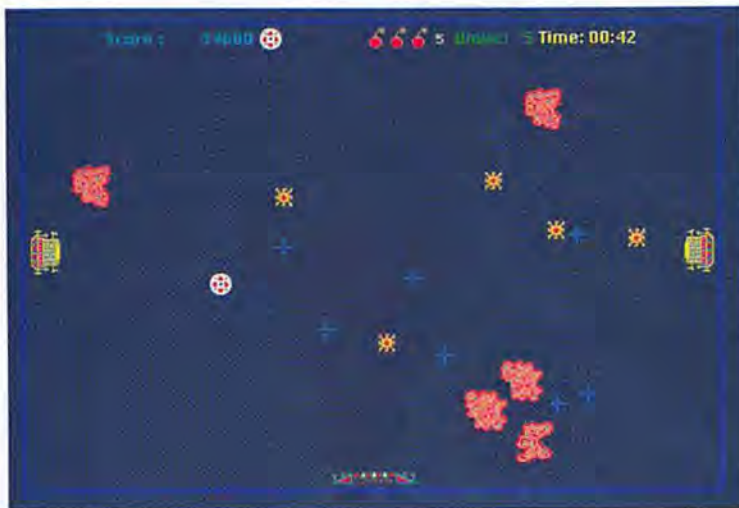


great in the world of Mac gaming. And the voting board has been unchanged from year one. This is what you call tradition. Mess with tradition—as you Shakespeare fans know—and the skies open. Disk drives get wet. Do we want this mess? Not on your life, cousin.

Not that we're closed to improvements. In fact, this year we have opened up the process by instituting a Board of Game-Crazy Advisors. This year's board includes such luminaries as Keith McCandless, long-time *Macworld* reviewer; John Markoff, chronicler of the industry for a major New York rag and a Mac II air-warrior; Adrian Mello, *Macworld* senior editor and antiproduktivity expert; and Erik Engstrom, a BMUG (Berkeley Macintosh user group) bigwig whose gaming qualifications include the ultimate advantage—he's 15 years old.

This year's process went like this: We solicited suggestions and recommendations from the board, added them to our already encyclopedic knowledge of Mac games, and locked ourselves in a knotty pine-lined cabin in the Berkshires. Ignoring country vistas and balmy summer weather, we wore our mouse to a frazzle playing games, and ultimately emerged with this year's additions to the Game Hall of Fame.

A few thoughts: Though games are still not appearing in floods for the Mac, their quality is higher than ever. One happy surprise is the number of publishers who take advantage of the capabilities of the Mac II. A disappointment is the paucity of great shareware games; that enterprise seems to be slowing. Overall, though, the new additions to the Game Hall of Fame are worthy successors to their predecessors. Those who would lower standards are thwarted again.



Crystal Quest

The player (the round cursor on the lower left) must avoid the onslaught of the pink blobs, called Dumplings. You move from level to level by avoiding a variety of antagonists, collecting all the crystals scattered around the window, and escaping through the gateway at the bottom of the screen.



Best Action Game

Crystal Quest

Every year we get totally hooked on some brainless shoot-'em-up. Our spouses complain. Our deadlines fade away. Our insistence that the game has therapeutic value sounds hollow—it's taken over our lives! Crystal Quest was this year's obsession. The game is so simple to play it's almost embarrassing: Use the mouse to run over "goodies" to collect points while avoiding projectiles and ramming forays from deadly "nasties." Clear the prizes on screen and go to the next level. But the assortment of nasties is so varied—and the sounds they make so delightful—and the thrill of avoiding them while grabbing goodies is so addictive that we felt like playing Crystal Quest forever. As it is, we never got beyond a score of 2 million. But other questers go far into the night, running up scores until the men in white take them away. A bonus: in this version, Casady & Greene Inc. offers you the option of creating your own nasties, or "critters," with your own sounds—to fully customize the game. Rightfully, the CritterEditor should be included in the basic package. But realistically, who cares? Playing the vanilla version of the game eats up too much of your time as it is.

Honorable Mention: Arkanoid. A demented marriage of Breakout and Space Invaders, with numerous frills, ably ported over to the Mac from the coin-operated version.



Best Role-Playing Game

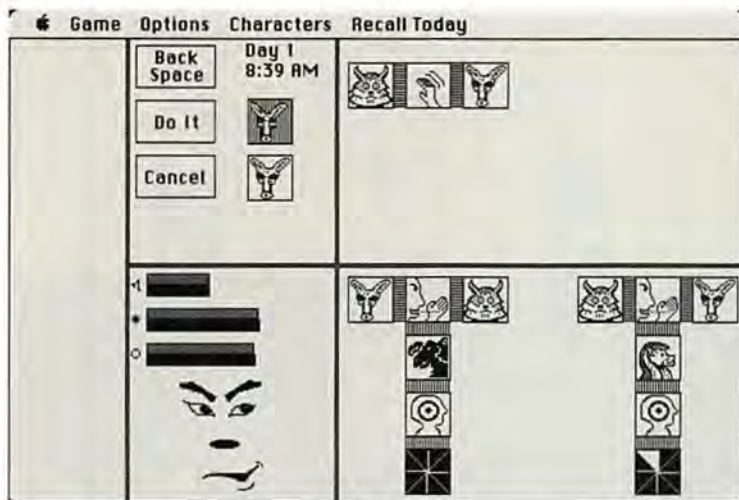
Trust & Betrayal: The Legacy of Siboot.

Game designer Chris Crawford has scored well before (Balance of Power, and others), but we think that Trust & Betrayal is his best effort to date. The plot is complicated—so much so that it's essential to read the novelle included in the documentation. I'll give you the basics: You play the part of Vetvel, one of seven characters involved in a paranoically intertwined rondelay of intrigues on the elaborately conceived world of Kira. Using a Crawford-designed, icon-based language to communicate with your peers, you visit others, exchange information, try to gain their trust, and figure out how you can advance your cause by safely betraying one or more of them. If you wheedle and cajole the proper information from your colleagues, you can slip into their beds at night and steal their auras, in your campaign to become the Shepherd of Kira. (It plays better than it sounds.)

There's more palace intrigue here than in a fistful of Shakespeare plays. As befitting a game this deep, it takes a while to get the hang of it, but once you do, you'll be fascinated by the layers of personality unfolding in the various characters. And since you're so deeply involved, your behavior as Vetvel can become a litmus test of your own foibles and peccadillos. All in all, Trust & Betrayal is a landmark in computer gaming, perfectly simpatico with the Macintosh, and deserving of its own cult.

Honorable Mention: Reach for the Stars.

A well-implemented scenario of economic empire building in outer space, which you can play with up to four players.



Trust & Betrayal

This game uses a deceptively simple hieroglyphic-style language. Here, the player, as Vetvel, has visited his colleague Gardbore, and solicited information about two other acolytes attempting to become shepherds. You can see by Gardbore's expression that he's being rather sneaky.

AWARD Best Arcade Game Beyond Dark Castle

This could have been a front-runner in the adventure category, as well; much of this brilliant sequel to its Hall of Fame predecessor is based on problem solving rather than hand-eye coordination, and it takes multiple sessions to complete the quest of Prince Duncan to collect the five magic orbs and destroy the Black Knight. But ultimately, this game delivers excitement in true arcade tradition.

Like the original Dark Castle, this game is still the only one that perfectly tailors its action to the motions available with the Mac keyboard and mouse. The graphics are equally stirring, and the list of perils has increased. So has the number of rooms you must conquer. But there are also more weapons available—besides rocks and fireballs, you now have bombs, gasoline cans, and even a chopper-pack to zip you over obstacles—and Beyond Dark Castle lets you save a game in progress. The most controversial addition is a feature that allows you to practice getting through each room—while you're in this "training mode" you get unlimited lives and weapons. Purists gripe, but this option is a boon to those who might not otherwise be able to meet some of Beyond Dark Castle's heady challenges. Our only complaint is that we hear this is Silicon Beach's last game. Maybe Prince Duncan can prod those guys with a lance until they agree to just one more sequel.

Runner-Up: Apache Strike. Some say it's monotonous. But playing this helicopter search-and-destroy opera gave our wrists a workout like they haven't had since the hokey-pokey.

AWARD Best Adventure Game The Colony

Not since *Déjà Vu*, another technological wonder first crafted on the Mac, has the adventure genre been advanced so elegantly and excitingly. The screen provides the point of view of a space traveler searching a distant colony in hopes of acquiring the wherewithal to restart a damaged spaceship. Three-dimensional graphics provide a realistic foreground for this intricate drama, which also requires some arcade-style blasting and not a little ingenuity. Though almost no typing is required (beyond entering a "security code" into the computer from a cardboard decoder, a necessity apparently inserted to thwart piracy), the play is complex, as you must negotiate six levels of the colony to complete the quest. You don't have to solve the game, though, to derive pleasure from the seamless interactivity it provides. The Colony, written by master hacker David Smith, puts us one step closer to the ultimate adventure game, in which the player is totally absorbed in the alternative reality created by the game's designer.

Honorable Mentions: Beyond Zork is a triumphant return by the Infocom adventure series to its dungeon roots, with myriad improvements on the original. **Police Quest** is an innovative graphics adventure that suffers only from the quality of its graphics (ported over from the IBM version) and its laconic use of the Mac interface.



Beyond Dark Castle

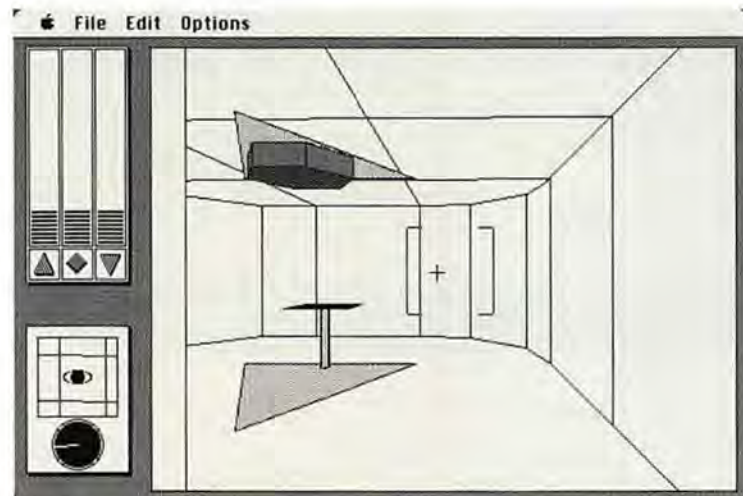
One of several screens you encounter in the rich and varied world of Beyond Dark Castle. Prince Duncan jumps on the clock tower's counterweights to reach the helicopter pack that will carry him over the forest to retrieve another orb. The bottom of the screen provides a variety of information on the player's status, including the number of orbs already retrieved.



Best Simulation

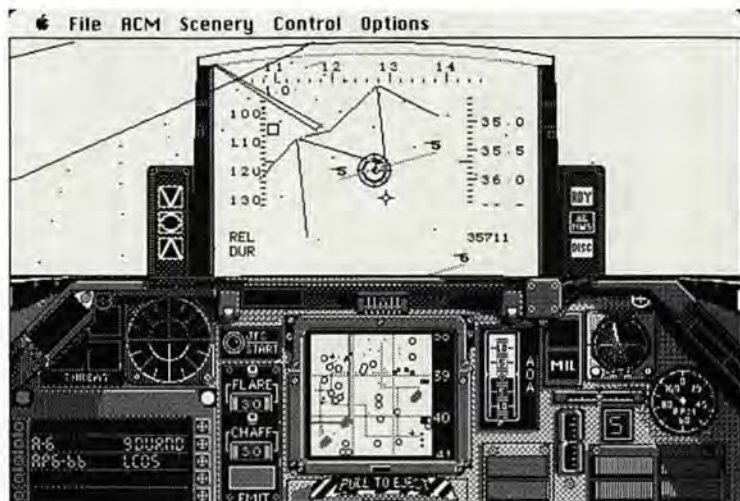
Falcon. We've seen great flight simulators before, but from the instant you are strapped into the F-16 in this one and hear the sonic whoosh of the engines, you know you're in for something special. In fact, this program is to the original Flight Simulator (a charter Game Hall of Fame member) as the ultra-high-tech F-16 is to a Cessna. We admit that we've never flown one of these things in real life... but we are certainly convinced that this is what it would feel like if we did. The graphics are stunning and the digital sound compelling. There's even a controller's voice correcting your mistakes and commenting on them wryly. The documentation tells you everything you want to know about your craft and assures you that you're in the hands of people who know what they're talking about. While it does take a while to become proficient at flying the Falcon, it's worth the effort—after some practice you'll be qualified to attempt some of the frighteningly realistic bombing runs and dogfights your flight controller will assign you. You know that the authors of Falcon have succeeded when you finally quit the program and eject into everyday reality. Your palms are sweaty, your heartbeat takes a while to slow, and you realize that, in your mind, you've actually been in a cockpit at Mach 2.

Honorable Mention: Orbital Mech. A delightfully intricate simulation of the challenges of docking a space shuttle with a space station while in orbit. Published by a one-person company for reasons as much educational as recreational, this is a well-designed, well-drawn program in which author Dale Greer's enthusiasm for orbital dynamics is wonderfully conveyed.



Colony

The view from Colony. On the left you see how much power and armor you have on your space suit, as well as a direction indicator. On the right, a 3-D representation of what you see as you attempt to reconstruct the mystery of the travelers who've gone before you.



Falcon

A typical hair-raising view from the Falcon cockpit. Learning to read the proliferation of instruments takes a while, but absorbing the readings becomes second nature to good pilots. Right now the Falcon is dive-bombing. The targets are helpfully located on the map in the low central screen.



Best Strategy Game

Tetris. The packaging and marketing of this brain-teasing gem are based on the fact that it was conceived by some Soviet computer scientists. So while you play it, Russian folk songs drone to a backdrop of Volga scenes. But it's not the glasnost that makes Tetris terrific—it's the addictive quality of the game itself. As with many of the best games, its very simplicity is bewitching. The idea is to arrange little polygons of various shapes into patterns, preferably solid shapes. The difficulty is that you must do your arranging as the polygons fall from the top of the screen to the bottom, a task that gets increasingly harder as the game progresses. So your problem is twofold: figure out the best way to fit the pieces into the jumble below, and do it before they hit the bottom. If you do this well, the pile gets shorter, and expert players can extend a game for quite a while. But no matter how long you play, you'll have reason for self-recrimination and want to try again. (For a closer look at Tetris see *Reviews* in this issue.) An added bonus is that you can install the game as a desk accessory and play it while spreadsheeting or databasing. Obviously a Soviet plot to undermine our productivity.

Honorable Mention: Ogre. Billed as a tank simulation, Ogre is actually a challenging battlefield strategy game. It's especially engaging when two players take on the opposing roles of defense force and Ogre, a killer super-tank.



Best Sports Game

World Class Leader Board. Two years ago, MacGolf seemed the sine qua non of golf simulations—it lacked only the split-second timing factor re-

quired in real golf, that instinct that comes once you've chosen the club, figured out how far to hit the ball and whether to hook or splice, and gauged the wind pressure or the break of the green. This is where the glory and frustration of real golf occurs, and this is where Leader Board shines. It uses a clever system of mouse clicks to approximate the timing of a golf swing, and though the skill required to master this bears little similarity to that demanded on the actual links, it's tricky enough to challenge any computer golfer, especially in the advanced mode. The graphics are fine, and they redraw themselves after each shot with sufficient speed. Digitized sounds include a gallery that applauds your successful long putts and groans appropriately when you fall just short of the cup. The four courses included range from interesting to maddening, but Leader Board doesn't stop there—one of the game's best features is a "course architect" mode where you can design your own. So once you get tired of challenging Curtis Strange, you can take on Robert Trent Jones.

Honorable Mention: Shufflepuck Cafe. Yes, barroom shuffleboard is a sport. And yes, this game gives the flavor of taking on some wizards of the sport, with the added ambience of the *Star Wars* saloon.

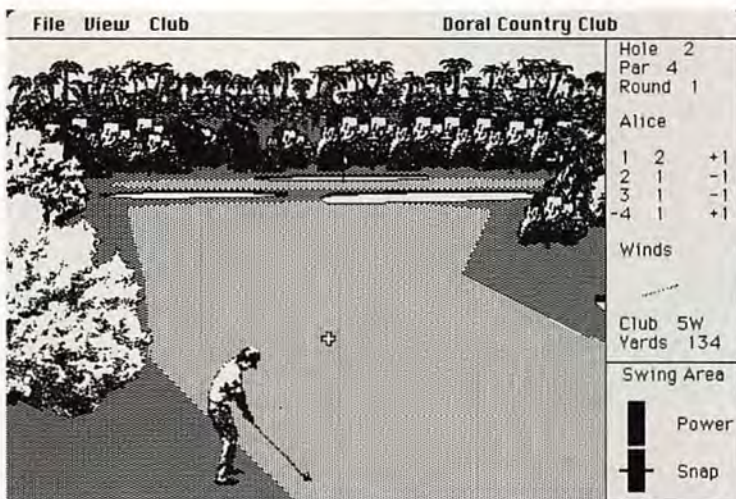
Best Multiplayer/Network Game

Falcon. The same game we talked about above, but on an AppleTalk network you can have a real-time dogfight with your friends. Although not as action-packed as last year's winner of the category, Air Warrior (where dozens of people log on to GENie and fight wars), Falcon is a definite distraction to networkers.



Tetris

Here's a look at the color version of Tetris, which had not shipped by press time but should have by the time you read this article. You play the game by rotating and stacking falling polygons to make rows at the bottom of the screen.



World Class Leader Board

Taking a second shot at the second hole of the Doral Country Club. Fortunately, the golfer is on the fairway, and should be on the green in position for a birdie. Note the all-important "power-snap" indicator on the lower right—you use it to gauge the power and accuracy of your shot.

Honorable Mention: Smash Hit Racquetball

II. On AppleTalk, you can get a good game from a friend. More troublesome on modems.

Best Mac II Game

Crystal Quest, in CritterEditor

version. With all the hoopla about the Mac II as a "serious" machine, we really didn't expect game publishers to take advantage of its color, graphics, and sound capabilities. What we didn't realize, and the publishers probably did, was that this year's premium machine is next year's standard. And that the pioneering Mac II people are as much suckers for game play as their low-end counterparts. In that spirit, we think that Crystal Quest plus CritterEditor should be standard equipment on the big Mac. (See the Action category for a fuller explanation of this game.) The CritterEditor even has a little color-paint capability. It's enough to make Amiga owners ditch their machines and get serious.

Honorable Mention: Chuck Yeager's

Advanced Flight Simulator. Real pilots dream in technicolor, and this simulator lets you choose your craft to realize your dreams. Also don't miss MacGolf Classic, where the greens are green, the waters blue, and the trees don't look like textiles. □

See *Where to Buy* for contact information.

Steven Levy, a Macworld contributing editor, has been caretaker of the Game Hall of Fame since its inception.





Twenty Megabytes and Spinning

*A dozen and one hard disk drives that
will satisfy your personal storage needs*

by Ron Risley

A Mac without a hard disk is like a house without closets. Sure you can get by with a floppy disk collection, but sooner or later you'll want to unpack your bags and move in. As applications balloon in size—and as HyperCard stacks, digitized beeps, and color paintings vie with budgets and memos for storage space—investing in a hard disk drive becomes a necessity. Though hard disks come in ever-increasing capacities, the 20-megabyte models continue to outsell the rest. And while you may subscribe to the bigger-is-better

school of hard disks, 20MB is a lot of storage when you're used to working with floppies on a Plus or an SE. I looked at 13 20MB hard disks, and evaluated each for compatibility, performance, ease of use, and environmental concerns like footprint and noise.

Ready to Run

All the hard disk drives I reviewed come complete with the necessary cables; all hard disks are preformatted and ready to boot. If you don't have any other SCSI devices connected, you can attach any of these drives to the SCSI port using the supplied cable, turn on the drive and the Macintosh (in that order), and you'll be up and running. The only problem I had was with the CMS hard disk, which wouldn't boot on a Macintosh Plus until I removed an INIT that was designed to fix a bug in System 5.0 (the INIT causes no problems on a Mac SE or II, but is unnecessary if you're using System 6.0 or later).

The units all come set up for optimum performance on a Macintosh Plus. If you're using an SE or a Mac II you'll generally want to reformat the disk to take advantage of performance improvements. All the hard disks include formatting software, but the quality of the software varies widely from hard disk to hard disk. CMS Enhance-

ment's SD20 and GCC Technology's HyperDrive FX/20 have the most flexible, easy-to-use formatting packages, both of which automatically recommend the optimum interleave and driver for the system you're running. Software supplied with the Crate Technology ST225N and MacProducts USA's MagicDrive 20 gives you a choice of Plus, II, or SE formatting. Reformatting the Everex EMAC 20DL, Rodime 20+, and SupraDrive disks doesn't improve performance on the SE or II, while the Apple Hard Disk 20 and MicahDrive XT20 automatically configure for best performance.

Chaining Daisies

If you have two or more SCSI devices connected together (a configuration known as a *daisy-chain*), life gets a bit more complicated. You must make sure that each device has a unique SCSI address. Units like the Everex EMAC 20DL, PCPC MacBottom HD21, and Warp Nine Engineering Photon 20 are the easiest to configure: setting the SCSI address is a simple matter of pushing buttons on the back of the unit until the address selector shows a number between 0 and 6 that hasn't been used yet. To set the Apple Hard Disk 20SC's SCSI address you need a paper clip. The MicahDrive XT20 and Rodime 20+ require a small screwdriver for turning a rotary

switch. The GCC, MacProducts USA, and the Relax Technology Hard 20 Plus and MiniMate 20 drives let you set the SCSI address by running the formatting program. While this all-software approach is clean and appeals to the technocrat in me, I found it a bit less convenient than pushing buttons when I had to change drive addresses often. The CMS and Crate Technology units are more difficult to set up, requiring a glance at the manual to translate binary jumper or switch settings to a SCSI ID. The SupraDrive is the most difficult to prepare; it requires that you open the drive case and manipulate jumpers on the board inside.

Another consideration when attaching two or more SCSI devices is cabling. All of these hard disks are designed to attach to the 25-pin SCSI connector on the Macintosh, even though many of the drives have standard 50-pin SCSI connectors on the drive itself. If you plan to daisy-chain two or more devices that use the 50-pin connectors you'll have to buy a 50-pin-to-50-pin SCSI cable to use in place of the 25-to-50-pin cable supplied with those drives.

If you plan to attach three or more SCSI devices to one Macintosh, things get even more interesting. The first and last device on any SCSI daisy chain must have a

The Apple Hard Disk 20SC is noisy, pricey, and offers only average performance. Still, it has what no other drive in its class can offer: that six-color, rainbow-striped apple.



The Crate Technology (formerly AppleCrate) ST225N has user-hostile jumpers for setting its SCSI address, but it's a good value with an exceptional two-year warranty.



The CMS SD20 represents a good dollars-per-megabyte value, is exceptionally quiet, and comes with good formatting software.



The Everex EMAC 20DL is only an average performer for the money, and its case, which can accept an optional tape drive, has an inconveniently large footprint.

terminator—a simple electronic device that keeps signals on the SCSI cable from reflecting back along the cable after they reach the end. Any devices between the first and last (an internal drive counts as a first device) must not have a terminator. Some of the drives tested have an external terminator that can be easily removed. Other drives have internal termination; if you plan on using a drive like this in the middle of a daisy chain you'll have to poke around inside the drive case.

One last warning: cabling fanatics should keep the total length of all the cables in a single SCSI daisy chain under 20 feet. While the 6-foot cables supplied with some of the drives are convenient for some installations, shorter cables are in order for systems with four or more drives.

Rating Performance

It's difficult to reduce hard disk performance to just one or two numbers. Two basic factors affect the perceived performance of a hard disk. The first, and easiest to measure, is *seek time*. That's the time required to move the drive's read-write head from one track of the disk to another (see "Moving Heads"; for more information on how hard disks work, see the article "Getting Started with Mass Storage" in this issue). The second factor is the *transfer rate*,

the number of bytes per second that the disk drive can transfer to or from the Macintosh. Sounds simple so far, but the seek time and transfer rate are interrelated, and their relative contribution to perceived performance is hard to predict. Under some conditions Drive A, with a very fast seek time but low transfer rate, might outperform Drive B, a slow-seeking but fast-transferring drive. Under different conditions Drive B might be faster. To further complicate matters, seek time can be expressed as a best-case number (the time required to move the head to an immediately adjacent track) or as an average value. The transfer rate depends on a variety of factors, including the number of bytes being transferred, the way the drive is formatted, the driver software installed on the disk, and the type of Macintosh the drive is connected to.

I ran performance tests on each hard disk drive. The tests were performed on a 1MB Macintosh Plus using a plain System 6.0 Folder straight from the Apple distribution disk. I formatted each hard disk according to the manufacturer's instructions before testing, and I configured the hard disk being tested as the start-up device.

To measure the low-level or basic performance of the hard disk drives, I used the venerable DiskTimer II utility by Steve

Brecher and a benchmark of my own design that served primarily as a reality check (see "Macworld Benchmarks Explained"). As might be expected, the results from these tests were generally not as optimistic as the best-case results often quoted by the manufacturers. If you need to evaluate a drive not on this list get a copy of DiskTimer II (it's free and available from most online services and user groups) and test the hard disk's performance yourself before you buy.

The results of the tests appear in "Macworld Performance Tests." This chart shows only the results of read operations; writing speed has much less effect on perceived performance, and on all the drives I tested, writing speed was essentially the same as reading speed.

After reformatting the hard disks, I performed a second set of tests on a Macintosh II to determine how well a given hard disk/software combination takes advantage of the higher transfer rates available on the Macintosh II or SE. Most of the hard disks performed significantly better. The MagicDrive 20 and the MiniMate 20 are exceptional performers on the Mac II, but the EMAC 20DL, and the Rodime 20+ showed no significant improvement. (The MacBottom HD21 also rated about the same on the Mac II test as it did on the Plus, but only be-

The GCC HyperDrive FX/20 includes backup, security, and print spooling software, and its formatting program is good, but the cable supplied with it should be a bit longer.



The MicahDrive XT20 is a quiet drive with a good price per megabyte. It includes partitioning software.



The MagicDrive 20, from MacProducts USA, is a good dollars-per-megabyte value. Its extra switch-controlled power outlets help make up for its large footprint. This hard disk drive performs quietly and quickly on a Macintosh II.



Moving Heads

To read a specific piece of data, a hard disk drive system must first position its read-write heads over the correct *track* (tracks are concentric rings of data recorded on the surface of the disk). That operation, called a *seek*, is the slowest part of accessing data. Seek times vary, depending both on the drive mechanism and on the distance between the starting track and the desired track, but generally range from about .018 to .2 seconds.

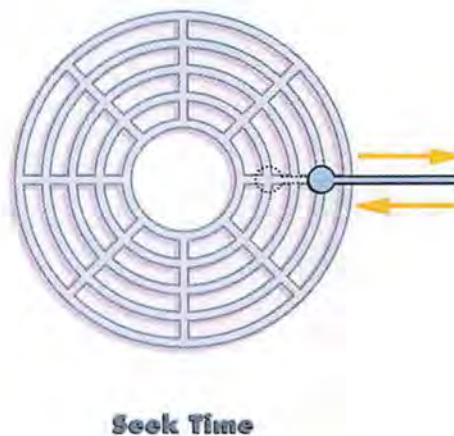
Next the system waits until the desired *sector* (an arc-shaped slice out of the current track) is underneath the read-write heads. Since disks typically spin at about 60 revolutions each second (3600 rpm), that latency time can range from 0.0 to 16.7 ms ($\frac{1}{60}$ second). Then the data is transferred one bit at a time from the read-write heads to the SCSI controller in the drive. Typical raw transfer rates are around 5 million bits (about 600K) per second.

After the read-write head has scanned the entire sector (drives always access data in

whole sectors), the SCSI controller transfers the data one byte at a time to the Macintosh. The SCSI transfer rate is typically limited to about 135K per second on the Macintosh Plus, since each byte must be individually acknowledged by the CPU as it's transferred. Some drive systems circumvent this restriction with careful timing. The Macintosh II and SE both have circuitry that implements a hardware handshake so that the processor needn't acknowledge each byte. Coupled with higher CPU speeds, SCSI transfer rates on the Mac II can exceed 600K per second, as fast as the raw transfer rate of hard disk drives.

Suppose the data being read spans more than one sector. Unless the file is fragmented, the additional data is probably in the next sector. If the CPU in question isn't a Macintosh II, chances are that the SCSI controller is still transferring bytes from the first sector when the beginning of the next sector passes under the read-write heads. Most controllers are unable to read one sector while

transferring a previous one, so the next sector is lost. After the controller finishes transferring the first sector, it must wait for the disk to make a full revolution before reading the second sector. To read all of the sectors on a track (typically 32), the controller would have to wait for the disk to go around once for each sector. In order to avoid this inefficiency, the controllers can lie about the position of sectors when formatting the disk. In a typical Mac Plus configuration, the system interleaves the sectors so that two physical sectors fall in between any two logical consecutive sectors (see "Interleave"). For example, when the controller finishes reading sector 1, it can transfer it while two logically "nonconsecutive" sectors pass under the heads. By the time sector 2 is under the heads, the controller has finished transferring sector 1 and is ready to read sector 2. With this interleave, known as 3:1, the controller can read the entire track in three revolutions.



cause its Mac Plus performance is already as good as most hard disks' Mac II performance. PCPC has better II/SE drivers under development.)

What About the Real World?

Since few of us can buy hardware without regard to cost, it's important to know just what the performance numbers really mean. Is a drive that seeks in 18 milliseconds (ms) and transfers 4000 kilobits per second really worth, say, \$200 more than a drive that takes 35 ms to seek and only boasts a 2500 kilobits-per-second transfer rate? To help answer this question, I ran a few tests using real-world data and some common applications (see "Mac-world Performance Tests"). Keep in mind that these tests aren't as accurate an indicator of a hard disk's performance as the controlled benchmark tests. Subtle operating conditions can cause a hard disk to fare better or worse than a manufacturer claims it will, and those same conditions may vary from system to system. The purpose of the real-world tests is to show how a few milliseconds of seek time or a few hundred kilobits per second of transfer speed affects an actual Macintosh application.

I used the Finder to duplicate a 500K folder containing small (5K to 40K) files. Next I duplicated a single 777K file. Duplicating many small files places more emphasis

on seek performance, while the single file duplication emphasizes transfer rate. Opening a 300K Excel document, importing 100K of text into HyperCard, and opening a 100K MacDraw II document show how hard disk performance might affect common applications. Some operations, like copying files in the Finder, were markedly affected by hard disk performance, with the fast MacBottom outpacing the lethargic SupraDrive two to one. Loading data files into applications was much less sensitive to hard disk performance; the MacDraw II test showed only a few percent variation across all hard disk drives. If you work primarily in a single data-intensive application you'll be less concerned about hard disk performance than if you frequently launch different applications and manipulate a lot of files.

Software Extras

A variety of software extras come packaged with many of the hard disks. All of the units reviewed can use the HD Backup program bundled with Apple's System software. The MacBottom HD21 provides a special version of PCPC's HFS Backup, and the Rodime 20+ comes with a copy of Fifth Generation's Fastback for the Macintosh. Both of these programs offer significant features not found in HD Backup. Print spoolers are included with the HyperDrive

FX/20 and the MacBottom. The MagicDrive 20 comes with 10MB of public domain and shareware programs. The Photon 20 also comes with 10MB of public domain and shareware HyperCard stacks. The MicahDrive XT20 includes partitioning software that can make the XT20 appear as several independent, smaller drives on the desktop.

Packaged to Fit

Many of the hard disk drives are designed to fit underneath a Mac Plus or Mac SE. That's especially convenient if you have limited desk space. Notice, though, that some of the under-the-Mac models—the MagicDrive 20, the EMAC 20DL, and the Hard 20 Plus—have a much larger footprint than the Mac.

The MagicDrive 20 and Hard 20 Plus can double as power-control centers; they each have four additional power outlets on the back, controlled by four front-panel switches. The Relax MiniMate 20 also features a power switch on the front panel, a convenience if you turn the Mac off and on often.

The Sound of Megabytes Spinning

One of the things that originally attracted me to the Macintosh was the fact that it was quiet. No hard disk is noiseless,

PCPC's MacBottom HD21 is a quiet, compact drive that outdistanced all others in the Mac Plus tests. The unit is pricey, but it comes with HFS Backup, a good spooler, and a two-year warranty.



The Hard 20 Plus from Relax Technology includes backup software and four extra outlets with illuminated front-panel switches.



The MiniMate 20 from Relax Technology is a relatively quiet drive that's also a stellar performer on the Mac II.

20MB Hard Disk Features Compared

Drive	Manufacturer	SCSI Connectors	Cable	Terminator	SCSI ID Set	Kilobytes	Price	Cost per Megabyte
HD20SC	Apple Computer	25/50	22 in.	external	push button	19,171	\$1099	\$57.33
SD20	CMS Enhancements	25/25	36 in.	internal	DIP switch	20,472	\$560	\$27.35
ST225N	Crate Technology	25/25	72 in.	internal	jumpers	20,472	\$545	\$27.35
EMAC 20DL	Everex	25/50	24 in.	external	push button	20,165	\$1095	\$54.30
HyperDrive FX/20	GCC Technology	25/50	20 in.	external	software	20,465	\$999	\$48.82
MagicDrive 20	MacProducts USA	25/25	72 in.	internal	software	20,623	\$599	\$29.05
MicahDrive XT20	Micah Storage Systems	25/50	30 in.	internal	rotary switch	20,519	\$649	\$31.63
MacBottom HD21	PCPC	25	22 in.	internal	push button	19,858	\$1195	\$60.18
Hard 20 Plus	Relax Technology	25/25	72 in.	internal	software	20,525	\$895	\$43.61
MiniMate 20	Relax Technology	25/25	72 in.	internal	software	20,623	\$895	\$43.40
Rodime 20+	Rodime	25/50	22 in.	internal	rotary switch	19,869	\$1195	\$60.14
SupraDrive 20	Supra Corporation	25	29 in.	internal	internal	20,163	\$699	\$34.67
Photon 20	Warp Nine Engineering	25/50	36 in.	internal	push button	21,780	\$499	\$22.91

Warranty	Dimensions (H × W × D in inches)	Features	Foibles
90 days	3½ × 9¼ × 10½	Fits under Mac Plus or SE.	Loud.
1 year	3¼ × 10 × 10½	Fits under Mac Plus or SE. Quiet.	You need manual to set SCSI address. Won't boot on Mac Plus until an INIT is removed.
2 years	3½ × 10 × 10½	Fits under Mac Plus or SE.	You need manual to set SCSI address. Formatting software gives some bogus error messages. Setting SCSI address with jumpers is awkward.
1 year	3½ × 11 × 12¼	Fits under Mac Plus or SE.	Fits under Mac, but has significantly larger footprint. Doesn't take advantage of faster transfers on SE and Mac II.
1 year	8½ × 3¼ × 12½	Includes security software, backup software, and printer spooler.	Formatting software gives some bogus error messages. Supplied cable is too short.
1 year	2½ × 10¼ × 11	Fits under Mac Plus or SE. Quiet. Includes 10MB of public domain/shareware. Has extra AC power outlets controlled by front-panel switches.	Fits under Mac, but has significantly larger footprint. Formatting program lacks features.
90 days	3 × 9¼ × 10½	Fits under Mac Plus or SE. Quiet. Includes partitioning software.	
2 years	2½ × 9¼ × 9½	Fits under Mac Plus or SE. Quiet. Includes backup software and printer spooler.	Utilities not supplied on floppy disk. Attached SCSI cable.
120 days	2½ × 10¼ × 13	Fits under Mac Plus or SE. Includes backup software. Has extra AC power outlets controlled by front-panel switches.	Fits under Mac, but has significantly larger footprint.
120 days	8 × 3¾ × 10½	Front-panel on/off switch.	
1 year	3 × 9¼ × 9½	Fits under Mac Plus or SE. Includes backup software.	Doesn't take advantage of faster transfers on SE and Mac II. Formatting program lacks features. Can't reinitialize under System 6.0.
90 days	3½ × 5½ × 11½		Loud. Formatting program lacks features. Attached SCSI cable. Difficult to change SCSI ID.
1 year	4 × 10 × 11	Fits under Mac Plus or SE. Quiet. Includes 10MB of HyperCard stacks.	Floppy disk with utility software isn't bootable.

Macworld Benchmarks Explained

In order to really show how well a drive performs, benchmarks must be simple and measure basic low-level operations. Although performance evaluations based on timings of commercial applications may seem to mimic more accurately situations encountered in the real world, the complexity in a typical Macintosh application often masks differences in drives, while blowing subtle differences out of proportion. Since no laboratory situation can ever come close to duplicating the environments created by end users (with different versions of applications and systems, background activity, INITs, networks, and peripherals), timing applications can lead to results that are uninformative and possibly even misleading.

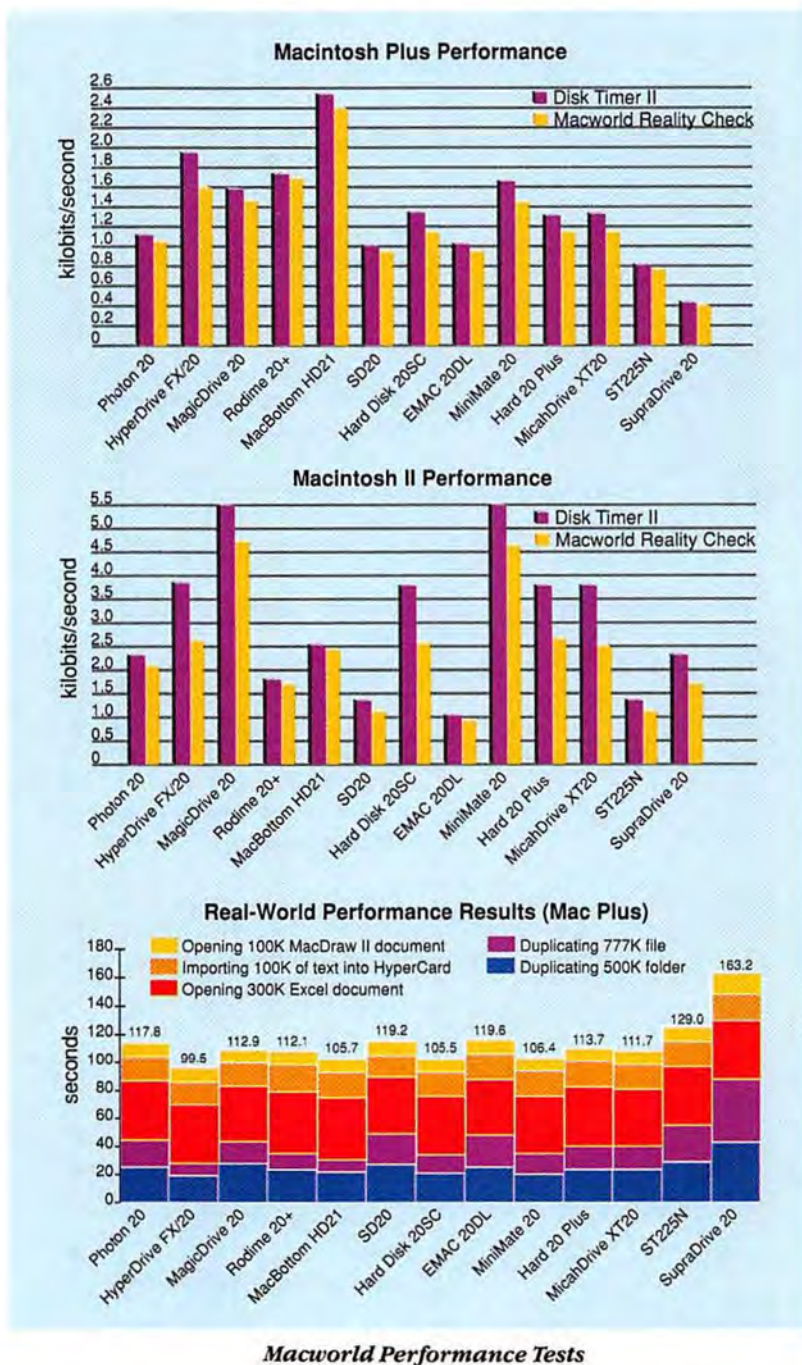
The benchmark programs I used are widely available so that, with reasonable care, you should be able to perform comparable tests on hard disk drives not included in my trials.

Prior to running these benchmarks, you should format the disk following the manufacturer's instructions for the system in question. Doing so insures that the proper drivers are installed (some hard disks use different drivers for different Macs), that the interleave factor is optimum for the CPU/drive/controller combination you're using, and that the fragmentation of files on the drive is eliminated. Be sure to disable the control panel cache and to disconnect AppleTalk. Copy a plain System Folder from the Macintosh System Tools 6.0 disk onto the disk being tested, along with copies of DiskTools II. Reboot and run the tests.

The main purpose of the "re-

ality check" benchmark is to eliminate, as much as possible, interfering factors, such as the idiosyncrasies of a specific product. A single operating-

system call initiates the check, which performs an asynchronous read of 524,288 bytes from a file while timing the results.



The Rodime 20+ includes Fastback backup software, but the unit's formatting software is weak.



The SupraDrive is a lethargic performer. It's loud, and you have to remove the cover to set its SCSI ID.



The Warp Nine Engineering Photon 20 gives great dollars-per-megabyte value, while still providing reasonably good performance.

but noise levels vary over a considerable range. The CMS SD20, the Crate Technology ST225N, the MagicDrive 20 from MacProducts USA, the MicahDrive XT20 from Micah Storage Systems, and PCPC's MacBottom HD21 all win the Librarian's Seal of Approval for quietness. Next to a newer, fan-equipped Macintosh the amount of noise a drive makes probably isn't a significant factor. Only the SupraDrive and Apple's Hard Disk 20SC could be heard above the jumbo-jet takeoff roar of my Mac II.

Will It Last?

Hard disk reliability has increased dramatically in recent years. All of these hard disks arrived in working order, and none failed during testing—a first in my experience. Make no mistake, though, hard disk drives still have moving parts and are much more subject to breakdowns than CPUs, memory, and monitors. The manufacturers of these hard disk drives were helpful when I called with questions or problems, though some expect you to get primary support from your dealer. Check out the warranty; the two-year warranties offered by Crate and PCPC are especially at-

tractive. Buy from a reputable dealer or manufacturer. And remember: regardless of how reliable a hard disk is, you'll want to back up your data.

Which One's for You?

For most buyers, the overriding concern when purchasing a drive will be price. The clear price leader is the Warp Nine Engineering Photon 20, followed by a closely packed group—the CMS SD20, the the Crate Technology ST225N, and the MacProducts USA MagicDrive 20. If you use the Mac a lot, give some consideration to getting a high-performance hard disk drive like the MacBottom HD21; the time you save might well make up for a little extra cost. Even if you're buying the drive to connect to a Mac Plus, if there's any chance you might upgrade to an SE or II in the near future be sure to take into account the drive's performance on the newer Mac models. If the drive you want didn't fare well in my Mac II test, check to see if the manufacturer is planning any driver or formatting software upgrades. Make sure your environmental needs are met; a drive that's too noisy or that doesn't fit easily on your desk won't be fun to use.

The Warp Nine Engineering Photon 20 is an outstanding value, but my personal favorite is the MacProducts USA MagicDrive 20. In spite of being a low-cost drive, it is quiet, it rates very well in Mac Plus performance, and it clocks in with a truly stellar transfer rate on the Mac II. It's a bit large for an under-the-Mac package, but its extra outlets, controlled by front-panel switches, can be a real convenience. Another favorite is the MacBottom HD21 from Personal Computer Peripherals Corporation (PCPC); for pure speed on a Mac Plus it has no rivals, it's small and quiet, and it includes HFS Backup, an Excellent print spooler, and a solid two-year warranty. □

See *Where to Buy* for contact information.

Ron Risley is a designer of computer and telecommunications hardware, software, and programming languages, and an amateur science fiction writer. He recently left the computer business to pursue a degree in medicine.



Merry Macintosh

Stocking stuffers for Macophiles

by Suzanne Stefanac

Christmas comes but once a year and boy am I glad. It's not that I'm a Scrooge. I like the tinsel, eggnog, and elf outfits. It's the eager hordes of fellow gift-seekers that I dread. Handbag-to-handbag combat doesn't make me feel jolly.

This year, as I made my list and checked it twice, I realized two things. One, the list is now longer than my income-tax return. And two, nearly every soul on it owns at least one Macintosh. "Aha," I chuckled. "Finding moderately priced, Mac-related gifts for all my relatives and friends ought to be a breeze."

Easier said than purchased. The computer emporiums were jammed with like-minded Santa's helpers. The sheer volume of products was enough to trigger sensory overload. And the price tags often made me wonder if I shouldn't just give everyone subscriptions to tacky tabloids, as I'd done the year before.

But I persisted. One by one, I gathered the array of handy and dandy gifts listed here. Each is sure to bring a twinkle to your favorite Macophile's eyes, and not one costs more than \$50.

'Tis the Season

To get in the spirit, I popped the **MacCarols** disk from Park Row Software into my Mac and picked the continuous-

play feature. One option allows you to hear the 20 carols sung in 7 languages ("Veni, Emmanuel" in voice-simulated Latin is particularly bizarre), while another option plays cheery harpsichord versions. The \$19.95 program displays the music notation and words for each of the songs, and you can print out sheet music for sing-alongs. (I thought the printed sheets might also make nice wrapping paper.)

My annual holiday newsletter is electronically published this year, and I'll be sending most of the copies out on disk. Loading my \$13.95 four-color **ImageWriter II Rainbow Ribbon** from I/O Design into my ImageWriter, I printed out multihued labels for all the disks and bright, colorful hard copies of the newsletter for my few pals who don't yet own Macs. Finally, it was time to begin wrapping all the presents.

Naughty or Nice

Lila, my favorite niece, complains that her brother Horace keeps peeking into her diary folder. Before he has a chance to blackmail her, I'm giving her **N'cryptor**, from Mainstay. She should be able to come up with a password that he can't guess, and \$39.95 is a small price to pay for a young girl's peace of mind.

Another one of Horace's hobbies is astrology. He has a telescope that he swears he aims only at stars. To keep his mind on higher subjects, I'm giving him **TellStar** from Spectrum HoloByte. A planetarium on a disk with enough technical calculations to keep Horace busy for years, the program is a steal at \$19.95.

I'm giving the twins, Marilyn and Monroe, \$29.95 clip art packages from A.A.H. Computer Graphic Productions. Monroe prides himself on his knowledge of premeval creatures, so he gets **Dinosaur Bytes**, a diskful of well-rendered reptiles and amphibians. Marilyn, who keeps two goldfish named Peter Paul and Mary, gets the **Sea Life** disk so she'll know that her pair are not the only fish in the sea. If the twins learn to name all the animals on their disks, they'll be the only Latin-speaking kids on their block.

Silent Night

The racket from cousin Stella's ImageWriter has been keeping the baby awake, so I decided to give her a **Bede Tech Printer Silencer**. For \$29.95, this faux-woodgrain cardboard-and-foam cover will let sleeping babes lie. And my sister Bonnie has been complaining so convincingly about the clatter of her SE that I bought her an **SE Silencer** replacement fan from Mobius Products. At \$49.95, it costs about half the price of an Apple replacement fan—and it's supposed to eliminate the screen flicker I've heard her talk about.

Aunt Tildy doesn't hear as well as she used to, but she loves writing whimsical sounds into her HyperCard scripts. A **MacSpeaker** from Infotek sells for \$19.95 and plugs right into her sound port. She'll love it, although Grandma Rosie, who lives with her, might not relish hearing Tildy's storybook frogs honk out their jazzy saxophone solos at full volume.

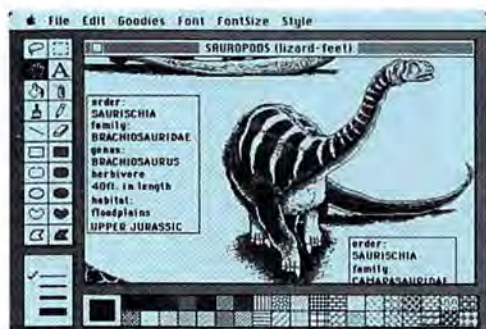
Rosie's hearing is just fine, but she ignores me whenever I ask her to start a memoirs folder on her Mac. I guess she's too busy putting the finishing touches on her newest HyperCard stack, *How to Win at Bingo*. Maybe the questionnaires on **My Personal Life History Disk** from Star-Com Microsystems will inspire her to record some of the more notable events of her 97 years. She can embellish her recollections with the two decorative fonts that come with the program and, for \$19.95, we just might find out how many of those family skeletons actually existed.

On Donder, On Blitzen

The next gift is for my 13-year-old nephew, Pugsley. I've felt responsible for Pugsley's new hobby ever since I lent him a batch of old *National Geographics*. He's been caught hitchhiking on the freeway twice now. He says he wants to see the world before ozone, war zones, and bozos change it beyond recognition. I decided to

Dinosaur Bytes

A part of one of the 13 files in the Dinosaur Bytes clip art collection. Each image is accompanied by informative data about the creature in question.



give him **Know Your World**, a \$39.95 geography quiz program from Soft Horizon. He can choose from among a variety of activities, from naming countries to traveling the world, and the program is blessedly forgiving when it comes to misspelled foreign names. I hope Pugsley sticks around at least until he's learned the names of the 169 countries and 600 cities included in the program.

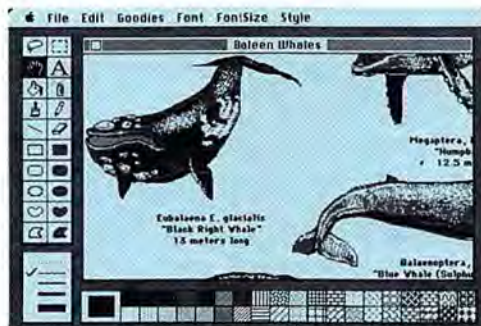
His mother will get the **\$15 Sun Clock** from MLT Software. Thus equipped, she'll be able to pull down the handy desk accessory while working on her gardening newsletter and find out whether or not the sun is shining on her precocious child, should the lad actually reach foreign climes.

Not Even a Mouse

I couldn't resist the bright yellow **Gourmet Cheese Mouse Pad** from H&H Enterprises. The \$9.95 mouse pad, shaped like a wedge of Swiss cheese, will make a great gift for my downstairs neighbor. Besides sharing power-user tips, he and I have shared the project of ridding our building of a particularly tenacious family of pint-size rodents. The mice are winning.

The old gent who runs the newsstand down on the corner has a Mac in the back of his booth. He tells his wife it's for book-keeping—and it is—but I don't think she realizes what an aficionado of the races her beloved really is. It's grimy down there on the street, so I'm giving him lovely gray **Dust Covers** from Crosby Creations for his SE and keyboard. They're only \$25.95, and maybe Angst, my favorite horse, will be a winner yet.

For the 12 students in my Macintosh as Paradigm class, I've ordered custom mouse pads embellished with the William Blake quote "We become what we behold." I sent a laser-printed design to **Mouse Pad Imprinting** at Computer Expressions, and for \$114 the company sent me a dozen pads. That's \$9.50 apiece, a fair price for getting my point across.



Sea Life

The Sea Life clip art disk features 16 files filled with well-documented illustrations of fish and marine mammals.

Tame an Image-Writer's clutter by putting it inside Bede Tech's foam-lined Printer Silencer.



Troll the Ancient Yuletide Carol

On a demo machine, I recognized **The Fool's Errand** as the haunting game that had my secretary, Adele, stumped. After overhearing a clerk recommend the booklet **Hints and Answers to The Fool's Errand**, published by Miles Computing, I realized that for \$7.95, I might be able to get Adele's attention back in time for the new year.

My cousin Angus, the cattle rancher, is the first to admit that pinball finesse like his is the sure sign of a wasted youth. If the simulation games included in the **Pinball Construction Set** from Electronic Arts are any indication, the release date for Angus's new herd-feed management software will probably be pushed back a bit. He'll be too engrossed in this \$19.95 program, arranging flippers, bumpers, magnets, and gates with graphics, variable speeds, and degrees of kick to build the best dang electronic pinball game this side of the Rio Grande.



This trio of holiday delights includes Infotek's MacSpeaker and Kensington Microware's Universal Copy Stand and Mac-accessories Tilt/Swivel base.

Let Nothing You Dismay

Few kids want educational presents, but Joel and his sister Mercedes seem to enjoy studying more than playing games. For Joel, who came in second in the state spelling bee last year, I picked out **Think Fast** from BrainPower. The drill and practice routines in this \$39.95 memory-improvement program may help him bring home the trophy next year. Mercedes is barely more than a tot, but she took to the Mac like a tadpole to a puddle. So she gets Addison-Wesley's \$29.95 **Puppy Love**. While toying with the charming imagery, she'll be learning the rudiments of programming.

Their dad, a cartoonist who specializes in computer humor, will get **Colorizer** from Palomar Software for his Mac II. Actually four programs, this \$49.95 gem lets you capture color screen shots, prints to a color printer, and add colors to the foreground and background of any object in a PICT file. It also lets you color in the title bars and scroll boxes.

Jingle All the Way

I selected **Technical Introduction to the Macintosh Family**, an Addison-Wesley publication, for my best friend Zorca. Although no programmer, she enjoys knowing what makes her Mac tick, and at \$12.95 this book is the best.

As a present for the lad at my favorite laser printing center, I picked the **Universal Copy Stand** from Kensington Microware. He has been most understanding of my panicky deadlines, and without him I might have botched more than one job. But in the rush, he sometimes loses track of the project he's working on. This handy paper holder attaches to the side of the Mac with Velcro and will keep his immediate work above the fray.

My young next-door neighbor has solved some of my most perplexing computer conundrums. A \$29.95 **Computer Tool Kit** from Curtis Manufacturing Company seems like an ideal gift for a girl who loves upgrading, repairing, and maintaining Macs. It includes a chip inserter/straightener, and the demagnetized tools have a lifetime guarantee.

Dressing Macs in style is easy with BMUG's Mac Chimney and Crosby Creations' Dust Covers.



Up on the Rooftop

My favorite bakery creates designs for novel cake shapes and decorations on a Mac. When I pick up the Red-Nosed Reindeer cake for the office party, I'm going to drop off a \$17.95 **Mac Chimney** convection cooling tower from BMUG. All those ovens keep the bakery offices a little too toasty for Mac-comfort. *Macworld's* tests show that Mac Chimney works pretty well for the price (see "Mac System Tools," November 1987), and it has the advantage of making the Mac look like a high-tech potbellied stove.

My workmate Matilda hasn't eaten an inorganic—I mean, nonorganic—vegetable in years, and so it's not surprising that she's concerned about the ultra-violet radiation emanating from her Mac screen. The **MacAmber Screen Enhancer** from Sideways Solutions is only \$29.95, and its filtering effect should set her mind at ease.

As I finished wrapping Kensington Microware's **Macaccessories Tilt/Swivel**, I realized I was out of tape and ribbon. Good timing, because this adjustable Mac

Gifts for Mac users can range from H&H Enterprises' whimsical Gourmet Cheese Mouse Pad to a practical SE Silencer from Mobius.



stand for my Uncle Harry was the last present I had. He'll be mad that I spent \$34.95 on him, but it should help him avoid those kinks in his neck.

And to All a Good Night!

Well, there are still a few names left on my list. Unfortunately, none of these people is a Mac user. Maybe I'll renew their subscriptions to the tabloids, after all. □

See *Where to Buy* for contact information.

Great Communicators

Compare seven programs that take you online

by Brita Meng

Macintosh communications software has evolved significantly since MacTerminal and MacTep put the Mac online. Several Macintosh communications packages now go far beyond the basics: Palantir's inTalk; Baseline's MacTell; Software Ventures' MicroPhone II; Freesoft's Red Ryder; Hayes's SmartCom II; Peripherals, Computers & Supplies' VersaTerm-Pro; and SuperMac's Acknowledge all offer impressive communications options. They differ primarily in the design of advanced features—such as scripting, autopilots, and macros—and in ease of use.

Given more features to choose from, it takes more thought to identify an easy-to-use, all-in-one program that includes the advanced features you require. But before looking at scripting capabilities or background file transfers, your evaluation of communications programs has to begin with the programs' ability to handle basic

communications tasks: modem compatibility, terminal emulation, and file-transfer protocols.

Connection Fits

The first job of communications software is getting you connected. You want to be sure that a particular package is compatible with your modem, especially if you have a nonstandard or high-speed modem such as Telebit's Trailblazer, or if your office uses a private branch exchange (PBX) system. Read the fine print.

For example, SmartCom II is designed to work only with Hayes modems—and that doesn't necessarily mean Hayes-compatible modems. Some programs, such as inTalk, allow you to manually set the command prefix, suffix, and answer, and to originate strings to control nonstandard modems; MicroPhone II allows you to override its own built-in modem commands with special, user-selectable modem drivers, and Acknowledge lets you write your own drivers. Such features increase the number of modems that you can use with those programs.

All communications software lets you set the parameters for the service you call: bits per character, parity, and stop bits. The terminal-emulation parameters determine how the Mac interprets keystrokes and how information finally looks on the screen. Both the Mac and the information service must use the same terminal emulation; therefore, the emulation you choose depends on the service you want to call. For example, if you're calling France's Minitel network, you have to use a program like MacTell, which offers Minitel emula-

tion. The most popular are emulations for Digital Equipment Corporation's VT100 terminal and emulations for teletype (TTY) communications.

The Capture

You can usually save information in two different ways. Most programs have a capture command that saves directly to disk as a text file, or saves to the printer, all the information received and sent by the Mac. You can select text and copy it to the Clipboard, or print it. Going beyond simple text, MacTell, MicroPhone II, VersaTerm-Pro, Acknowledge, Red Ryder and inTalk all let you select text as a table for import into a spreadsheet.

If you want to capture a formatted file such as a PageMaker document, or a public domain application from a service, your communications program must support the MacBinary file-transfer protocol. MacBinary ensures that Mac files don't lose their Mac-specific attributes, such as the icons. File-transfer protocols are necessary not only to send data back and forth but also to automatically check the transmission and reception for errors. Xmodem is the most widely used error-correction protocol; all the programs listed in "Connect Time" support Xmodem.

Advanced communications programs help you navigate through information services and bulletin boards by employing features such as macros and autopilots to simplify the process. Although some applications do provide Mac-like interfaces for accessing information services or bulletin

boards (see "Communicating with Pictures"), the majority of services and bulletin boards still use text-based interfaces. That is, they require that you type in a sometimes cryptic command, or series of commands, to locate information in the service.

You don't have to memorize those commands; the Mac can remember them for you. With macros and autopilots you save time, and that means money when you're online to a long-distance bulletin board. A macro (also referred to as a function key or a command in some communications programs) lets you assign commands or text to specific key combinations or to on-screen buttons. Some programs let you designate a label or name for keys or buttons. With macros you don't have to remember how to type a specific command, you just have to touch a key or click on a button which you yourself have designated. You can also save keystrokes and avoid making typographical errors.

Chain of Command

An autopilot, or script, is much more sophisticated than a macro. Unlike a macro, which is a simple text string that issues a command to the online service, a script automates a series of commands. Autopilots allow the Mac to "watch" for prompts from bulletin boards and services and respond accordingly. With the appropriate script, an unattended Mac can dial an information service like CompuServe, log on, download your mail to disk, and then disconnect.

What you can do with an autopilot or script really depends on the script language of your communications software. An icon-based language such as SmartCom II doesn't have as many commands as Acknowledge's programming language, which even has its own compiler.

As important to consider as language flexibility is the actual process of scripting. For example, with inTalk you must write the script and know the syntax, whereas MicroPhone II's Watch Me feature records all the steps in a procedure—such as logging on—as you do them, and converts them into scripts. If you're not a programmer, you probably don't want to have to learn programming to write a script. Pick the wrong communications package, and you might find yourself spending more



time learning the scripting language than you would spend manually logging on to the service.

Background Check

With the advent of MultiFinder, a Macintosh could finally do two things more or less at the same time. Unfortunately, downloading or uploading files wasn't one of them. Several communications programs now permit you to transfer files in the background. To take advantage of background file transfer, you'll probably need more than 1 megabyte of memory. MicroPhone II, for example, needs 488K of memory to run under MultiFinder. Add another program (one to run while you're uploading or downloading in the background), and you're liable to start getting those an-

Connect Time

Product	Acknowledge	inTalk	MacTell	MicroPhone II	Red Ryder
Company	SuperMac	Palantir	Baseline	Software Ventures	Freesoft
Maximum transfer rate	57,600 bps	57,600 bps	57,600 bps	57,600 bps	57,600 bps
Terminal emulation					
TTY	•	•	•	•	•
VT100	•	•		• ¹	•
VT52	•	•	•		•
Other	Minitel, Prestel	ADDS Viewpoint/60, Beehive DM5A, Vidtex, Televideo 925	Minitel, Minitel Mixte, IBM 3101, Televideo 925, ADDS Viewpoint/60, Hazeltine 1510		
Text capture					
To disk	•	•	•	•	•
To printer	•	•	•	•	•
Copy table	•	•	•	•	•
Text only	•	•	•	•	•
File-transfer protocols					
Xmodem	•	•	•	•	•
Ymodem			•	•	•
Kermit			•	•	•
MacTerminal	•		•	•	
Other		inTalk, Crosstalk, YTerm, Connect			CompuServe B
MacBinary	•	•	•	•	•
Macro mechanism	scripts ²	function keys	function keys	scripts	macro buttons
Script mechanism	scripts ³	function keys	macros	scripts	autopilots
Learn mode	•		•	•	•
Background transfers	•		•	•	•

¹ VT102 emulation.

² Service files.

³ Connection files.

noying "Approaching the limits of memory" messages.

Regardless of the amount of memory in your Mac, be prepared to trade off some speed for the privilege of background downloading or uploading. Depending on what you're doing in the foreground, the transfer time (and hence the cost) will increase. In addition, the response time of your foreground application may degrade slightly, especially for saves and scrolling.

Advanced Functions

The "Connect Time" table lists the principal features (terminal emulation, file-transfer protocols, and text capture) available in seven communications software

packages. It also includes information on language capabilities such as command sets, macros, scripts, and autopilot. The table covers complex language capabilities with just a one-word label; understanding and comparing these advanced functions requires a more in-depth view.

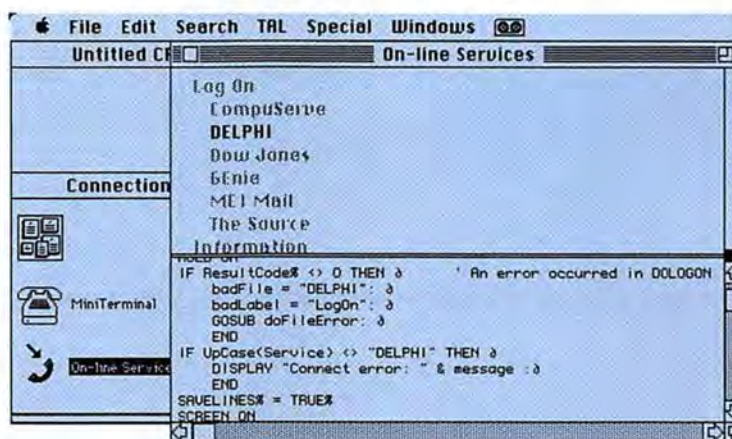
Acknowledge

SuperMac's Acknowledge is more of a development environment for management information systems professionals and communications programmers than it is an end-user application, although it does support background file transfers. Acknowledge enables you to build an entire Mac interface for information services. Of all the packages I looked at, Acknowl-

SmartCom II	VersaTerm-Pro
Hayes	Peripherals, Computers & Supplies
38,400 bps	19,200 bps
•	
•	•
•	
	Tektronix 4105, Tektronix 4014, Data General D200
•	•
•	•
•	•
•	•
•	•
•	•
•	•
autopilots	command sets
autopilots	command sets
•	•
•	•

edge offers the most powerful programming features, and it requires the most experience in programming. In fact the manual recommends that you be familiar with at least one other programming language, for example Pascal.

scripts because they can also include custom dialog boxes and menus.

inTalk

inTalk is the only program of those compared that doesn't support background file transfers.

Scripts are called (that is, activated) from InTalk's function keys, which are actually on-screen buttons. For example, you can write a script that automatically logs

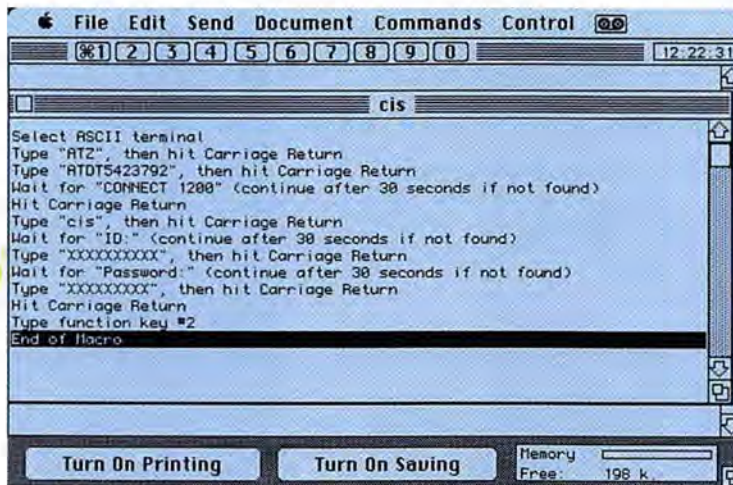
Buttons for Mail

This MCI Mail document for inTalk includes several scripts and macros specifically developed for the service. You activate all CCL scripts, such as the MCI Logon script shown here, by clicking on the buttons in the lower part of the window.



Filling the Blanks

You complete a Mac-Tell macro by selecting commands from menus in the program's macro editor. The script language is split into four categories: Send, Document, Command, and Control. MacTell's function keys appear in the upper part of the background window.



to eight separate buttons. These buttons don't have to contain scripts; they can function as macros.

MacTell

Baseline's MacTell is a relatively unknown communications software package that supports macros (called function keys), scripting (called macros), and background downloads. For purposes of clarification, I'll refer to MacTell "macros" as scripts and "function keys" as macros.

Like MicroPhone II, MacTell offers a learn feature that helps you write scripts. It's not quite as sophisticated as MicroPhone II's Watch Me. MacTell's learning mode records what you type only while

you're online; it doesn't record any text a service sends to your Mac. To add other commands such as Wait Until . . . , you must enter MacTell's script editor (see "Filling the Blanks"). The editor lists the available commands in menus. The plain-English scripting language will appeal to many, but the number of menu commands is slightly intimidating. Creating MacTell scripts also involves more trial and error than it should, because of inadequate documentation.

Although only one script at a time can appear in MacTell's menu bar, you can call other scripts from that script. You can also call MacTell macros. These are ten ⌘-key options or on-screen buttons to which you can assign any character string. However, you can't include a carriage return in a MacTell macro, an oversight which lessens the usefulness of the macro. You can program a macro to automatically type a command, but you cannot transmit the command to the service without manually hitting a carriage return afterwards.

MicroPhone II

Software Venture's MicroPhone II's best feature is its Watch Me command, which automatically transforms online actions into scripts. You don't have to learn a scripting language at all. If you do delve into the language, however, you'll find that it's all straight English and powerful to boot. For example, you can change communications settings, control cursor position, even perform calculations from within a script.

MicroPhone II's script editor provides context-sensitive list boxes from which you select a command and its parameters (see "Dialog Box Programming"). Experienced programmers can also write scripts with a text editor, import them into MicroPhone II, and use the application's Trace mode for debugging. A short script can serve as a macro, and you can access such scripts easily through on-screen, labeled buttons. MicroPhone II supports MultiFinder, so you can easily download files while you're doing something else. There is a small admonition here: MicroPhone II won't let you drag or resize the program window during a download, which means you can't access desktop icons hidden by the window.

My biggest problem with MicroPhone II was the program's complete lack of keyboard commands. Even the standard quit (not to mention copy, cut, or paste equivalents) is missing. The obvious advantage is that you can assign all the standard command keys to your autopilots. But if you

Communicating with Pictures

Logging on to bulletin boards and information services can make you homesick for the Mac's user interface. Luckily, several information services now offer software that enables you to access the services using the conventional Mac interface instead of text-oriented command sequences.

CompuServe Navigator lets you navigate through CompuServe's menus with session files. By clicking on tiles representing forums and services, you completely bypass the text-based procedures. Navigator saves messages, mail, and other information in a session log, which you can look at and edit after Navigator quits the session.

Desktop Express and Dow Jones News/Retrieval Service help users navigate through MCI Mail and Dow Jones information services, respectively. These programs lay icons over text-based command lines. The text-oriented design of the information services does not allow the programs to take full advantage of the Mac's user interface.

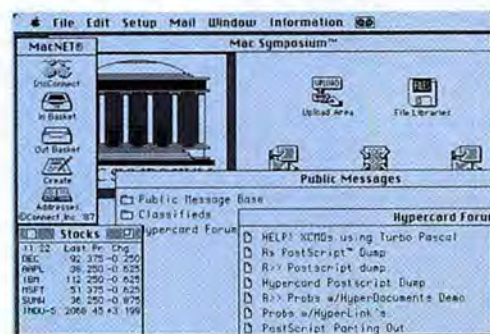
MacNet from Connect relies completely on icons and folders to organize information. It's as easy to navigate as the Mac desktop; all you have to do is double-click on a forum's icon to enter it. You do the same thing to read a message and to

create electronic mail.

MacNet's idea for a user interface isn't new. A service called AppleLink was the prototype for MacNet and Desktop Express. AppleLink has been available to Apple developers, employees, and dealers for some time. But as of this writing, MacNet is the only service open to the general public that offers the interface. That situation should change once Apple and Quantum debut the information service called AppleLink Personal Edition, which was announced this summer.

The advantage of such Mac interfaces is that users never have to leave the Mac environment. The disadvantage is that MacNet, Navigator, and AppleLink are service-specific; in other words, MacNet software can't access any service other than MacNet.

One solution to this problem may come in the form of SuperMac's Acknowledge, a general communications application that programmers can customize to user specifications or, in this case, information service specifications. Should enough Acknowledge front ends appear for services, the possibility of learning one program that affords an easy entry into multiple services may draw in Mac owners looking for an all-in-one communications solution.



The screens pictured here are from CompuServe Navigator (top), Desktop Express (middle), and MacNet (bottom).

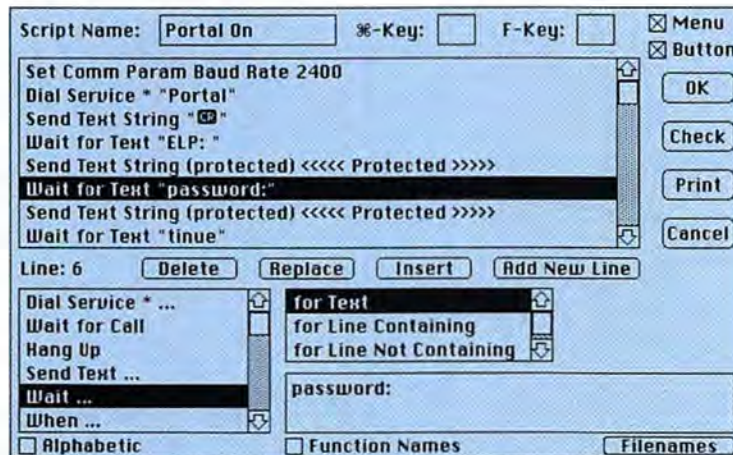
don't require this flexibility, you'll find it annoying not to have the faster keyboard equivalents.

Red Ryder

Freesoft's Red Ryder has always been respected for its flexible scripting capabilities.

Dialog Box Programming

Writing scripts in MicroPhone II is like using a construction set. Selecting a command produces a list of subsequent choices. To complete the command you pick the appropriate subcommand and enter text to further specify the command's function.



Time to Compile

The upper window displays a Red Ryder autopilot or procedures file. The Procedure Compiler Preferences dialog box lets you specify setup information for the program's compiler. Red Ryder's macro button (lower window) can be seen on screen after you select the macro's status bar from the Local menu.



ties (called procedures). Unlike MicroPhone II's scripting language, Red Ryder's command language is more like a DOS-based text editor. However, the two languages offer similar capabilities. The principal difference is that Red Ryder lets you create custom menus in scripts.

You can call scripts from Red Ryder's 30 macro buttons (three levels with 10 buttons each). The same buttons can also hold text string commands. Red Ryder doesn't have a built-in script editor, but it does provide a Watch Me command to help you write scripts. If you decide not to use that feature, you create scripts with a text editor, such as MockWrite, and then compile

the text files (see "Time to Compile"). This extra step can be somewhat painful if you encounter compilation errors. To correct the errors, you have to reconvert the script to text, reedit it, and then recompile it.

Red Ryder lets you download files in the background, but like MicroPhone II, Red Ryder won't let you resize the main program window during the download. You can drag the download progress window, however. The background download has a strange windowing problem. When you launch from MultiFinder, any windows already open on the desktop in the same position as the initial Red Ryder screen blank out that screen.

SmartCom II

Of all the communications programs, Hayes's SmartCom II relies the most heavily on icons. You do almost everything in SmartCom II with icons: dialing, receiving files, even writing autopilots. Despite some shortcomings, SmartCom II performs well.

Writing scripts in SmartCom II is not difficult. The icons don't really help you learn the scripting language, but they save you trips to the manual once you have learned it. All the commands are laid out in front of you on the screen (see "Programming with Pictures"). Nevertheless, I was surprised to find that SmartCom II had no watch-me feature, especially since the IBM PC version does include this feature.

Because of its icon dependence, you won't find SmartCom II's scripting language as versatile or powerful as those of other communications programs. For example, you can't call several different services from one SmartCom document. Like MicroPhone II, there's no macro feature per se in SmartCom. Even a shortcut for a text command must be programmed as an autopilot. SmartCom won't generate labeled buttons. However, you can assign option keys for autopilot sequences. SmartCom supports background file transfers, but you can't program a script to automatically start itself from the background. This restricts the program's Perform Later function to those times when you're not actively working on the Mac.

VersaTerm-Pro

Peripherals, Computers & Supplies' VersaTerm-Pro is billed as a terminal emulator first and a communications application second. Like most of the other communications software, the program permits background file downloads.

VersaTerm-Pro also offers sophisticated Tetrax graphics terminal emulations, not available in other programs. The Tetrax terminal emulations allow you to access mainframe computer graphics applications.

VersaTerm-Pro includes powerful macro capabilities, but a relatively weak scripting language. The program's scripting language is based on control characters and is generally limited to waiting for and answering prompts. The version of VersaTerm-Pro I used (2.20), for example, doesn't allow you to perform a log-on at a specified time of day. Because of its control-character syntax, the language is hard to understand, as well.

VersaTerm-Pro's well-designed macro feature helps offset the shortcomings of the scripting language. An Automatic Macro Define feature lets you record keystrokes and menu selections, as well as any host prompt characters. You then name the macro and place it in the Commands menu, or give it an Option key shortcut. VersaTerm-Pro can access two different sets of macros, with 24 in each set. Any macro can also call a linked command set specifically tailored to it (see "Macros within Macros"). For example, calling a CompuServe log-on macro from the top command layer might bring up another command set that includes its own macros for CompuServe E-mail.

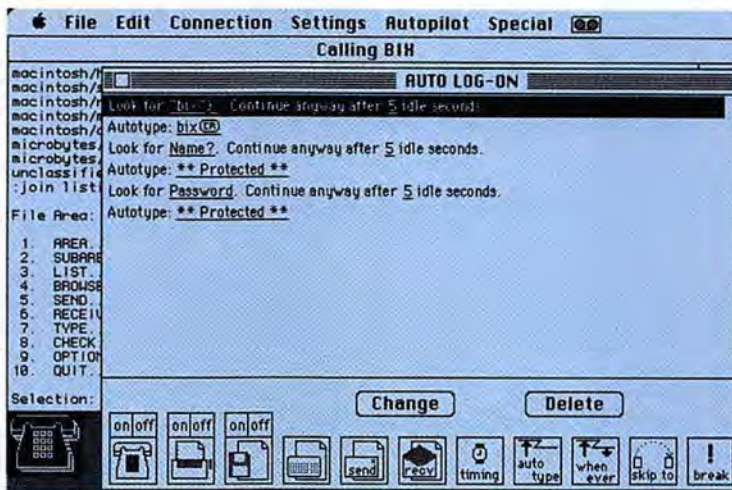
Where You Stand

Your choice of a communications program depends first on how you plan to use it. For example, you shouldn't buy inTalk if you need background file-transfer capabilities. Nor should you pick SmartCom II if you have a non-Hayes modem.

Macros, autopilots, and scripts really do make communications easier, but you should determine how much work you want to put into making the job easier. If you're an experienced programmer, and you want to develop very sophisticated scripts for a variety of services, Acknowledge would be a good choice.

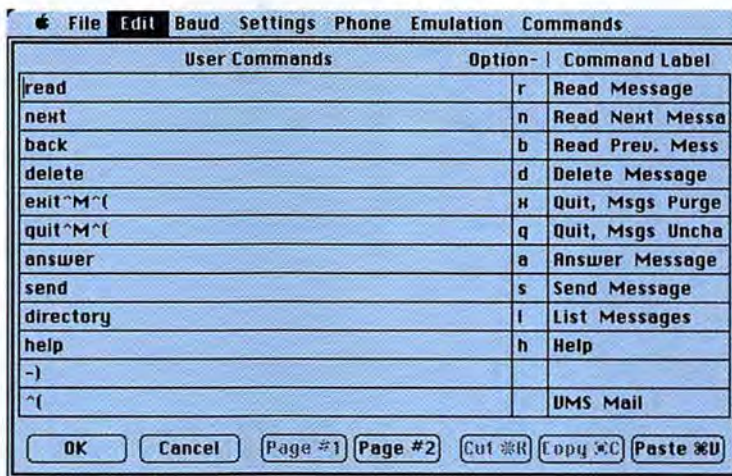
On the other hand, MicroPhone II and Red Ryder both have extensive scripting abilities as well as automatic learning features. These two programs let you access numerous services from within one document. Which communications package you buy may depend on whether you prefer a scripting language that uses English or a more standard programming syntax.

If you primarily use one service and want a language that's easy to use, consider SmartCom II. Icons make SmartCom II scripts simple to write, but they do some-



Programming with Pictures

When you enter SmartCom II's autopilot editing window, the command icons are lined up along the lower portion of the window. Selecting an icon causes a dialog box to pop up. You enter the command specifics, such as a protected password, in the dialog box.



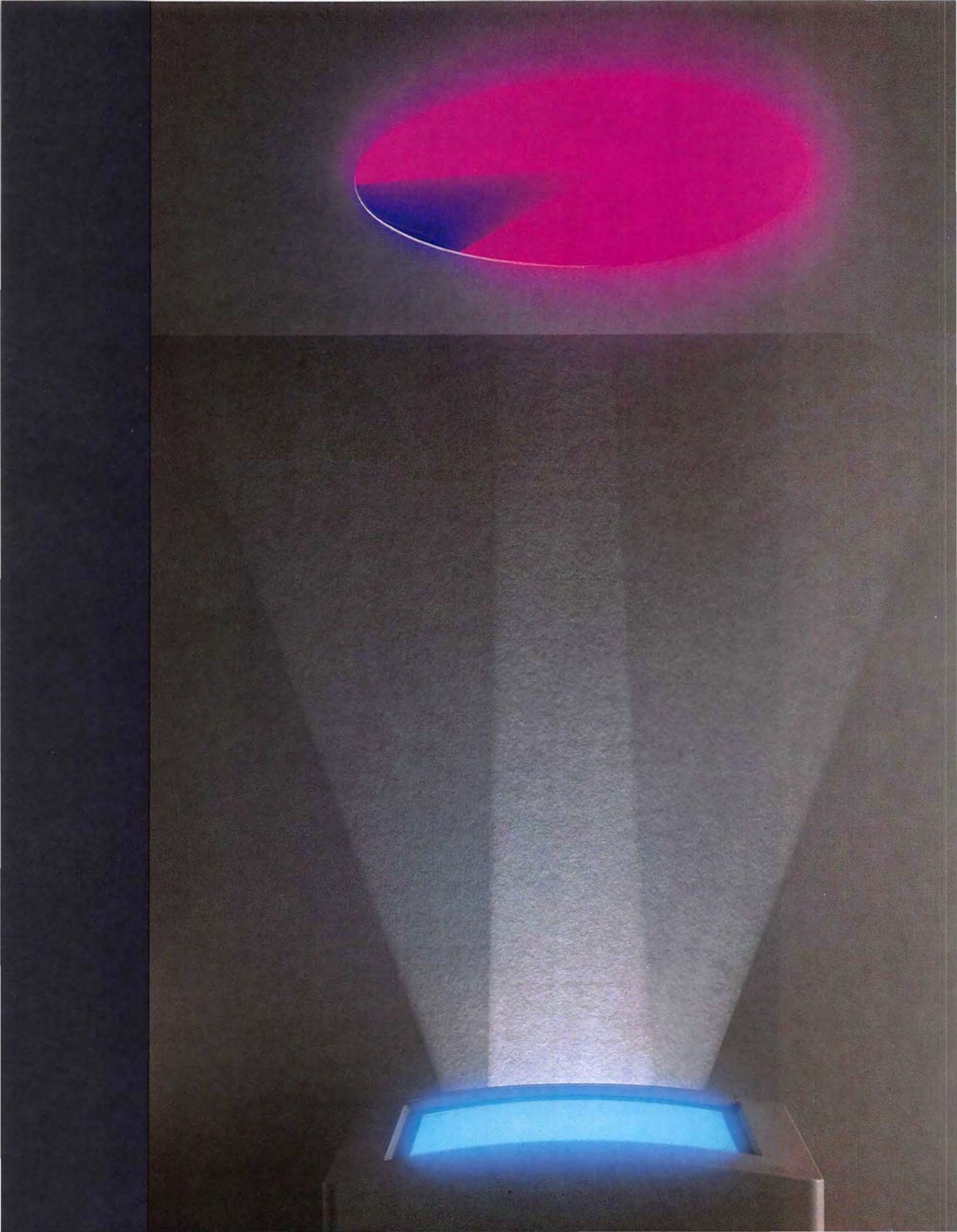
Macros within Macros

VersaTerm-Pro allows you to create hierarchical command sets. For example, this specific command set for VMS Mail appears after you choose VMS Mail from the command set that also includes Kermit, CompuServe, and UNIX Mail.

what limit the program's capabilities. VersaTerm-Pro's scripting features, meanwhile, are very limited; but the program can help you to navigate several information services by keeping track of all those services' commands with its many macro options.

You may not find that one package meets your overall communication needs. I use MicroPhone II to access the five information services I log onto routinely, but I rely on VersaTerm-Pro to access and navigate the VAX computer. Consult "Connect Time" and review the features listed above to identify the program or programs that supply the capabilities you need in a format you find easy to use. □

See *Where to Buy* for contact information.



Step-by-Step Slides

*A guide to creating slides
on the Macintosh*

by Franklin Tessler

Whether you're showing off the summer cottage to friends or making a marketing pitch to the board of directors, slide presentations are hard to beat. Thirty-five-millimeter transparencies are durable and easy to duplicate, and they're perfect if you have to take your show on the road. With its ability to mix text and graphics, the Mac is an ideal tool for putting together the ingredients for a successful slide show.

Although you can design slides using any word processor, page-layout program, or drawing application, the work is much easier with software that's been specially designed for the job. As always, careful planning is the key (for a primer on creating presentations, see "Get to the Point" in the April 1988 *Macworld*).

The best way to learn how to create a slide presentation is to work your way through a practice session using one of two popular programs currently available, Cricket Presents and Microsoft PowerPoint. By the time you read this, a few other presentation graphics programs suitable for creating slides should be available or announced from companies such as Letraset, Symantec, and Aldus. If you have either Cricket Presents or PowerPoint, you might try working through the steps as you read this article, using the illustrations to guide you. When you've finished assembling your presentation, you'll see how to transfer it to film using a commercial slide service.

STEP 1: CREATE AN OUTLINE

Once you've put some thought into what you want to include in the presentation, it's time to create an outline. In this case, our objective is a presentation for the annual meeting of the not-so-famous RAM Corporation. Several outlining programs are available, but we'll use Acta because it comes with Cricket Presents and

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works well with PowerPoint. Acta lets you plan your presentation in outline form as a hierarchical list of topics and subtopics, and it handles both text and graphics.

First, open Acta, create a new topic, and enter the title of the first slide. Next, insert a blank topic with subtopics corresponding to the slide's text (this setup simplifies copying text to the final slide). Do the same for each slide. This is the best time to refine and hone the presentation, so keep working at it until you're sure it's ready to go.

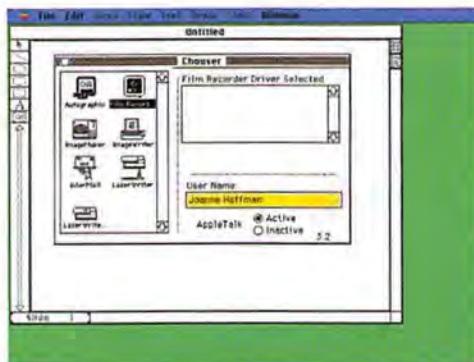


STEP 2: CREATE GRAPHICS

Text slides make up the bulk of most presentations, but illustrations add the visual punch that keeps the audience awake. Although both Cricket Presents and PowerPoint have some built-in drawing and charting tools, for complex graphics you may still need to rely on specialized graphics applications. When you've finished an illustration, copy it to the Clipboard and paste it into the outline. For this presentation, I drew the RAM Corporation's logo using Illustrator 88.

STEP 3: OPEN THE APPLICATION AND CHOOSE THE DRIVER

Fire up Cricket Presents or PowerPoint. First, indicate how you want to print the slides, so the program can format them correctly (see "Film on Your Own"). Open the Chooser desk accessory and select the appropriate output device driver from the scrolling list. (Cricket Presents users have to repeat this step in the Assign Devices dialog box.) Complete the process by selecting Page Setup from the File menu. It's crucial that you perform these steps before creating any slides; otherwise you might be in for some tedious reformatting down the road.



PowerPoint



Cricket Presents

STEP 4: CREATE COMMON ELEMENTS

To give a presentation a sense of visual continuity, it often helps to repeat graphic elements, such as the company logo or the title of the presentation, on every slide. For our sample presentation, let's put the company name and logo in the top left corner of each frame. In Cricket Presents, select Background from the View menu; in PowerPoint, select Slide Master. Now anything you add to the frame will appear on every slide in the presentation. Using Acta, cut the logo from the presentation outline and paste it into the corner of the frame.

STEP 5: NOW FORGET ABOUT COLOR

If you're working on a Mac II with a color screen, this next bit of advice may surprise you: turn the color off. I find it distracting to deal with color when I'm putting together a slide presentation. Content is what counts; color simply has to be tasteful. The key to success is to plan the presentation in a way that lets you change colors later without having to alter individual slides. I'll show you how to do this in step 7. I've kept the visuals that accompany this article in color for the sake of continuity, but for your own presentations, turn the color off.

	Mac/LFR	ProColor	FilmPrinter	Montage FR1	ImageMaker Plus
Manufacturer	Lasergraphics	Matrix Instruments	Mirus Corporation	Presentation Technologies	Presentation Technologies
Resolution¹	4000 lines	4096 lines	8000 lines	4000 lines	8000 lines ⁴
Interface	SCSI	SCSI	SCSI	SCSI	Serial
Chooser-selectable	No ²	No ²	Yes ³	Yes	Yes
Hardware required	MacPlus, SE, II	Mac II	Mac Plus, SE, II	Mac Plus, SE, II	Mac Plus, SE, II
List price	\$9750	\$6495	\$5895	\$5995	\$4995

¹ Manufacturer's stated maximum resolution.

² Chooser-selectable driver planned.

³ Driver available for Mac II only.

⁴ Electromechanical imaging technology. Uses font cartridges to image text and can't handle complex drawings.

Film Recorders

Several companies have announced high-resolution film recorders for the Macintosh for under \$10,000. At press time, however, not all products were shipping.

Film on Your Own

How you print a presentation depends on your budget and the quality you want. For small, informal presentations, you can output your frames on a color printer and photograph them, or even point a camera at the Mac screen and shoot. But for professional-level slides, you'll have to step up to a film recorder or a commercial slide service.

Film recorders are specialized pieces of hardware that copy computer-generated text and graphics onto film by "painting" with a fine beam of light from a high-resolution monitor. The slide image is separated into red, green, and blue components, which are then drawn in succession by scanning an electron beam across a picture tube from top to bottom and from side to side. The monitor is black and white, and a filter corresponding to one of the three primary colors is interposed between

the film and the display screen during each part of the exposure. Until recently, full-featured Macintosh-compatible film recorders cost at least \$12,000, well beyond the price range of many businesses. But now recorders in the under-\$10,000 range have begun to appear (see "Film Recorders").

Ideally, using a film recorder shouldn't be any more complicated than printing on a LaserWriter. Unfortunately, early versions of some recorders for the Mac were inconvenient because they required separate programs to run them. Like the LaserWriter file in your System Folder, film recorder drivers should appear when you open the Chooser desk accessory. These drivers translate source images into instructions that tell the recorder what to do. (Commercial slide centers also use film recorders. If you use the Autographix service that works with Cricket Presents, for example, you have to choose

the driver that comes with the program.)

Should your company or department spring for a film recorder? The obvious answer is based purely on economics: at \$12 a slide for slide services, the break-even point would be about 416 slides for a \$5000 recorder, not including the cost of film and processing. If you need to make only 50 or so slides a year, the expense might not make sense. Aside from cost, the best reason for getting your own film recorder is convenience: it's always there when you need it. But there's another, less obvious consideration. Slides produced by a reputable service bureau are likely to be more consistent than ones you do in-house, especially if you use different processing labs to develop your film. In any case, slide services are a good way to get your feet wet without spending too much money.

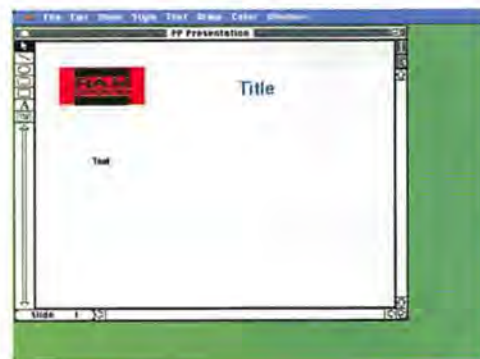
STEP 6: PREPARE A TEMPLATE

Whenever possible, all the slides in a presentation should have an identical format. It's distracting, for example, if the title shifts position from slide to slide. The best way to maintain consistency is to use a *template*, or guide. Working with a template also means fewer keystrokes—you can copy text and graphics right into the template from the outline.

Return to the frame view. Start with a fresh, blank slide (only the company name and logo from the background should appear at the top left). Type **TITLE** in the top right corner. You can use any type style that

suits you, but you'll get the sharpest results if you use Times, Helvetica, or Courier in a size between 24 and 36 points. Let's underline the text. Next, prepare a space for the subtopics by typing **Text** on the left side of the frame. If you want to include other graphic elements like borders, add them now using the appropriate drawing tools.

If you'd rather avoid the do-it-yourself route, both PowerPoint and Cricket Presents offer extensive libraries of slide templates. It's worthwhile to browse through them before you create your own presentation. Once you've designed or chosen a suitable template, you'll probably use it for most of your presentations. It's also much easier to add slides to a presentation if you have a template to work from.



PowerPoint

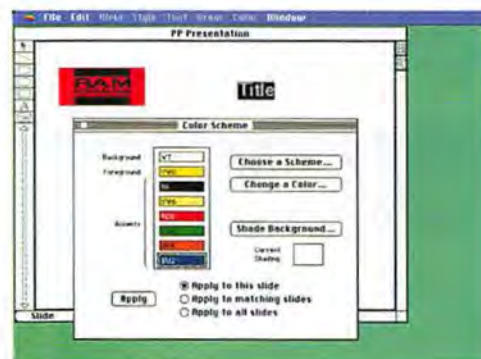
STEP 7: PLAN FOR COLOR

Remember what I said about forgetting color a couple of steps back? Planning for color now will make it much easier to change colors later. The trick is to assign a unique hue to each element in the template. Because you'll base every slide on a copy of this template, each element in the presentation (say, the title) will share the same color. When you're done, you'll be able to globally change the color of any element by editing the shade you assigned to that element to begin with.

In Cricket Presents, select the title and assign to it any color in the current color palette. If you're working with PowerPoint, select a color from the current color scheme. It doesn't matter what color you choose, so long as it's one that you can edit later on. Choose a different color for the subtopic text.



Cricket Presents



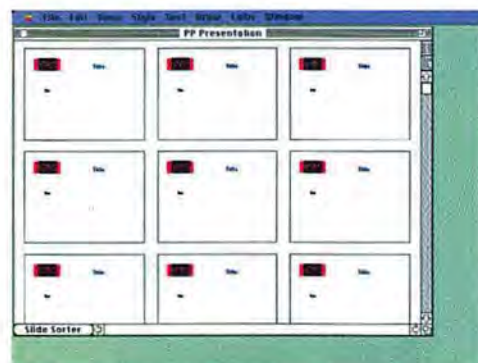
PowerPoint

STEP 8: CLONE THE TEMPLATE

This is the last opportunity to make changes to the template, so make absolutely sure you're satisfied with the layout. Next, make a copy of the template for every slide in the presentation. Both Cricket Presents and PowerPoint let you view slides in miniature form: select the template slide, copy it, and paste it as many times as needed. At this point, the presentation consists of multiple copies of the template.



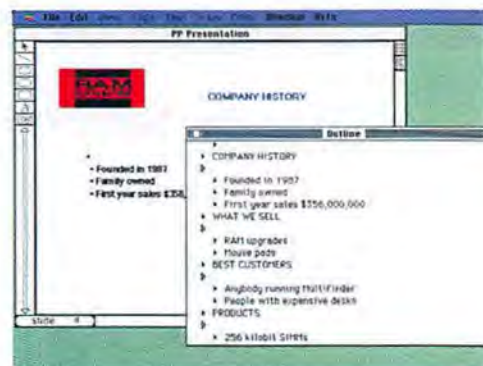
Cricket Presents



PowerPoint

STEP 9: CUT AND PASTE

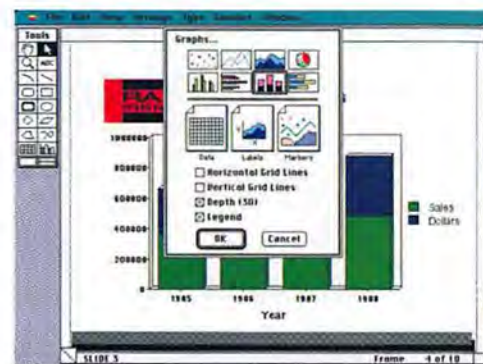
For every slide, replace the word *TITLE* with actual title text copied from the outline. Do the same with the subtopics by copying the blank topic heading (along with the subheads beneath it) below each title in the outline and pasting it over the word *Text*. The advantage of doing it this way is that you can copy all the subtopics for a slide at once, each with its own bullet. The only catch is that a blank line preceded by a bullet will appear before the bulleted list in the slide—you'll have to delete this line before going on to the next slide.



PowerPoint

STEP 10: CREATE OTHER GRAPHICS

Now is a good time to prepare whatever illustrations your application is capable of handling. Let's make a sales chart in Cricket Presents. Select the graph tool and click anywhere in the frame to bring up the graph dialog box. You have eight styles of graph to choose from; click on the icon for the stacked column chart (the third one in the second row). Clicking on the data icon brings up a mini-spreadsheet into which you can enter up to 25 rows and 5 columns of data. For our sales chart, type the years in column 1 and some sales figures in columns 2 and 3. Finally, set the attributes for the markers and text. Place the completed graph into the frame by pasting it where the subtopic text would normally go. Although PowerPoint lacks full-fledged charting capabilities, you can use its drawing tools to draw simple graphs.



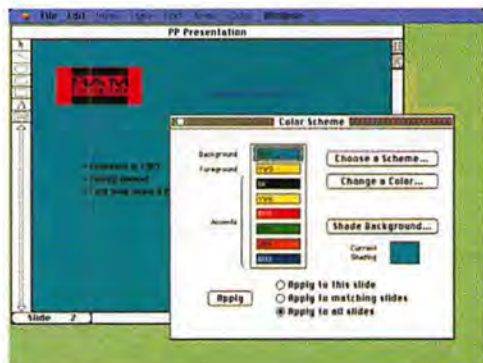
Cricket Presents

STEP 11: SELECT A BACKGROUND COLOR

If you're working with a color monitor, turn the color on at this point and select a background color for the presentation. In Cricket Presents, return to the background view and select Frame Color from the View menu. In PowerPoint you set the background color in the Color Scheme dialog box. The background should contrast with the shades you've chosen for text and graphics—dark colors usually work best. Now you'll be able to see if the colors you've picked for the title and subtopics go well with the background. Experiment with different background colors until you find one that pleases you. I've used a light blue because dark colors don't work as well for printed materials, but I recommend darker colors for slides.



Cricket Presents

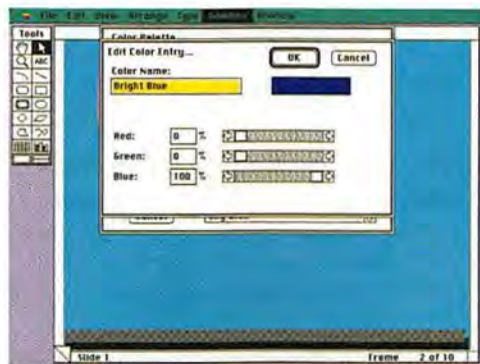


PowerPoint

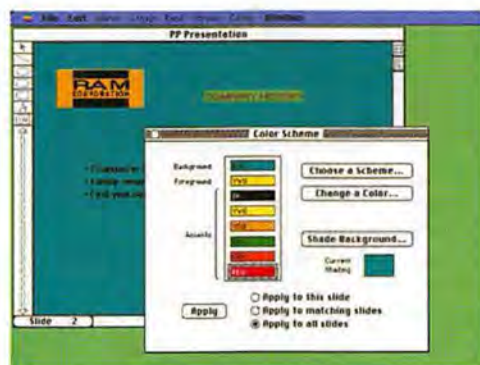
STEP 12: EDIT THE FOREGROUND COLORS

Changing background colors is simple, but what if the color of the title doesn't suit your taste? Let's say you chose a shade

of blue for the title in the original template, but now you'd rather have red titles. Using the command Edit Colors in Cricket Presents or Color Scheme in PowerPoint, select the blue color you used and reassign it to the shade of red you prefer. Voilà—every title in the presentation changes from blue to red. It's just as easy to make global changes to the color of any other element.



Cricket Presents



PowerPoint

STEP 13: PRINT THE PRESENTATION

Before you commit the presentation to film, be sure that you don't want to make any more changes. Page through the frames one by one, trying to read them from the audience's point of view. To output our sample presentation, we'll use the Autographix software and slide service that works with Cricket Presents. Microsoft has announced a similar capability for printing PowerPoint slides using Genigraphics software and imaging centers, but at press time Genigraphics still required having an operator re-create the PowerPoint visuals on its own system.

Using the Autographix software is easy. First, print the presentation using the Print command in Cricket Presents. If you selected the Autographix driver at the beginning, Cricket Presents saves the slides in a special file ready to be sent to the nearest Autographix center on disk or by modem. In either case, the next step is to run the AGXit application that comes with Cricket Presents.

Begin by entering your billing and delivery information. Sending slides by modem is an automated process that should be familiar to anyone with basic telecommunications experience. Of course, disks can be delivered to Autographix in any way that's convenient for you. Slides received before noon are generally ready within one business day and cost \$12 each. Rush service extends the deadline to 3:00 p.m., but costs \$8 more per slide.



Cricket Presents

THE LAST MINUTE

The steps I've described are by no means the only route to a successful slide presentation. The manuals that come with both Cricket Presents and PowerPoint include a wealth of useful information on how to plan and put together a professional slide show. The primary advantage to my method is speed—working from an outline, you can go from concept to finished material in a day. And that's ideal if the boss sticks you with a last-minute assignment. □

See *Where to Buy* for contact information.

Reviews

Full Impact 1.0

Spreadsheet program. *Pros:* Ability to add charts, paragraphs, and graphic elements to worksheet; easy to customize; good navigational tools; macros can be attached to worksheets and do not have to be opened separately. *Cons:* Limited database; slower recalculation and less precision than Excel; smaller documents take up relatively large amount of disk space. **Company:** Ashton-Tate. **List price:** \$395. **Requires:** 1MB.



For those of us who have come to think of Excel as synonymous with the word *spreadsheet* in the Macintosh arena, the arrival of a realistic competitor may seem like the end of an era. So it is with mixed emotions that I report that, in many ways, Full Impact is a fuller and more versatile spreadsheet than Excel 1.5. Functionally, Excel and Full Impact are almost identical. The advantages of Full Impact are cosmetic—but those of us who have to teach, explain, or persuade as part of our job know that cosmetics should not be underestimated.

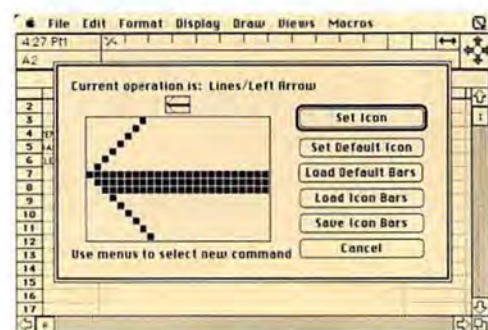
Dressing Up the Worksheet

The biggest advantage of Full Impact is that it produces a clearer, better-looking worksheet. You can add lines, arrows, rectangles,

angles, and ovals with any of a large number of outline and fill designs and colors. You can create charts from tables, as you would expect, but the chart becomes a design element of the worksheet rather than a separate document as in Excel. You can also add paragraphs to explain the data or to provide notes for yourself. The text in these paragraphs is entered in a block whose border style can be customized. The text also supports standard cut, copy, and paste functions. And you can change the size of the spreadsheet rows and columns and select the font type, style, and size for individual cells.

Full Impact has a number of features that make the worksheet easier to use than Excel. The most important is an icon bar across the top of the screen that lets you

perform almost any activity by clicking on an icon. The program comes with four icon bars. Two of the icon bars contain a total of 30 general spreadsheet activities such as cut, copy, paste, and fill. A third customizable icon bar allows you to create icons and assign them to operations or to macros. You toggle between the three icon bars using a switch icon. A fourth icon bar, which appears when you begin to enter data, contains functions such as sum,

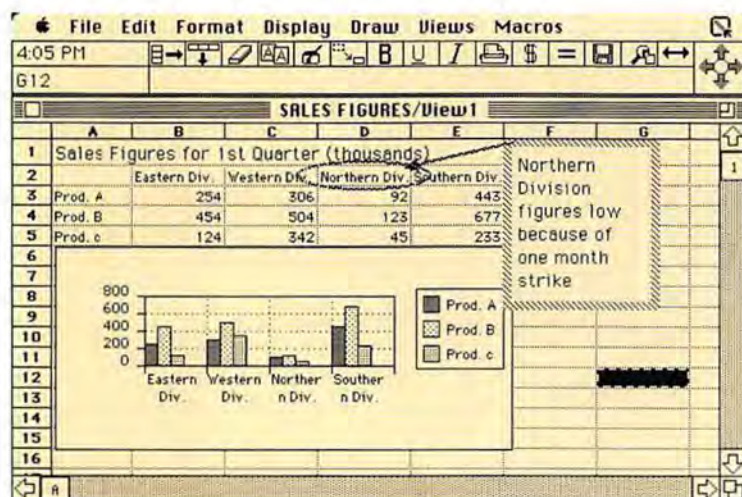


Customizing the Icon Bar

This Full Impact screen allows you to create an icon and its associated function. The large box is a drawing screen where you create the icon—clicking an area creates a black square, and clicking again removes it. Once you have created the icon, you select the operation it will perform from the appropriate menu.

Advantage: Full Impact

One advantage Full Impact has over Excel 1.5 is its presentation capabilities. The program supports seven types of charts and enables you to add text notations and to draw lines, circles, and rectangles. You can change font styles and sizes. In addition, you can color individual elements or fill them with a pattern.



square root, and multiply by. With all four icon bars in use, you can perform a total of about 60 operations and macros, each with only a mouse click. But if you have to toggle between three bars to find the icon you need, it is faster to access the operation through the pull-down menu. Full Impact partly solves that discrepancy; you can change what an icon stands for and even what it looks like, so you can represent with icons the 15 operations you use most

(continues)

frequently and keep them always in view at the top of the screen (see "Customizing the Icon Bar").

Full Impact provides a number of navigational tools. You can create up to nine views to display different areas of a document. You can also zoom in and out, and you can get back to the first column or row with one click of the mouse.

The ability to specify views and customize icons reflects a pervasive philosophy in Full Impact—that the user should have a good deal of control over the look, feel, and methodology of the worksheet. Usually being able to control the look of the worksheet is an advantage, but sometimes it goes too far and makes the program seem wishy-washy rather than accommodating. For example, do you really want to waste valuable disk space on code that allows you to choose whether the mouse pointer is an arrow or a cross, whether the marquee around selected cells moves fast or slow, and whether the insertion point moves when you press Option *and* the arrow keys or when you press the arrow keys *without* pressing Option?

Performance: It's a Toss-Up

In terms of performance, Full Impact is about equal to Excel, but each program has its strengths and weaknesses. Full Impact is much slower than Excel in recalculating the worksheet. In a 17,500-cell document where each cell had to be recalculated, Excel took 23 seconds and Full Impact took 32 seconds. But loading and saving documents is much faster in Full Impact. Loading the document I used for the recalc test took 1 minute and 10 seconds in Excel and only 10 seconds with Full Impact. Full Impact uses more disk space than Excel for smaller documents but less disk space for larger documents. A 9K Excel document took up 49K in Full Impact, and a 48K Excel document took up 81K.



The break-even point is at approximately 180K, where documents are the same size in both programs. After that, Full Impact documents are smaller. A 607K Excel document was stored in Full Impact with 385K.

Full Impact's database capability is also a good news, bad news story. The good news is that you can sort by any number of columns or rows (Excel allows only a triple sort). But the bad news is very bad: you can't find or delete entries by criteria as you can with Excel.

If you're using the spreadsheet in precision-oriented scientific or engineering applications, you might consider that in my test, Excel was more precise. I repeatedly took the square root of numbers starting at 100, bringing the result as close to 1 as possible without going below 1. I then squared repeatedly back to 100 to see how close the program could get. Excel got within .000001 of 100, but Full Impact missed it by .360119.

You create macros with Full Impact in about the same way you do with Excel. Full

(continues)

Double Helix II 2.0r4.9

Data-management program. **Pros:** Excellent integration of database creation and user modes; powerful; easy-to-use icon interface; icon to automate posting; excellent documentation and support. **Cons:** Constructing calculations can be tedious; no way to copy calculations between databases; lacks some control structures found in procedural languages; poor form-design capability. **Company:** Odesta. **List price:** \$595. **Requires:** 1MB; hard disk.

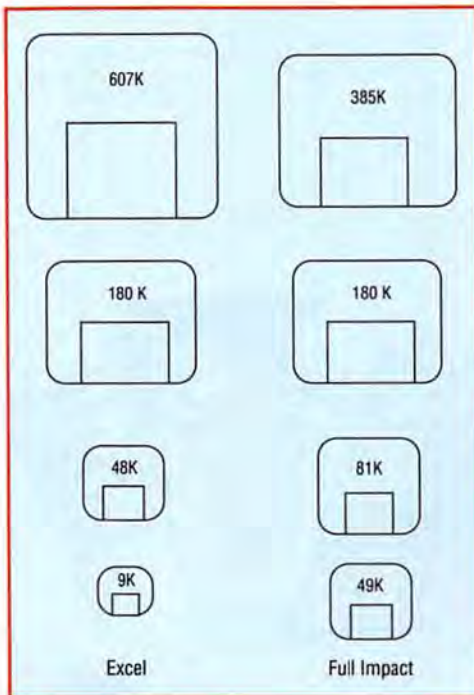


Double Helix II 2.0r4.9 is the fourth major release of one of the most remarkable and distinctive data-management applications ever created. Since its introduction nearly four years ago, Helix has gained power and flexibility without losing its distinctive look and feel or its ease of use. Because Helix uses icons instead of a text-based programming language to represent data structures and relationships, even nonprogrammers can use Helix productively. Odesta has added enough features and functions in this release to keep the program a contender in the increasingly competitive market of full-featured Macintosh databases.

Like most programs capable of generating applications, Double Helix II provides two environments: a full mode used to design, construct, and alter the database; and a customizable user mode intended strictly for accessing the database. In the full mode, you build a database by dragging icons corresponding to data structures (like fields, indexes, and calculations)

from a palette into a window representing the database. Previous versions of Double Helix were supposed to support unlimited numbers of icons, but that dream wasn't realized until this release—Odesta has finally overcome the Macintosh system's inability to handle the large number of icons needed to build elaborate databases. Instead of limiting you to 2000 icons, Double Helix II supports as many icons as your Mac's memory can handle.

Double Helix II differs from other application generators in the degree to which the full and custom environments are integrated; in Double Helix II you can modify the structure of the database while you view the data (as long as the changes do not affect currently entered data). As in previous versions of Helix, you can open an unlimited number of windows to view data. If you alter the structure of a database



The Size Difference

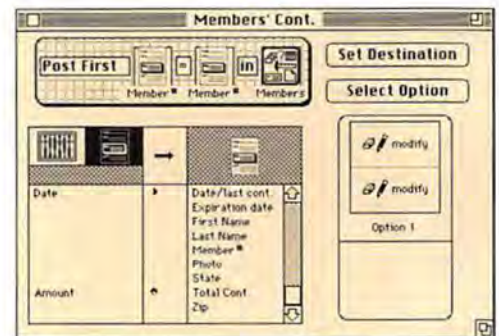
The smaller the spreadsheet, the more disk space it consumes proportionally in Full Impact. When document size hits about 180K, both Excel and Full Impact require equal disk space. Then as the spreadsheets grow, Full Impact takes the lead by requiring less disk space than Excel.

Impact's macros, however, are much easier to access. Not only can you assign a macro to the icon bar, but the program lists available macros as submenus on the menu bar as well. Local macros are part of the document in which they will be used, so when you open the document, Full Impact automatically opens all the corresponding macros—you don't have to open macro sheets separately. You can also create global macros that are available in all Full Impact files.

Full Impact or Excel—a Draw?

If you need to create display-quality worksheets combined with fancy graphics and charts and peppered with paragraphs of text, Full Impact is your only choice. If you don't, I'd call it a draw. Full Impact has more convenience functions and is more customizable, but Excel has a better database, is more precise, and has more third-party programs written for it.—*Lawrence Stevens*

See *Where to Buy* for contact information.



Post It

Using Double Helix II's Post icon, you can connect activities from one database to another. In this example, a Post icon has been configured to post or transfer the date a contribution is made to the field "Date/last cont." located in a separate database containing member information. Post icons can specify the automatic entry, alteration, replacement, or deletion of data.

or the data it contains, Double Helix II immediately updates any related views to reflect the new state of the data or structure.

Double Helix II's most powerful new feature is an icon that controls the posting of data from one database to another (see "Post It"). For example, by defining a Post icon you can enter an invoice and have Double Helix II automatically subtract the quantity of each item sold from the appropriate inventory records. You can even handle situations where changes in an invoice result in returning misordered items to

(continues)



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Customer Profile

Rick Smolan

Age: Withheld upon request.

Profession: World class photographer, entrepreneur and inspirational force behind the now famous *Day in the Life of Australia*; *Day in the Life of the Soviet Union*; *Day in the Life of America*—you get the picture.

Hobbies: When he's not taking photos in exotic places like Bangkok, Nairobi or Cairo, Rick enjoys kicking back, relaxing, and possibly doing some serious scanning of articles related to one of his favorite subjects—Levitation as practiced by Tibetan monks.

His Page Recognition Software:

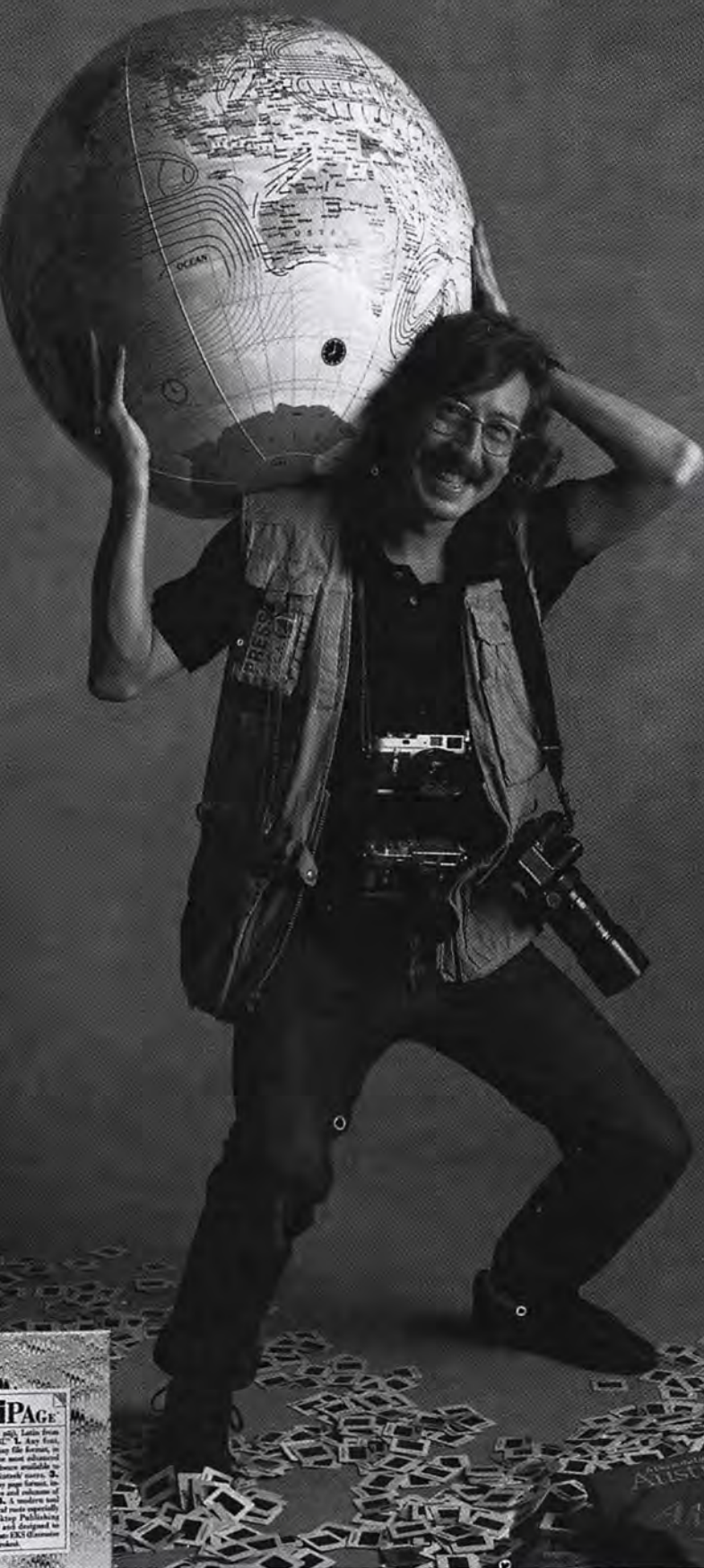
OmniPage, of course. Why else would we have him in our ad? According to Rick: "Coordinating 100 photographers in the Soviet Union for a one day photo shoot is no easy task for a small group like ours—despite what you hear about glasnost. Especially when you have to put an entire book together in a matter of weeks. When we're on assignment each photographer turns in notes—about a given shot—in whatever language he or she speaks. You can imagine some of the type styles that we have to deal with. When do you guys think you'll be able to handle the Cyrillic alphabet?"

Favorite Quote: Jonathan Seybold summed it up best: "OmniPage is the first good reason to buy a scanner."

Things Disliked Most: "Scanner software that over promises. Being able to scan any font in almost any column format really makes a difference. I wish that our photographers had the time to submit captions that are 99.9% accurate, or even half as reliable as OmniPage."

Favorite Scan: "I'm developing a library of some of my favorite photography articles—serious professional stuff—and putting it into files that I can get to and use. That's my idea of a meaningful scan."

Future of Page Recognition: "The idea of making computers compatible with paper is long overdue. People like myself who are on the move need products like this to save time. Everyone could stand a few less key strokes. I also see some real possibilities for OmniPage in the area of desktop publishing. Being able to scan specific sections from general publications, even typed notes, provides a real benefit to anyone who has to quickly turn around a publication. Do you guys think OmniPage will ever be able to read my handwriting? Our staff would love that."



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OmniPage lets you scan, store, and search any page to almost any file format, in compressed, 2. The most advanced page recognition software available to MS-DOS and Macintosh users. 3. Allow you to scan any page format, including multiple rows and columns of text and graphics. 4. A modern tool with Windows command menu especially applicable for Desktop Publishing (DTP) and designed to eliminate 100% of the time spent scanning.

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CAERE

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stock and subtracting the newly ordered items. Complex operations like this are not so easily performed in other databases—for instance, you would need to code all these interactions manually in 4th Dimension.

Other new features include hierarchical custom menus, duplicate record suppression, automatic pagination, and a crash-recovery system to safeguard data in case of a serious system error or power failure.

While Double Helix II's ease of use and its symbolic programming language make it a good choice for novice programmers, the program also has the specialized tools advanced developers need for solving sophisticated database-management problems. However, the same graphic interface that makes Double Helix II so accessible to the inexperienced user can get in the way of the skilled developer. In fact, there are many aspects of programming in Double Helix II that might drive experienced programmers to screaming fits. For example, you construct complex calculations by stringing together flow charts composed of icons that represent various functions or operations. This procedure can quickly become tedious, especially if you are using a small monitor. If you need similar or identical calculations in another database, there's no way to copy your original work. Double Helix II also fails to provide adequate means for documenting calculations or ascertaining where they're used or displayed.

To make matters worse, several control structures usually provided in pro-

Database Benchmarks

Operation	Double Helix II	4th Dimension	FoxBase+/Mac
Import data (index one field)	2009	10,009	67
Find exact	<1	<1	<1
Find (starts with...)	<1	<1	2
Find (containing...)	566	300	116
Sort numeric (indexed)	14	43	2-3
Index numeric	898	2008	18

All timings are in seconds.

gramming languages are missing; these include the While and Do Loop structures. In order to implement such iterations, you have to do some clever programming. The pity is that most of these deficiencies have been around since Helix's introduction and now, three releases and nearly as many years later, they still haven't been addressed. Likewise, Helix's template-design environment has seen little improvement over the years. Although the tools provided are sufficient to design functional forms, the form-generation capabilities of 4th Dimension and FileMaker II are far superior. Helix really should include the ability to draw graphic primitives like lines and boxes and to add control structures like buttons and pop-up menus.

Performance

Although previous versions were widely criticized for being sluggish, Double Helix II's performance has improved so dramatically that it's now on a par with most other relational databases available for the Macintosh. Double Helix II is comparable to, or only marginally slower than, 4th Dimension and Omnis3Plus for most functions (FoxBase+/Mac is much faster and dBase Mac is far slower). Of course, choosing a database on the basis of speed benchmarks alone would be as foolish as picking a car solely on the basis of its mileage rating. For example, if generating attractive forms is important to you, Double Helix II is currently a far better choice than either Omnis3Plus or FoxBase+/Mac. And remember, the performance you'll actually get from any of these programs depends on your system's horsepower.

Realistically, the optimum environment for running Double Helix II is a

Data used was 10,000 records of a disk file catalog consisting of the 10 fields/record. The ASCII text file was 997K.

Equipment used was a Mac II, 2MB memory, Apple RGB monitor in BEW mode. 91MB Relax Technologies hard disk drive.

68020-equipped Macintosh SE or II with at least 2 megabytes of RAM and a large display monitor. Double Helix II *can* be operated on a 1MB Mac Plus or SE, but be careful to restrict your use of start-up documents (INITs and CDEVs) and desk accessories, they might rob Double Helix II of the memory it needs to operate correctly. Although Double Helix II will operate under MultiFinder, Odesta's technical staff warned me not to use MultiFinder while in custom mode since this combination can irreversibly damage a database (and you may not find out until it's too late). Odesta plans to release an update correcting this problem soon, but I think they've betrayed their users by not warning them in the documentation of this serious incompatibility. If MultiFinder compatibility is important to you, make sure this problem has been corrected before using MultiFinder with Double Helix II.

Documentation and Support

Double Helix II's documentation is superb, perhaps the finest of any software package available today. The user's guide and reference volumes are well written, fully illustrated, indexed, and easy to read. An introductory booklet guides the first-time Double Helix II user through all the steps required to build a functional database, eliminating the need to read the massive manuals before getting started. Double Helix II also has an online help file and allows you to easily create your own help files for your database programs.

Odesta provides extensive support through a technical staff that users can access by phone or through OdestaLink, an online bulletin board service. Support is both free and unlimited (but don't expect Odesta to serve as a free consultant to



Custom Mode

By assigning User icons you can control functions and access. You can define a customized menu bar, which will become the working environment for the users assigned to that icon. You add or delete menu items by dragging them out of a scrolling list. As data views are selected in the scrolling list you can alter the range of permissions for that form.

(continues)



Tom Tjelmeland
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T & K Roofing Company, Inc
50 employees
1988 Roofing Contractor of the Year

"Our business was going through the roof, but our old accounting system was holding us down.

"In the commercial roofing business, you have to be on top of things in the office, too. Accurate budgeting and planning are essential.

"But in the last five years, our business has really grown. And our stand-alone computers and simple accounting software system just couldn't handle it. We decided to switch to the Macintosh. And fortunately, our dealer showed us the Great Plains Accounting Series at the same time. It was just what we needed!

"It was so easy to learn and use, we didn't lose any time putting the system into place. And since it is fully-integrated and expandable, we've been able to add modules as our business required them.

"Adding Network Manager was easy—no data re-entry was necessary. And it gave us multi-user capability. Now, our people at eight different work stations can use Great Plains at the same time. And the customer assistance from Great Plains is excellent—the most responsive we've ever dealt with.

"We haven't even begun to use all the capabilities that Great Plains provides us. And we feel good about that. Take it from me—after you've outgrown one system, you don't make that mistake again."

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*Sheldon Needle survey, 1988

MW-1288

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write applications for you). I called technical support on several occasions and always received prompt and courteous help. Odesta also offers introductory and advanced courses on Double Helix II as well as a registered developer's program. Runtime, multiuser, and VAX-compatible versions of Double Helix II are also available.

Short on Programming Skills?

Double Helix II is the kind of software that enables ordinary people without programming skills to do things that they would otherwise never do—like create elaborate relational databases. Although Double Helix II's design and features take good advantage of the Mac's graphic nature, the program's rigid adherence to an iconic interface showcases both the best and worst aspects of this approach. The absence of an internal procedural language definitely limits the program's flexibility, but if you're short on programming skills, want to do it yourself, or are in a hurry (and who isn't?), you should take a serious look at Double Helix II.—*David L. Foster*

See *Where to Buy* for contact information.

HyperTools #1 and HyperTools #2

HyperCard tool kits. **Pros:** Facilitate many HyperCard authoring routines; list and summarize most stack routines; automate scripting of radio and check box buttons; allow editing of icons and creation of new sounds. **Cons:** Reorder tool in #2 can leave permanent tool window on stack cards; scan tool sometimes unwieldy. **Company:** Softworks. **List price:** \$99.95 each. **Requires:** 1MB and HyperCard 1.2 (HyperCard is included).



Building HyperCard stacks that exhibit polish, grace, and logic isn't as easy as Apple would have you believe. Cards get out of order, buttons balk, and scripts become labyrinthine. Stack authors, particularly new ones, often wonder if there isn't an easier way. The 28 tools and utilities included in these two HyperTools programs provide solutions to many of these HyperCard authoring dilemmas. Each set of tools is full of shortcuts and automatic functions, and each installs as the last card in the stack on which you are working.



Tools in Common

Both programs have tools that summarize how many backgrounds, cards, fields, and buttons are in your new stack. You are alerted when the free stack size exceeds a predetermined number of bytes, you can then compact the stack with the click of a button.

In addition, both programs offer a scanning tool that lets you flip forward or backward through a stack. The tool can be installed on any of your cards; it also appears automatically when you choose any one of several other tools such as button, font, or visual effects. I found the scan tool a bit awkward to use, especially when I was trying to maneuver to the middle of a large stack. For instance, since scanning can be erratic (particularly when you use the scanning tool at its fastest speed), clicking on the appropriate card turns into a hit-and-miss game. Here's an undocumented tip: To go directly to another card from the HyperTools card, type **push card** into the message box while viewing the desired



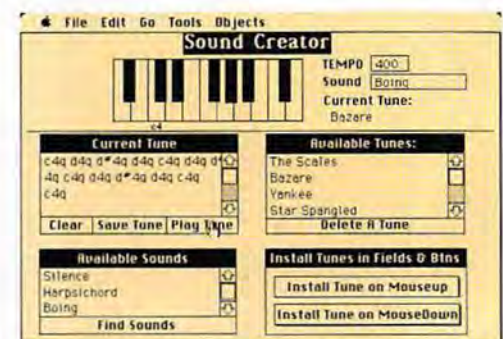
Info Tools

The Info Tools window in HyperTools #1 lists message handlers and references to global variables, and also allows you to search for strings in the stack scripts.

card. Then go to the HyperTools card and press the Shift key before choosing a tool icon. This pops the tool to the desired card.

HyperTools #1

HyperTools #1 will prove most useful to those with some familiarity with HyperTalk. The Info tool is a gold mine of scripting information. You can view all the message handlers or references to global variables in a stack; search for strings; print or export findings; or leave the stack to work in a word processing program. Other tools let you automate the scripting of radio and checkbox buttons, copy button scripts, and create arrays of buttons in rows and columns. You can edit icons, change fonts and styles (even on buttons), and display all the XCMDs and XFNCs in the stack.



Sound Tool

The Sound Tool in HyperTools #2 lets you play, create, and install sounds and tunes on your stacks.

HyperTools #2

The second set of tools is useful if you're building stacks that require entering information. You can assign number, date, and text formats to fields, and you can require that all or some of these fields be filled in before the user can go on. You can install automatic sorting on mouseUp or closeField. One of the tools also lets you assign a list of selectable entry choices to a card or background field.

Installing visual effects and sounds in button scripts is a cinch with HyperTools, and it's nice that the program lets you view hidden fields or buttons. There is one tool, however, that's designed to reorder all or a portion of the stack's cards and it's scary. It can be very useful, but if you should accidentally interrupt the reordering process, a permanent tool window remains on ev-

(continues)

THIS IS WAY BEYOND COMPUTERS.



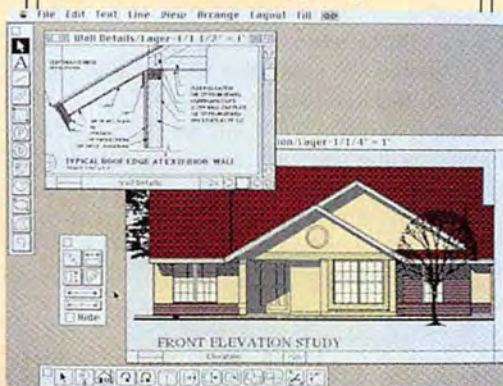
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ery selected card. The result is a ruined stack—unless you are working on a backup.

The tools and utilities in these two packages (16 in each program) are powerful, and they can definitely help stack authors take fuller advantage of HyperCard's potential. It is imperative, however, that you follow the manuals' instructions carefully and that when you use the tools, particularly the Reorder tool, you *always* work on a backup copy of the stack you're building. —*Suzanne Stefanac*

See *Where to Buy* for contact information.

SoftQuad Author/Editor 1.1

Text editor conforming to Standard Generalized Markup Language (ISO 8879).

Pros: Easy to learn and use; produces structured files conforming to international standard; powerful text processing features. **Cons:** Not WYSIWYG; requires two other programs for complete publishing system. **Company:** SoftQuad. **List price:** \$495. **Requires:** 1MB.

AE SoftQuad Author/Editor is not for small publishers who want to create a document and quickly see the finished output for another formatting go-round. Instead, Author/Editor belongs in a world of team writing.

What It Is

Author/Editor is a very specialized text editor that you need not consider unless you're writing for the U.S. Department of Defense, interacting with mainframe or minicomputer publishing systems, or doing compact-disk database development. Author/Editor produces ASCII text files marked according to ISO 8879 SGML (Standard Generalized Markup Language)—a set of international codes that describe the structure of a document. In sharp contrast to most Mac word processors, you use the codes to tag all of a document's structural elements—such as chapter start/chapter end, paragraph start/paragraph end, emphasis start/emphasis end, and so on.

In fact, Author/Editor resembles nothing so much as WordStar. That venerable

text editor, which hails back to 1979 and the CP/M operating system, also used embedded codes. Author/Editor's codes are distinguished by their dialog box entry method, which guarantees that they will appear correctly formatted. Also, every element in a document, down to variant characters in a parts number, can carry an SGML code.

Author/Editor, however, offers more than just a different way to format text. The program's text-editing facilities are nicely implemented and include about a dozen practical features also available on some word processors, such as an outline view, a spelling checker, embedded comments (for the writing team), embedded auto-referencing for tables and graphics, and multiclick selection (click once to set the insertion point, twice to select a word, three times for paragraph, and so forth).

Parts of Author/Editor are particularly powerful. Find and Replace, for instance, can be limited to text appearing between certain codes, or it can find and replace the codes themselves. Its options compare favorably with those of FullWrite's Find, Change function. Author/Editor also has password protection for files, and a record-and-play macro facility.

Text, file, and figure *entities* provide some of Author/Editor's most powerful capabilities. An entity is a code that represents something else: words, a file name, or a graphics file. For example, a text entity can stand for a complex technical term throughout a document. Thus, you need only insert the entity rather than type a long, complex word or phrase. You can display the word or the entity on screen. You can also edit the entity to display some other word—the change affects the entity wherever it appears.



On-Screen Formatting

An external publishing program actually formats the SGML files, but the writer does have some control over what appears on screen. Printing from Author/Editor, even to a LaserWriter, is strictly for proofreading.

With file entities, you can build a master document that is really a shell for the finished product. Instead of including all the text, the master document contains file entities that serve as cross-references to the various text files. When you send the master document to the publishing software, the cross-referenced text is inserted in the appropriate place in the shell. File entities work like the powerful "include file" command found in some Mac word processing programs (such as Microsoft Word) and in many UNIX text processing programs.

With figure entities, you can vary the illustrations you send to the publishing software.

And What It Isn't

Because Author/Editor is solely a text editor, however, you need two other pro-

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Split Screen

You can split the screen for two different views of your document. The top part shows the structure of the document; the bottom part shows how the tagged document appears while being edited. The structure view is not an outline, but it is useful for jumping around a document and for moving components using cut and paste.

Three smart steps to doin' the "Mac."



1. While you print in the background, run in the foreground.

any other spooler around, SuperLaserSpool makes a great partner for any Mac 512e and up and any Apple® printer, with or without MultiFinder™. It gracefully handles multiple downloaded fonts and keeps pace with the latest versions of Macintosh® applications. In fact, it's even optimized to correctly spool PageMaker™ files. Some performance!

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DiskFit™ makes that crucial step of backing up your hard disk such a breeze you'll find yourself doing it again and again. DiskFit backs up your data on floppy disks, Bernoulli® cartridges, DTC/Kodak cartridges, another hard disk or 3M DC 2000 tape cartridges.

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How's that for a neat turn?

DiskFit: \$99.95

Network DiskFit: \$395.00



3. Click your files closed.

Locking sensitive files is the *only* step for anyone who works with confidential or private data. Now our encryption utility, *Sentinel™*, makes it so easy you'll waltz through it. For example, protection of your documents occurs right on your desktop: protected files appear with a lock symbol on the icon, or can be made invisible. And you get your choice of the Data Encryption Standard (DES), or our other fast and secure encryption algorithms, including our critically acclaimed SuperCrypt™, which will protect a 100K document in an incredible 5 seconds. And our intelligent "WorkSet™" feature keeps track

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Aldus: PageMaker. Registered: Apple, Mac, Macintosh, ImageWriter. Iomega Corporation: Bernoulli. Prices listed are suggested retail price.



grams to complete the publishing system—the Rules Builder program and the publishing software. Rules Builder is necessary for creating the specifications for the embedded codes. (Author/Editor comes with two rules files for producing standard book manuscripts.) More important, however, Rules Builder allows you to specify a strict hierarchy for text elements—for instance, allowing subheads to appear only under chapter headings or allowing italics to be used only within block paragraphs.

The third part, the publishing software, interprets the marked structure of the document and applies styles, margins, indentations, and other such information at printing time. Several third-party publishing programs are available that run under UNIX, MS-DOS, or the Mac operating system. Under UNIX you can use Interleaf Scribe, Context, Xyvision, and Datalogics. On the Mac, you can use products such as PageMaker or Word—but you must establish the relation between SGML codes and the way the Mac software interprets them. SoftQuad provides publishing software that runs with A/UX, MS-DOS, UNIX, or the Mac.

Whether you need all three parts depends on your application. If you're preparing text for submission to the U.S. Department of Defense (a heavy user of SGML documents), all you need is Author/Editor and a copy of a rules file describing the structure of the document. If you're designing structures for documents as well as writing them (preparing a reference volume for use on CD ROM, for example), you also need the Rules Builder program to create the required rules file. Only if you're planning on interpreting an Author/Editor document for printing do you need the publishing software.

As for Author/Editor itself, if you intend to submit electronic manuscripts to the Defense Department, transmit books to a major publishing house via modem, or concoct online documentation that must be searched and retrieved piecemeal, Author/Editor is a hot product that demands your attention. If you're a desktop publisher but don't interface with mainframe publishing systems or don't do team writing, stick with the more common word processors.—Jeff Walden

See *Where to Buy* for contact information.



Practica Musica 2.0

Music theory, sight-reading, and ear-training instructor. *Pros:* Intuitive, challenging exercises; MIDI compatible; clever use of digitized sounds. *Cons:* Overly fussy about enharmonics; occasional interface inconsistencies; limited to classical nineteenth-century theory; requires entry of disk serial number upon first launch. **Company:** Ars Nova Software. **List price:** \$125. **Requires:** 512K.



The big advantage to learning music from a computer is that immediate audiovisual feedback is much livelier and more engaging than a trudge through a theory book. Practica Musica, a simple, thorough, even charming ear-training program, fills the bill very well; version 2.0 offers new exercises at both ends of the skill spectrum, can now compose its own drill melodies, and has been modernized with the addition of MIDI compatibility. Despite the changes, Practica Musica retains the friendly, professorial tone of the earlier versions, making it a patient teacher for students at almost any level who want to become better musicians.

Practica Musica's philosophy is revealed by its simple display: a musical staff above a piano keyboard. This screen continually reinforces the relationship between the piano keys, the pitches they produce, and the corresponding written notation. Indeed, when you finish an exercise and return to the home screen, there is an overwhelming temptation to drag the mouse randomly across the piano keyboard, just for the fun of seeing the corresponding whole notes dash madly up and down the musical staff.

You access the program's nine activities from a menu; each activity stresses a different aspect of ear training, and each has various difficulty levels. A running score total and digitized keyboard sounds make the learning more fun.

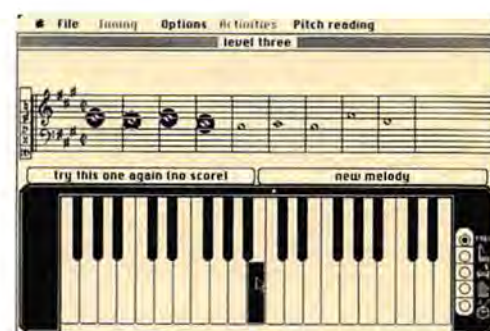
Here's the Pitch

The first activity on the menu—new in this version—may be the most elegant and useful aspect of the entire system. It's called Pitch Reading, it teaches you to read notes, and it couldn't be simpler. Practica Musica displays a single line of whole notes on the staff. Your job is to play them on the piano keyboard (see "Pitch Reading"). The program encourages you with written comments like "Excellent! That was both fast and accurate."

What seems like a simple drill takes on a new dimension with the addition of MIDI capability. MIDI (musical instrument digital interface) is a protocol that allows computers and synthesizers to communicate over a cable. In Practica Musica, attaching a MIDI keyboard means that you can hear the exercises played by a violin, sung by a choir, or barked by a dog—depending on the synthesizer.

MIDI turns Practica Musica's Pitch Reading drill into an infinitely patient sight-reading teacher. A child can play match-the-note on a MIDI keyboard as part of beginning piano lessons. What's more, an adult with a MIDI-equipped guitar, clarinet, or violin can now learn the basics, with the

(continues)



Pitch Reading

Each note you play correctly on the keyboard sprouts a highlighted halo. If you give up, just click on the written note to see the corresponding piano key light up—but you'll lose points if you do. On the panel to the right of the keyboard, you can select the sound for the exercises: snare drum, organ, harpsichord, piano, or MIDI instrument.



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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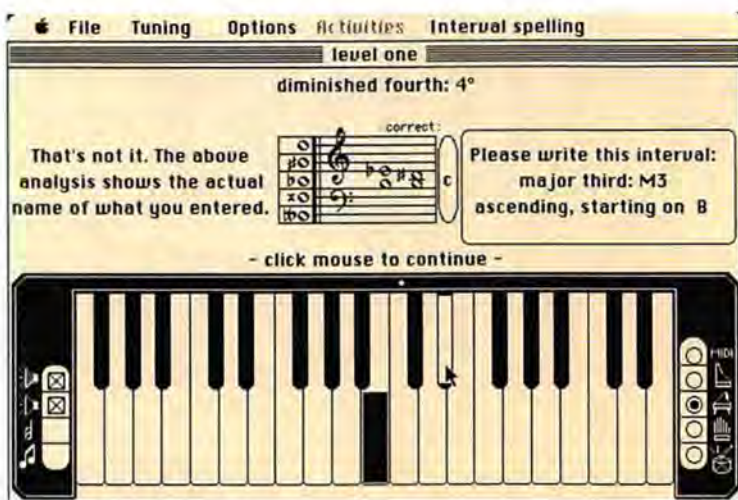
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Enharmonic Fussiness

Even though the correct piano keys were played, *Practica Musica* decided that the highlighted keys were B and E-flat (as noted on the staff by the left-hand pair) and marked the answer wrong. Actually the interval is perfectly correct, but the program confuses itself by recognizing only one key name for each answer.



Mac providing encouragement. There are even MIDI converters for the voice—you can teach yourself to sight-read by attempting to sing the displayed pitches.

A Touch of Classroom

The other modes of *Practica Musica* are aimed more directly at the college-level musician. With its feet firmly planted in classical music theory, the program offers such activities as Interval Spelling, where you are asked to write a given chromatic interval; Chord Spelling, where you construct a specified chord; and Ear Training for Intervals, where you hear two notes together, and you must name and play the interval on the keyboard.

Although these exercises are creatively implemented, in one respect they work at cross-purposes to their pedagogical origins. The program is extremely finicky about enharmonic equivalents (two names for the same note on the piano keyboard), and sometimes marks right answers as incorrect (see "Enharmonic Fussiness"). The problem is that when you strike a note, the program decides for itself which enharmonic equivalent you played. And how does *Practica Musica* decide? According to the manual, it chooses an enharmonic name "by assuming that you mean the most common one." Unfortunately, there's no such thing. A C-sharp is no more or less "common" than a D-flat or any other note.

Take a Note

For more advanced students, *Practica Musica* offers three special activities: Melody Ear Training for Pitch, for Rhythm, and

for Pitch and Rhythm Together. Music students will recognize these drills as an updated version of dictation exercises, a staple of introductory theory courses. *Practica Musica*'s clever electronic versions are particularly effective.

In Melody Ear Training for Pitch, the program plays a simple melody and displays the starting note. It's your task to notate the rest of the tune by playing it on the keyboard or by clicking the notes directly onto the staff. The elegant part of this drill is that, with each note you enter, the cursor automatically takes the shape of the next note's rhythmic value, since the goal is pitch dictation. Similarly, in Melody Ear Training for Rhythm, you select the note type (quarter, eighth, and so forth) from a palette and click on the staff; the note jumps into place, relieving you of having to determine the pitch.

At any point you can play the full tune again or listen to what you've entered so far, so you can hear and correct your mistakes before you're graded. The melodies are excerpts from Western classical music, from Mozart to Stravinsky. When you tire of these examples, *Practica Musica* can actually generate some respectable musical fragments of its own, according to the key, meter, and difficulty parameters you specify.

The use of actual melodies is more musical than the nonrhythmic strings of pitches generated by the only other player in the ear-training racket, Listen 2.0. Although it looks more polished and, with its on-screen guitar and superior chord drills, holds a promise of its own for jazz students, Listen offers no rhythm drills at all and makes no attempt to teach sight-reading—only ear training.

Final Movement

In general, *Practica Musica* feels a little bit homegrown. Its graphics aren't very polished, its text is all in the Chicago font, and the musical symbols smack slightly of a birth in MacPaint. Then, too, its nineteenth-century-theory mentality, while right on the nose for college classes in classical music, isn't very useful for pop or jazz musicians; for example, *Practica Musica* neither generates nor accepts chords with more than four notes, thereby excluding common chords like ninths and thirteenths.

But the program does have heart. It will lead you off the theory-book page into the real world of hearing, understanding, and making music. With infinite patience, positive feedback, and useful, ever-changing exercises, *Practica Musica* may well be one of the best professors you've ever had. —David Pogue

See *Where to Buy* for contact information.

SuperExpert 1.4

Expert-systems development shell. Pros: Fast; simple; run-time DA available. **Cons:** No graphics; awkward forward chaining. **Company:** Softsync. **List price:** \$199.95. **Requires:** 512K, 800K external drive.



Scotland's smoked salmon and whisky are now sharing export status with integrated circuits and artificial intelligence software such as Dr. Donald Michie's SuperExpert. SuperExpert, commercially available from Softsync, offers a simple, practical way to capture expertise for delivery to end users. This is not primarily an educational program like Human Intellect Systems' Instant Expert Plus—it's designed for developers who want to package commercial decision systems.

Tabling the Motion

At the heart of SuperExpert is the decision table, which summarizes information about the decision to be made by organizing decision criteria. Suppose you would be willing to buy a red Volkswagen, but not a red Peugeot, for less than \$10,000.

(continues)



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Simply construct a table (using Add Criterion from SuperExpert's Edit menu) listing color, manufacturer, and price as column headings. The last column heading, set by SuperExpert, is always Decision. To enter the information (using Add Example on the Edit menu), you just type **red**, **Volkswagen**, and **10** (for \$10,000) in the appropriate criteria columns, and **Buy** under Decision. That's all it takes to set up a decision system in SuperExpert—you pick the decision criteria and fill in the table.

But when you add the Peugeot information in the same table, you get the first glimpse of SuperExpert's power. When the program draws the decision tree corresponding to your information, you will see that color won't appear as a decision branch. After all, the only information entered concerned red cars, so there's no decision (yet) based on color. As you add more examples (maybe you would buy a black Toyota for \$15,000), SuperExpert constantly analyzes the base of examples to determine the real decision rules lurking in your information, flagging inconsistent examples and ignoring redundant information. This feature, "auto-induction" of rule logic, makes SuperExpert very easy to use. In practice it means that examples can be entered in a haphazard, free-form manner, and that SuperExpert will check your input for logical content and make sense of it all.

To arrive at a decision, SuperExpert asks you appropriate questions. Unnecessary questions (about color, in our test case) won't be asked, since the program pursues the most efficient path through the decision tree it developed from the examples. In this case, it would ask for the car's manufacturer and report Buy for the VW



and Don't Buy for the Peugeot. You can rewrite the general-purpose default question screens so that the questions present the criteria in normal English sentences, and you can also customize the text itself with formats and fonts. Macintalk, along with special instructions, is included in the SuperExpert package for producing talking versions of the question and answer sequence.

Excellent Criteria

Hidden in the criteria is another of SuperExpert's strengths. The criterion categories are Logical, Integer, and Problem. Problem lets you define subproblems of complex criteria—in the car example such a criterion might be performance—that call for the program to collect information on simpler points (acceleration, brakes) in a process called *backward chaining*. Since the program arrives at a decision based on other decisions, the user only sees questions that refer to the smallest pieces of information.

Large applications can be constructed using backward chaining (some commercial systems implemented in SuperExpert have 64 levels of subproblems) without overwhelming the end user with program logic. Use of subproblems actually speeds decision making in large (more than 100 rules) problems. This speed increase, however, is barely perceptible—since the program moves through the logic tree as you respond to its questions almost as fast as you can click a mouse button.

The converse process, *forward chaining*, can also be used in SuperExpert to break down problems. SuperExpert recommends, for example, that in cases involving more than eight possible decisions, forward chaining should be used to direct the program to different tables with different decision classes grouped together. Forward chaining is the least automatic of the program's facilities, requiring insertion of text commands.

SuperExpert presents a neat solution to the problem of delivering the decision-making system in a convenient form to end users. A desk accessory called Question Box (Softsync licenses use of this DA to developers) lets users call up any SuperExpert example file and run through its questions to a decision. (These files are remarkably compact—3K–4K for about a hundred rules.) Most real-world applications for decision systems are likely to be financial—real estate taxation is a lively area at the moment—and users who work mostly in Excel can thus toggle back and forth between their worksheets and Question Box's inquiry screen. The DA option is an elegant way to implement a crash-proof run-time version of the program that doesn't require any user expertise in expert systems.

The Machinery of Logic

When you enter your examples in the decision table, SuperExpert formulates the logic in an IF-THEN tree, shown at the left in this figure. The program weeds out redundant and inconsistent examples for you when it draws up the tree.

Examples: decision			
	Location	Condition	decision
1	Excellent	New	Consider
2	Excellent	Used	Don't_Buy
3	Excellent	Old	Don't_Buy
4	Good	New	Consider
5	Good	Used	Don't_Buy
6	Lousy	*	Don't_Buy
7			
8			
9			
10			
11			

Rule: decision	
7 nodes.	
1	Condition
2	Used : Don't_Buy
3	Old : Don't_Buy
4	New : Location
5	Excellent : Consider
6	Good : Consider
7	Lousy : Don't_Buy

SuperExpert Lives Up to Its Name

SuperExpert offers all the features needed to make powerful stand-alone decision systems, and it offers two significant improvements over MacSmarts and Instant-Expert Plus. First, its simple scheme for rule entry and its auto-induction feature make it easy for nonprogrammers to create useful decision systems. Second, using a DA for its run-time system makes SuperExpert applications particularly Mac-friendly for end users. Perhaps the people who gave the world the steam engine have now given us the first really practical engine for the information revolution.

—Charles Seiter

See *Where to Buy* for contact information.

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LCD Projection Pads

Mac-Screen Overhead. *Pros:* Blue-tone projected image is large and easy on the eyes; unit is small and lightweight; no external power supply required. *Cons:* Separate box for adapter circuitry must be plugged into LCD panel; not compatible with Mac II or non-Macintosh computers; hot projector can cause image fading. *Company:* Ask LCD. *List price:* \$1490, including adapter and interface. *Requires:* Overhead projector.

Kodak Datasbow HR/M. *Pros:* High-contrast black-and-white projected image matches Macintosh screen; cooling fan guards against overheating. *Cons:* Projection pad with power supply is relatively heavy and bulky; not compatible with Mac II or non-Macintosh computers. *Company:* Eastman Kodak. *List price:* \$1595, plus \$99 for interface. *Requires:* Overhead projector.

The Macintosh's designers clearly didn't intend for large groups of people to view the small Mac screen. But with today's sophisticated graphics and desktop-presentation software, the Mac is an ideal tool for communicating with large groups as well as small ones—provided you have a way to enlarge the 9-inch screen.

Several flat-panel liquid crystal display (LCD) devices allow you to project Macintosh screens with a standard overhead projector. The first LCD projection panels released for the Mac were warmly received in spite of the fact that their blue green images lacked the crisp contrast that makes the tiny Mac screen so easy to read (see *Reviews*, *Macworld*, August 1988). Less than a year after the introduction of those early units, two new high-visibility flat-panel displays have emerged: Ask LCD's Mac-Screen Overhead and the Kodak Datasbow HR/M Projection Pad.

Making Connections

Both units are compatible with a Mac SE or Plus, each modified with a special video adapter. The two video interfaces are similar but not interchangeable. In both cases, installation is simple for trained technicians with the proper tools.

The Mac-Screen Overhead consists of a thin, .07-inch-thick LCD panel that sits on an overhead projector, plus a separate



The Ask Mac-Screen Overhead (on the left) has a viewing size of 8.3 inches by 5.6 inches and weighs 3.2 pounds. The Kodak Datasbow's viewing size is 6.5 inches by 4.4 inches, and the unit weighs 6.6 pounds.

adapter unit. Custom cables connect the panel to the adapter box and the adapter box to the modified Mac. The plugs on the ends of the cables have many tiny pins that must be seated properly for the unit to project a clear image. But once the cables are properly plugged in and the contrast control is adjusted, the LCD screen clearly displays anything that appears on the Mac screen. It's not necessary to plug the panel into an external power supply; it draws power directly from the Mac.

In contrast, the Kodak Datasbow comes with a separate external power supply that must be plugged in for the unit to operate. But there's no separate adapter box for the Kodak unit; all of the necessary circuitry is housed in the 2.4-inch-thick panel, along with a quiet fan to dissipate the heat generated by the overhead pro-

jector. A simple custom cable connects the computer to the projection pad. The pad itself has controls for adjusting the contrast and reversing the video image (light to dark).

The Eyes Have It

The final exam for any projection panel is the image that it produces. Both of these units pass with flying monochrome. The Ask unit produces a pleasant blue version of the Mac screen; Kodak's unit scores a bull's eye with a solid black-on-white carbon copy. In both units, the high-contrast images are easier to read than those of many competing models. Movement and animation are usually easy to follow, although images don't refresh as quickly as they do on the Mac screen itself.

I set up both units side-by-side on identical projectors in front of a class that was accustomed to seeing projections from the In Focus PC Viewer, and projected identical images. I asked the students to choose between the two machines, and the vote was close. Some students preferred the crisp, high-contrast Kodak image; others preferred the larger, tinted Ask image.

To test the units' resistance to heat (the bane of many LCD pads), I left both cooking on the hotter-than-average projectors for the entire class period. After 45 minutes, both images were still clear and readable, but the Mac-Screen Overhead had faded enough to sway the class overwhelmingly toward the air-cooled Datasbow. There was a clear consensus



(continues)

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among the students, though, that both were better than the PC Viewer.

Of course, the PC Viewer has one advantage over either of these devices: it's compatible with Mac IIs, IBM PCs, and a variety of other computers. The units reviewed here work only with Mac SEs, Pluses, and earlier Macs. But for use with those computers, the Mac-Screen Overhead and the Kodak Datashow HR/M do an outstanding job.

Which is better? Ask's lightweight, wide-angle Mac-Screen might be more appropriate for presenters who must constantly carry equipment around, or who are forced to position the projector very close to the screen. But for most applications, the Kodak Datashow does the best job of making the tiny Mac screen larger than life. —George Beekman

See *Where to Buy* for contact information.

Grapppler LQ

Macintosh interface for third-party high-resolution dot matrix printers and laser printers. **Pros:** High-quality text and full-screen graphics reproduction, and fast draft-mode printing, on non-Apple laser printers and 24-pin dot matrix printers. **Cons:** Slow print speed for graphics and high quality text; very limited font selection. **Company:** Orange Micro. **List price:** \$149. **Requires:** 1MB, two 800K floppy drives; hard disk recommended. Printers must have a parallel port; laser printers must have 1MB of memory.

Like an arranged marriage that succeeds in spite of conspicuous differences between the partners, the pairing of the Macintosh with third-party high-resolution printers—made possible by Orange Micro's Grapppler LQ interface—can be a productive if imperfect union. If your printing volume is low, the Grapppler LQ can turn any of several dozen reasonably priced laser printers or 24-pin dot matrix machines into all the printer you'll ever need.

The Grapppler LQ joins a short list of earlier products designed to bridge the gap between the Mac and non-Apple printers, such as the Grapppler C/Mac/GS interface for 9-pin dot matrix printers and GDT Softworks's excellent utility for daisy

Example 1: the Grapppler LQ's Courier typeface.

Example 2: the Grapppler LQ's "Dutch" typeface, a Times-like font.

Example 3: the Grapppler LQ's "Swiss" typeface, a Helvetica-like font.

Example 4: the Mac's standard Helvetica typeface.

Sample Output

These text samples are printed on a Hewlett-Packard LaserJet Series II using the Grapppler LQ interface. The first three examples use the Grapppler's special fonts for best resolution, while the fourth shows the blocky text output you'd get without them.

wheel machines, Mac Daisy Link. The Grapppler LQ, however, is the first package that lets you use your Mac to obtain WYSIWYG text at top quality, plus bitmapped graphics at screen resolution (72 dots per inch), from the current generation of high-res business printers. It works with the ubiquitous Hewlett-Packard LaserJet and its compatibles; HP's new 300-dpi ink-jet printer, the DeskJet; and a host of excellent dot matrix printers from manufacturers like Epson, Toshiba, and NEC.

Physically, the Grapppler LQ consists of an unimpressive rectangular plastic housing containing the circuitry that converts the Mac's serial output to the parallel format expected by most non-Apple printers. A hardwired cable leads from the back of the unit to the Mac, while a parallel connector mounted on the front plugs the device directly into a printer.

For Better, for Worse

The Grapppler LQ is well named, since the unit relies on Apple's own ImageWriter LQ driver to turn Mac files into a form the printer can digest. Like Apple's LQ, the Grapppler creates razor-sharp text by con-

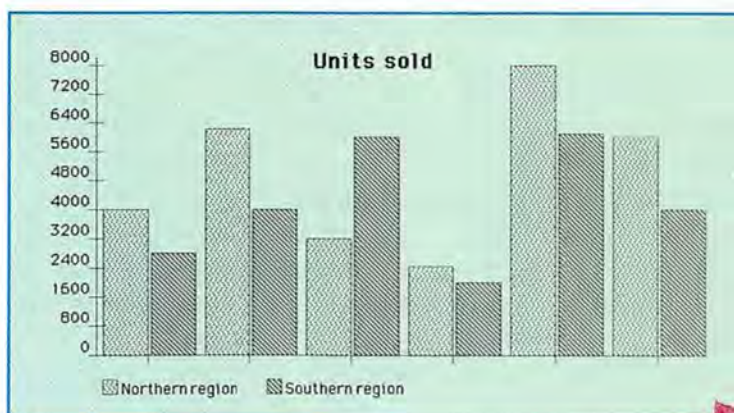
densing oversize bitmapped screen fonts to the size of each font in your document. These larger fonts are always an exact multiple of the corresponding screen font's size—24-pin machines require printer fonts that are 2½ times the size of the screen font, while laser printers need fonts 4 times as large.

In either case, the idea is that each character in an oversize font is composed of many more dots than is its counterpart at a smaller point size. When the Grapppler shrinks the large character, the dots become smaller and closer together, and the character appears much more sharply defined (see "Sample Output").

No comparable wizardry can increase the resolution of graphics or, for that matter, of text that lacks a corresponding oversize font. For those, the Grapppler LQ simply transfers exactly what you see on the screen to the printed page, but it does so very accurately and with attractive results (see "More than Text").

While the Grapppler can't be faulted for print quality, it does have its share of draw-

(continues)



More than Text

The Grapppler LQ lets you print business charts and graphics images at screen resolution.



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backs. The worst of these is its painfully slow performance, even when compared to the sluggish ImageWriter LQ. A three-page text-only document required a grinding 18 minutes to print (on a LaserJet); a LaserWriter would have finished the same job in about a minute. Graphics pages take a bit longer. To an extent, you can work around the system's slowness by taking advantage of a print spooler option wisely included with the Grappler driver. Selecting a Draft mode option can also shorten print time dramatically, by substituting the printer's built-in fonts for those specified in your document—our test document took about 30 seconds. But you'll give up control over text alignment, and graphics—even straight lines—don't print at all. Unfortunately, neither the spooler nor Draft mode works properly with all programs.

The Grappler LQ also has a couple of important font limitations. You get only three fonts with the package: facsimiles of Helvetica and Times, and a version of Courier. You're also restricted to a very narrow range of full-quality font sizes—from 9 to only 18 points if you're using a laser printer, from 10 to 24 points on dot matrix machines. (Apple's ImageWriter LQ offers only a slightly wider variety of fonts and point sizes.)

I Do... I Do?

On balance, though, for many who need a high-res Mac printer but don't require a PostScript device, the Grappler LQ's crisp output may offset its slow performance and limited font selection. Obviously, if you already own or have access to one of the machines that works with the Grappler LQ, you'll want the Orange Micro ticket to hard copy output. For the thousands of Mac users who share office space with the HP LaserJet, the Grappler LQ should be a real boon.

It's a tougher call if you're planning to purchase a new printer, but for light use a Grappler teamed with a non-Apple printer is still a smarter buy than an ImageWriter (although some may find the Grappler LQ's slow performance unacceptable under any circumstances). You can find a sizable assortment of 24-pin dot matrix printers in the \$500 price range—roughly what you'd pay for a standard 9-pin ImageWriter. Though they lack the ImageWriter LQ's wide carriage, these powerful machines give you essentially the same print quality at less than half the cost. And don't forget the HP DeskJet for laser printer resolution

(300 dpi) at a street price of about \$850. If you do need a wide-carriage dot matrix printer, a top-of-the-line NEC, Epson, or Toshiba won't save you much money over Apple's offering, but you still might prefer a machine you can use with a PC if need be. If you've budgeted for a laser printer, however, you'd be smarter to choose a QuickDraw machine over a LaserJet-compatible model—you'll get much faster performance, greater font selection, and better-looking bitmapped graphics.

—Steve Cummings

See *Where to Buy* for contact information.

Mathematica 1.03

System for mathematical computation and graphic display. **Pros:** Encyclopedic functional capabilities; versatile programming language; impressive symbol-manipulation facilities. **Cons:** Needs 4MB for full system; text-oriented interface; no 68881 support for Plus/SE version. **Company:** Wolfram Research.

List price: Plus/SE version \$495, Mac II version \$795. **Requires:** 2.5MB, hard disk.



Mathematica is the most impressive single science/engineering application available for the Macintosh. While many of its capabilities, such as equation-solving, symbolic math, and graphing, are available in other applications, no other program currently on the market approaches Mathematica's scope and level of integration. It is, without exaggeration, simply amazing.

It's also not for everyone—this is a serious research product that assumes you

are familiar with programming and with mathematics beyond calculus. Mathematica will revolutionize production of Ph.D. theses throughout the sciences, but if you have never heard of the confluent hypergeometric function or tensor analysis, you may not want all the resources of this giant program. And if you own a stock (1-megabyte) Macintosh, you can't have them anyway, unless you upgrade.

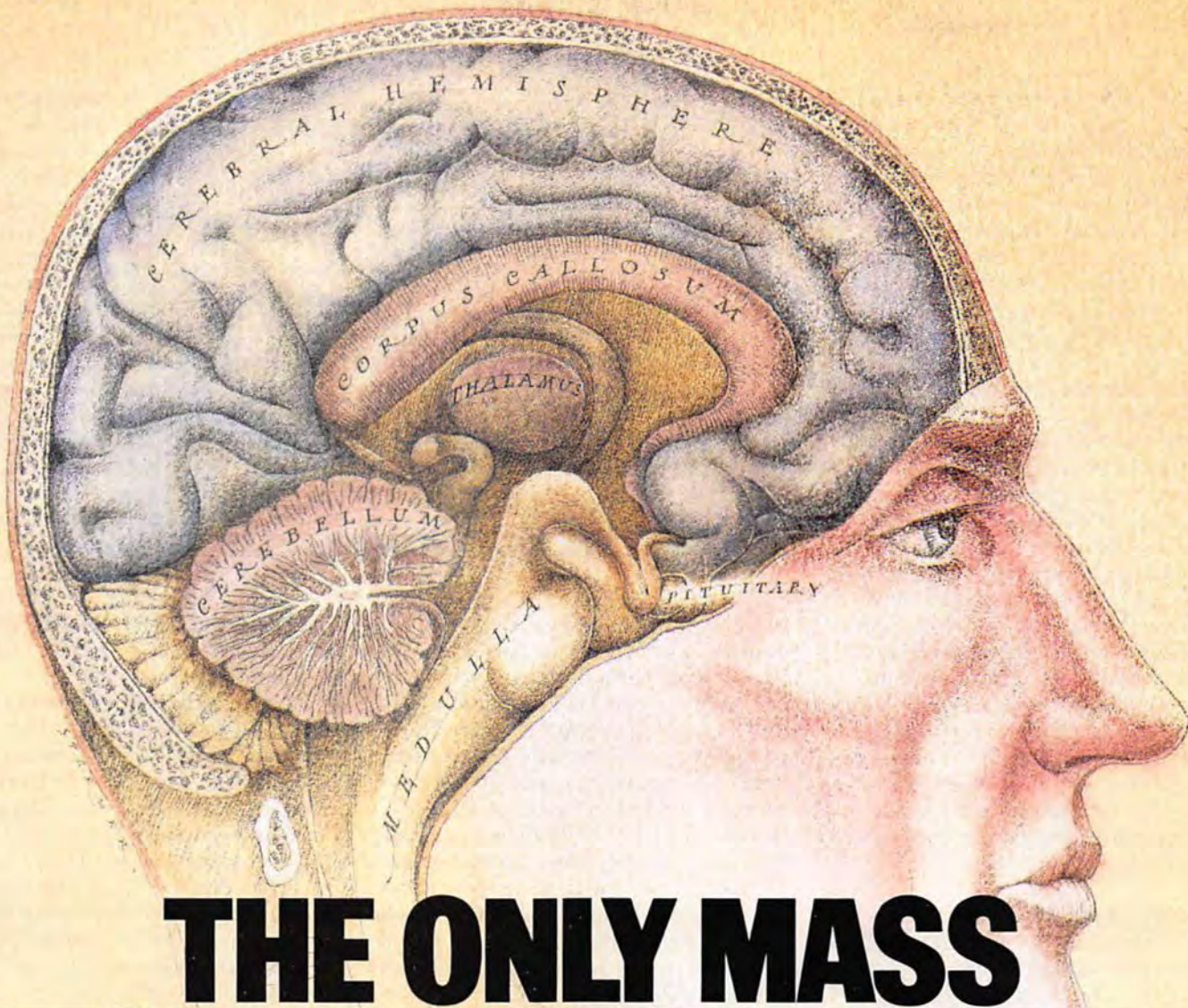
With some exceptions noted below, the Plus and SE are employed mainly as terminals, running Mathematica as a front end in universities and research labs to communicate with a remote computer (a Cray, one hopes). The program was refined on Sun workstations with abundant memory, and it needs a math coprocessor for speed in most contexts, notably graphing. The expected target hardware in the Macintosh world is therefore a 4MB Mac II. Nonetheless, the program itself, despite hardware demands, is actually a bargain, providing in one package facilities that would cost thousands of dollars to acquire piecemeal.

The Wide World of Mathematica

Mathematica's declared aim is to automate all types of mathematical calculation, just as calculators automated arithmetic. It does this through a special, object-oriented, interpreted computer language that offers dozens of unique features. First, it performs calculations symbolically. Commands operate on algebraic symbol strings, and return algebraic rather than numeric answers (see "Abstract Expressionism"). Second, these algebraic answers can then be evaluated numerically to arbitrary precision. If you want 40 significant figures in a decimal fraction, you can have them. Finally, the language itself apparently includes everything its designer, Stephen Wolfram, has found useful in the course of his meteoric career. It offers the command equivalents of all the capabilities of BASIC and FORTRAN, explicit commands for the special functions of mathematical physics (about 120 of them), LISP-like commands for list processing, symbolic and numerical matrix manipulation, commands for pattern matching and operations on sets, and a library of plotting and display-control commands (see "Graphic and Explicit").

(continues)





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Circle 204 on reader service card

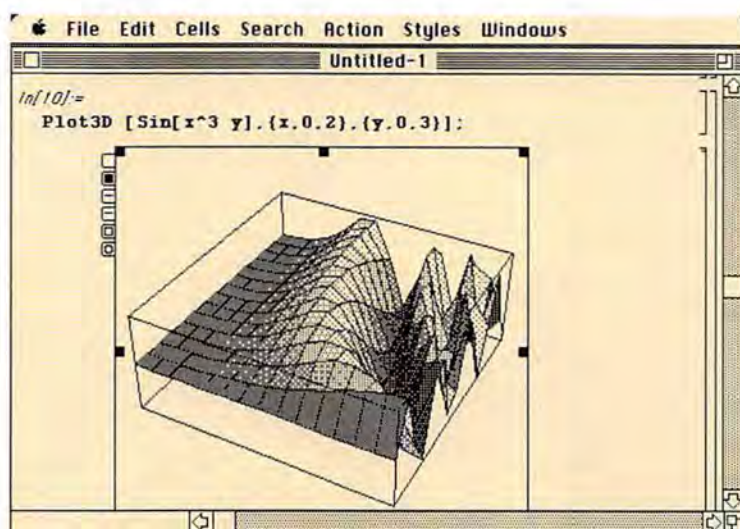
Reviews

The results of these symbolic calculations, taken as objects, can further be manipulated by the command set. In practice this means that four or five well-chosen command lines can correspond to pages of code in a traditional language. The program, for example, contains a surprisingly small set of statistical functions, because most of these can be programmed in one or two lines using other Mathematica commands. You can also expect to spend considerable time getting to this level of language mastery.

After spending a few minutes invoking TrigReduce to simplify trigonometric expressions, or calling up Integrate to solve all the indefinite integrals you don't remember anymore, or inverting a matrix with polynomial elements, you begin to see the compelling logic behind Mathematica's everything-and-the-kitchen-sink inclusiveness. Using this program, you can analyze any problem that can be formulated symbolically or numerically—every standard tool, and nearly every esoteric one besides, is available to you in convenient, automated form. Mathematica is, as claimed, nothing less than a system for doing mathematics (not just calculation) by computer.

Math on the Mac

Mathematica's Mac implementation is command-line oriented, and initial setup is fairly clunky. The programming language is also unforgiving and fussy about punctuation and capitalization. The most Mac-like features of the program are its use of standard Mac cut-and-paste editing techniques, and hierarchical menus for format-



ting. Individual calculation elements called Cells are organized into Notebooks (workfiles for a particular problem). Notebooks can contain a mix of calculations, text, and graphics, and the Clipboard allows exchange of material between Notebooks. It's easy to organize a logical approach to a research problem in the Notebook scheme, and the developers of Mathematica hope that Notebooks become a standard method for informal communication of research results among mathematicians and scientists.

Mathematica thoughtfully implements PostScript graphics (there's a special provision for designing presentations and posters used in technical meetings) and also supports PICT and bitmapped graphic output. The program features a gigantic online help system; this is a summary of appropriate parts of Wolfram's text, *Mathematica: A*

Graphic and Explicit

For many users, the extensive graphics commands alone make Mathematica worth its price—you would probably never need to program a plotting routine again. Mathematica's high-density plots typically require several minutes to prepare on a Mac II, but they provide quality sufficient for research publication.

System for Doing Mathematics by Computer (Addison-Wesley, 1988), rather than a beginner's how-to guide.

For acceptable speed on numeric calculations of any complexity, this program demands a 68020/68881 combination. On an SE with 2.5MB RAM, it will function properly with an 020/881 accelerator board from Novy, Levco, or Radius (the Radius board, using its own implementation of SANE, gives near-Mac II performance with the Plus/SE version of the program). Mathematica contains its own communications facilities so that its computational core, or *kernel*, running on more powerful hardware (from Mac IIs through supercomputers), can serve a set of 1MB Macintoshes as interactive terminals.

The Last Word

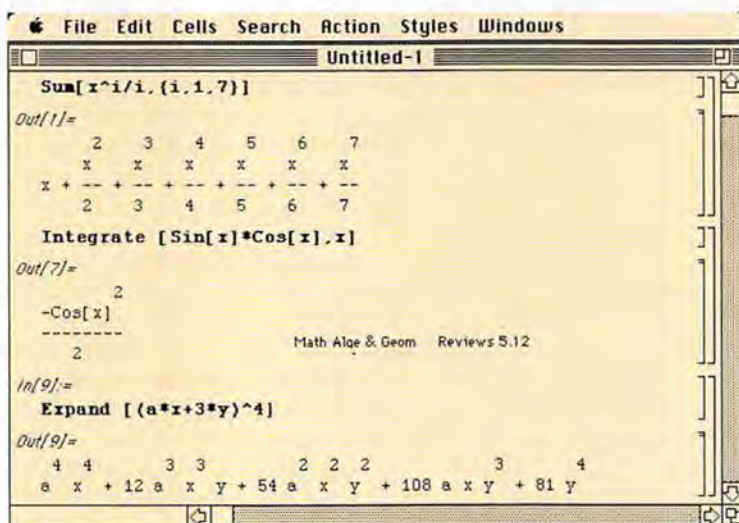
Mathematica is the ultimate in computing sophistication for Mac science applications, and it calls for sophisticated hardware to match. If you simply want to investigate symbolic computation (approximately through the undergraduate science/engineering level), the new program Milo from DynaComp looks promising and will run on a standard Plus or SE. Likewise, if you need numerical problem-solving and simple graphing, Borland's Eureka can handle a wide range of applications. But if you want a professional computing environment that can handle any task you are likely to encounter, Mathematica is the only choice at present. —Charles Seiter

See *Where to Buy* for contact information.

Abstract

Expressionism

Like MACSYMA and SMP, Mathematica evaluates expressions symbolically (you can then further evaluate them numerically to arbitrary precision). The familiar calculations shown in this section of a Mathematica Notebook only hint at the algebraic scope of the program.



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Tetris 1.0

Arcade-style game with a twist. *Pros:* Elegant; easy to play; challenging and addicting; requires quick thinking, long-term strategy, and lightning reflexes; includes DA version. *Cons:* None. **Company:** Spectrum HoloByte. **List price:** \$34.95. **Requires:** 512K.



Tetris, the only Macintosh game developed in Russia and sold in the United States, is an example of true international *glasnost*, or openness. But it more literally fits the meaning of *perestroika*—rebuilding. Its challenge: as a series of geometrical shapes—each composed of four square pieces stuck together in different configurations—rain down from the top of the screen, you must stack them as solidly as possible in the rectangular playing area in the middle of the screen, called the pit.

Take It from the Top

With Tetris, you have only seconds to maneuver falling pieces into empty spaces in the pit. Since pieces can't overlap, you must fill in lines in order to delete them and free up trapped white space. One option allows you to preview the piece about to fall—but that's cheating, so it's not turned on here.

While this sounds simple, in practice it's not. To succeed, you must have a keen sense of shape and be able to quickly decide how to manipulate the falling pieces in order to fill gaps in the rows below. Though you can't change the shape of the playing pieces, you can change their orientation.

Once a row (ten squares wide) is filled, it evaporates, the entire stack falls lower, and you gain points. But as the rows with gaps in them mount up, so does the stack—and you have less and less time to decide the next course of action. When the pieces reach the top of the screen, the game is over.

Being a Good Builder

Tetris comes in two versions, Standard and Desk Accessory. They are virtually identical, the main exceptions being that the DA version saves only the highest score (instead of the top ten) and doesn't offer the multiplayer options or cheerful Russian folk tunes of its counterpart.

Before you start playing, you must determine the game's level of complexity—and there are many choices. First, you choose a playing level from 0 to 9—the higher the number, the faster the pieces fall. Next, you determine the depth of the pit. You can start with an empty pit or with up to 13 randomly filled layers. All told, there is room in the pit for only 20 layers, so starting with 13 rows filled is a real challenge. But the greater the starting height, the more points you can accrue. As you quickly move the pieces into place, the final choice is whether to kick into Advanced Mode, which doubles the speed of the falling pieces at each level of play.

Now you're ready to play. By manipulating three keys—either the letters J, K, and L or the numbers 4, 5, and 6 on the numeric keypad—you can move the falling pieces left or right and rotate them in mid-air in the never-ending effort to build solid rows. If you exhibit steady success, the game automatically advances to higher and higher levels—changing the music and background screen as you go.

Strategy

Reaching the highest levels takes a deft mind that can react quickly to each new shape. Like a good hitter in baseball, you should be thinking ahead for ideal pitches (in this case, shapes). But don't get locked into needing only one particular shape or you'll be paralyzed when something different appears.

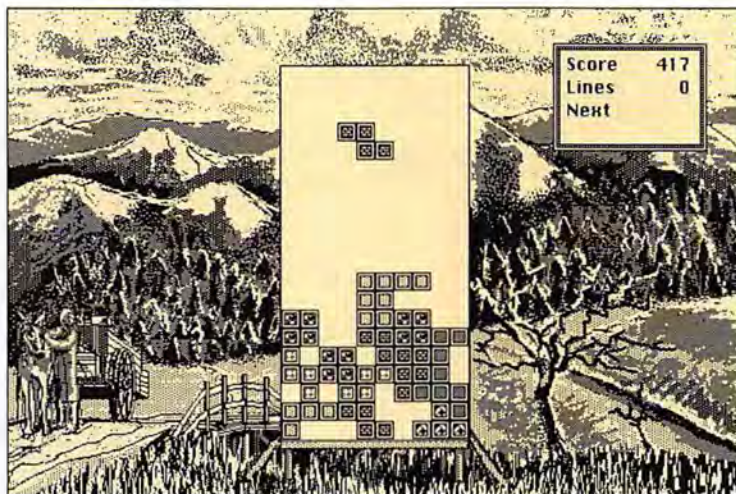
For example, it's tempting to allow gaps to mount in the same place along several rows, and then wait for the ideal piece to fill everything in. This is a big mistake. In general, it is best to complete a row when you have the chance, avoiding the nightmare of building your stack so high that you don't have time to react.

But there are no all-inclusive strategies—and this adds to the challenge of Tetris. Sometimes it is better to deliberately leave gaps, especially when completing a row would mean leaving a piece sticking straight up on the screen, making it more difficult to manipulate shapes needed to build future rows. Along the same lines, when it is impossible to fill in a row, the next best thing is to keep the pieces as compact as possible.

A more subtle piece of strategy centers on the fact that the shapes fall from a point slightly left of center. Therefore, especially as the stack builds higher and manipulation gets harder, you can ease your task by filling in the right-hand side of each row first.

Because Tetris offers the rare combination of being simple to learn but extremely challenging to play, it is the kind of addictive game that will appeal to all ages. In short, it's an excellent game.—Robert Buder

See *Where to Buy* for contact information.



A composite image featuring a Cricket Paint advertisement. The ad shows a hand holding a paintbrush, a red square, and a yellow line. Below the ad is a black and white photograph of a Native American man in traditional dress, resting on a dark cloth. Two paintbrushes are visible in the foreground.

In addition to the standard Cricket Paint format, you can import or save your files in TIFF, MacPaint™, and PICT formats.

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CompuServe Navigator 2.1

Terminal program. **Pros:** Gives CompuServe a Macintosh interface; saves time and money on-line; archives messages; downloads files at high speeds. **Cons:** Overly modal; has several bugs. **Company:** CompuServe. **List price:** \$79.95. **Requires:** 512K, System 4.1/Finder 5.3 or later.



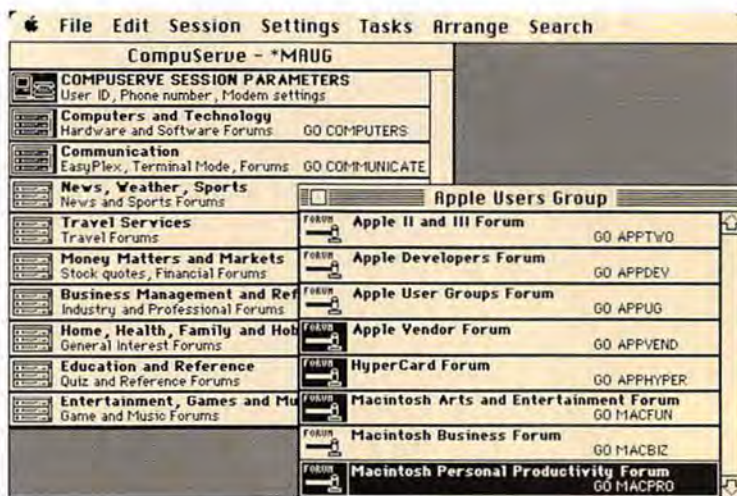
One of the most interesting things you can do with a Macintosh is to hook up with one of the big on-line services. But many of these services have old-fashioned interfaces that require you to memorize a list of commands or pick from seemingly endless menus. (Connect's MacNet is one exception, with its well-implemented Macintosh interface.) CompuServe, one of the most popular on-line services, now provides CompuServe Navigator, which grafts a Mac interface onto the service's arcane command structure, saving you time and money in the process.

Time Really Is Money

Online services usually charge an hourly connection fee. CompuServe's current rates are \$12.50 per hour, so your best strategy is to connect, get the information you want, store that information on disk, then disconnect and review the information while the clock isn't running. Navigator automates this process and completes it much faster than you could manually.

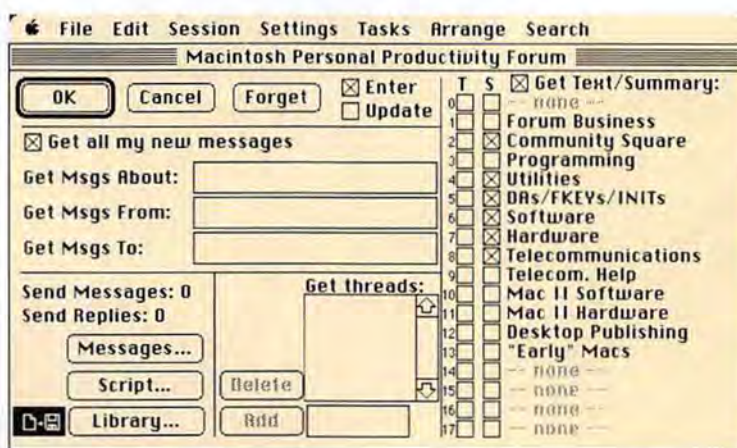
CompuServe has many different information areas, called forums, which are dedicated to specific interests from wine to scuba diving to Macintosh personal productivity. Each forum contains up to 17 message sections and 17 data libraries (whose files are available for downloading). Navigator automatically joins any forum you enter if you are not already a member.

On starting Navigator, you see the main selection window, which has a set of selection tiles (see "Tiles of Information"). The top one, the Session Parameters Tile, is where you enter the local CompuServe phone number, your User ID, modem settings, and your password. Double-clicking one of the other menu-selection tiles opens a window displaying the forum tiles under that topic. Opening a forum tile gets



Tiles of Information

Navigator represents the different areas within CompuServe as tiles. The Apple User Group Forum, whose icons are highlighted, will be entered when the next session is run.



Picking and Choosing

This may not be the prettiest dialog box you've ever seen, but it does the job of choosing the forum message sections you're interested in. Notice that you can also search for a message's author or recipient, and for a particular message subject.

you to a dialog box, where you choose message sections and data libraries to scan (see "Picking and Choosing").

Using Navigator is a three-step process. Combining choices from the Forum dialog boxes and the Tasks menu, you tell the program what you want to do while you're connected to CompuServe. For instance, you can direct Navigator to get a listing of the current message topics (also called threads) and new files uploaded to specific forums, and to get your private electronic mail. Then you can tell Navigator to run a session. The program dials CompuServe, quickly performs the tasks you've requested, and then disconnects. You review the session log offline, marking interesting message topics for retrieval, replying to electronic mail messages, creating new messages, and picking files to be downloaded. The next time you run a session, Navigator sends your replies, picks up the full texts of the message threads you marked, and downloads the files you want.

Navigator provides a useful Preview dialog box, which shows you all the forums you've set to enter on the right side of

the screen. On the left side is a list of tasks that will be performed in each forum. After a session, the Review dialog box shows you each message and provides buttons that let you reply to your messages, create new messages, or archive messages to any one of eight disk files.

If you download a file, Navigator uses CompuServe's Quick B downloading protocol, which allows the download to proceed at very close to its maximum speed. For instance, regular Xmodem protocol downloads may only occur at 1600 baud or so, on a 2400-baud modem; a Quick B download usually runs at over 2300 baud.

Faster Than the Human Hand

Navigator is fast; it entered and joined 15 forums in just eight minutes and got listings of the message sections and library names for each. This was faster than what even an experienced CompuServe user could do manually. And once Navigator has

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entered a forum, the program remembers the path to sections and library names for future use.

The program isn't limited to just the forum areas on CompuServe; you can access the Quick Quotes stock information area or search for other service's access numbers. For areas of information that the program doesn't support automatically, such as the Access General Uploading section, the Electronic Mall, or the online games area, Navigator provides a manual Terminal Mode and a scripting capability that allows you to write special commands.

Navigating the Rough Spots

Although the program runs well, it has several annoying bugs. Navigator won't always get your electronic mail messages, even when the Preview shows that it will. Entering the names of archive files vertically, instead of horizontally, causes an error message when you attempt to access the archive file. Worst of all, copying and pasting using the Edit menu can unexpectedly remove text from your desk accessories, unless you're running MultiFinder and a DA in the active window (the ⌘-key equivalents for Copy and Paste work properly). The program's author promises to fix these bugs in a future release.

Another problem with Navigator is that while preparing for an online session you must often go through several layers of windows to accomplish a single task, such as creating a new electronic mail message. This quickly becomes annoying, but not enough so that I want to spend money doing the work online.

Navigator works well under MultiFinder, and you can run a session as a background task. This takes up a lot of the Mac's processing time, however, so the foreground tasks may run noticeably slower.

Will It Save You Money?

Despite some problems, CompuServe Navigator makes it easier, faster, and more economical to use CompuServe. Both novice and experienced CompuServe users can benefit from the automation provided by the program. You can tell Navigator to run a session at a preset time, so you can sleep while the Mac and modem are hard at work. In fact, the program makes it so convenient that you may find yourself using CompuServe more than you did before owning Navigator. So even though you're using CompuServe more efficiently, your monthly bill could actually go up. Maybe this is what CompuServe had in mind all along. —Tom Negrino

See *Where to Buy* for contact information.

LOT's CD-ROM

CD ROM drive. **Pros:** No caddy needed for disks; Mac-to-SCSI cable provided. **Cons:** Works only with SCSI ID #4; inadequate documentation; no external audio play button. **Company:** Laser Optical Technology. **List price:** \$1095. **Requires:** 1MB.

With the introduction of its own **compact disc read-only memory** drive, Apple officially sanctioned CD ROM technology for the Macintosh. Now, several third-party companies are offering their own CD ROM drives for the Mac. Laser Optical Technology (LOT), which announced

its Mac CD ROM intentions before Apple, is one of those companies.

LOT's CD-ROM, a stand-alone SCSI device, is actually Toshiba's XM-2000A. Like the AppleCD SC, the LOT drive can accommodate CD ROM disks as well as audio compact disks (CDs). You load disks into a tray that slides in and out of the drive, much as you would with a home CD player; unlike Apple's drive, LOT's doesn't require disk caddies.

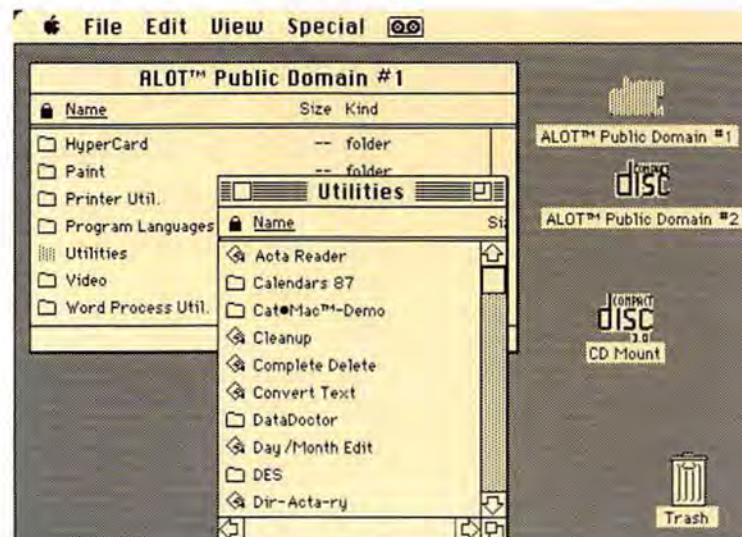
SCSI Conflicts

Despite the fact that the LOT drive is a typical SCSI device, I had several problems getting it to work. The drive comes with a floppy disk that contains three files: an application called CD Mount, a DA called CD Stereo, and an INIT called CDINIT. The DA and the INIT aren't mentioned in the documentation at all. Luckily, I knew enough to put the INIT in my System Folder. Because I wanted to play audio CDs as well as CD ROMs on the LOT drive, I also installed CD Stereo with Font/DA Mover, figuring (correctly) it was similar to Apple's CD Remote, a DA for controlling audio disks in the CD ROM drive.

The LOT drive arrived set at SCSI ID #4. Since I have an external hard disk attached to my Mac—also set at SCSI ID #4—I decided to change the CD ROM drive's ID number. The SCSI switches are conveniently located on the front panel of the drive, and the process is clearly outlined in the manual.

Unfortunately, LOT's CD-ROM drive refused to recognize any disk—CD or CD ROM—after my initial setup. It wasn't until

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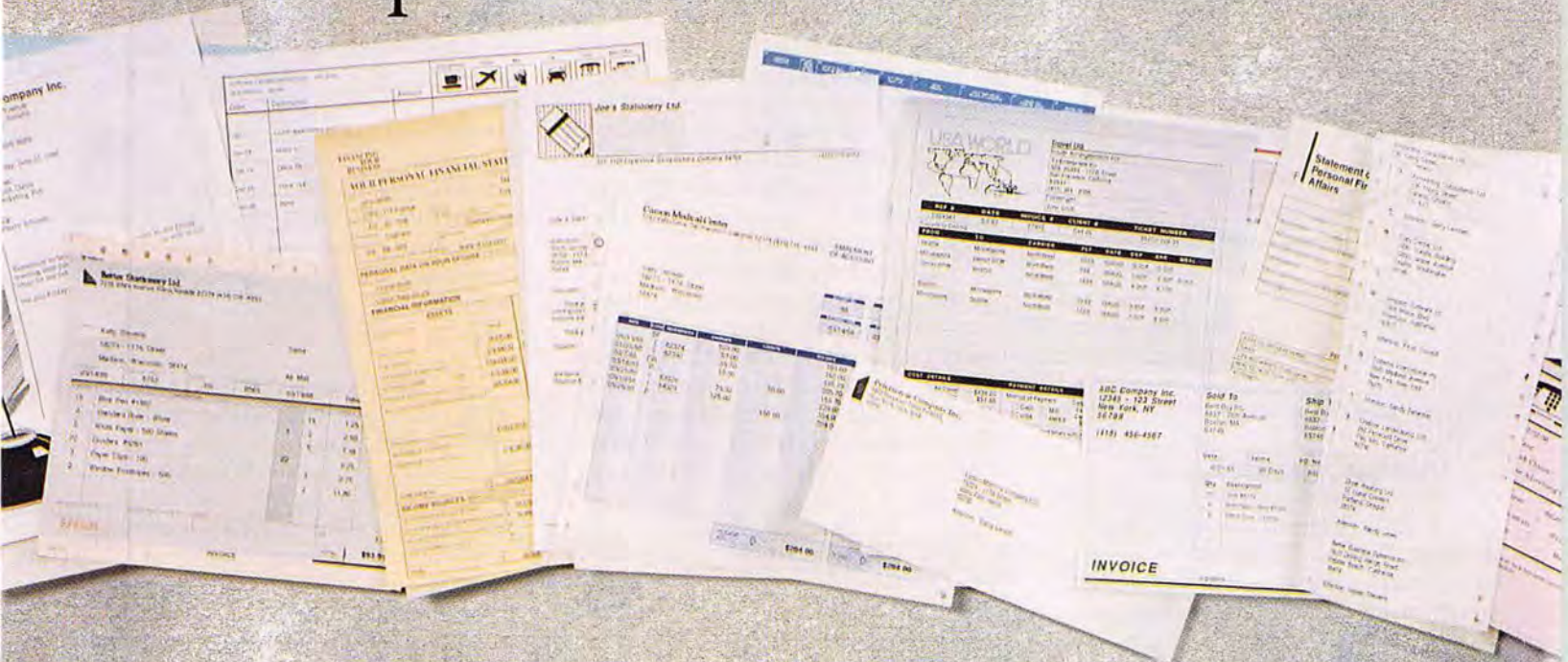


On the Desktop

CD ROM disks mounted from LOT's CD-ROM drive are recognizable by the Compact Disc icon. Here the CD ROM was split into two volumes during its mastering, so two volumes (from one disk) show up on the desktop.

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drawing a form



I reached LOT's helpful customer service that I found out the LOT drive would currently function only with its preset SCSI ID number of 4. Needless to say, this wasn't mentioned in the manual.

Desktop Appearances

There are two ways for a CD ROM disk in LOT's drive to show up on the Mac's desktop. If you have a disk in the drive when you start the Mac, that disk mounts automatically (see "On the Desktop"). If the drive is empty—or if you want to change disks while the Mac is on—you'll need LOT's CD Mount application, to manually mount the CD ROM disk. This procedure is similar to mounting an AppleShare file-server volume after starting the Mac.

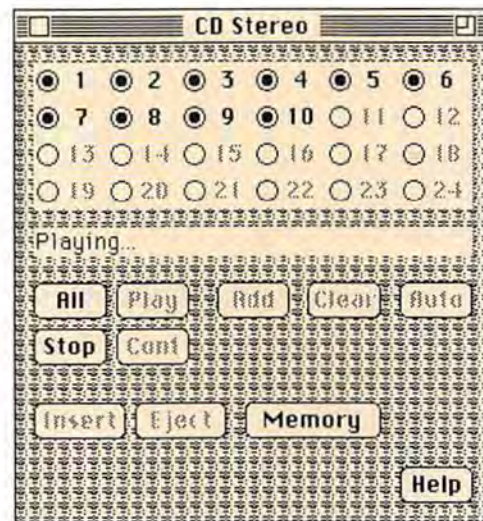
There's nothing wrong with this manual-mount scheme. But CD Mount isn't a terribly intelligent program. I ran it when a CD ROM was already mounted on the desktop; much to my surprise, another icon of the disk appeared—next to the first icon. I received no error message from the software about my mistake. Neither of the two icons would then open. I also tried to mount an audio CD with CD Mount. After staring several minutes at the watch cursor (again, no error message), I finally gave up and rebooted.

You must control audio CDs through LOT's CD Stereo DA. There's a standard headphone minijack and a volume-control knob on the front panel of the drive. I found the CD Stereo DA less elegant than Apple's CD Remote (see "Music to Your Ears"). You can't type in disk or song titles, and the queuing/user-programming function was more difficult for me to understand than Apple's version. I was even able to confuse the DA itself. When I ejected a disk from the DA and then inserted a disk from the drive's front-panel open/close

button, the DA never recognized that a disk was ready to play. I had to click Insert in the DA before it would react.

CD ROM drives aren't as fast as hard disks—it took 15 seconds to launch an application from the LOT drive, as opposed to 10 seconds to launch the same application from a hard disk—but the LOT drive performs at about the same speed as a floppy disk for opening folders (LOT 3 seconds; floppy 2 seconds) and launching applications (LOT 15 seconds; floppy 16 seconds). You can copy files and folders from the CD-ROM to floppy or hard disk by dragging them in the normal fashion.

I just can't say that LOT's drive matches the AppleCD SC for ease of installation and ease of use. Better documentation is a must. I didn't mind changing my external drive's SCSI ID number, but the information about the drive's mandatory SCSI ID number should be in the manual—even if LOT is working to fix the prob-



Music to Your Ears

Like other CD ROM drives, LOT's drive allows you to play audio CDs. To do this, you must use the CD Stereo DA provided with the drive.

lem. Similarly, the discussion of software in the manual needs to be more detailed. I would also suggest that LOT make its CD Mount and CD Stereo DA software more foolproof—that is, if you've made a mistake the program should inform you.

LOT's CD-ROM is a good drive. It's durable, capable, and fast—as CD ROM drives go. But LOT needs to work harder to integrate the drive with the Mac. As it stands now, the AppleCD SC has the LOT CD-ROM beat. —Brita Meng

See *Where to Buy* for contact information.

Pearl Lisp 1.01

Programming language and environment.

Pros: Interactive programming environment based on Common Lisp; supports backtrace, a multielement clipboard, object-oriented programming, Macintosh interface in programs; reasonable price; upgrade path to Allegro Common Lisp. **Cons:** Generates bulky stand-alone applications; lacks certain Common Lisp features that may be required for porting applications from full Common Lisps, including packages, structures, and hash tables.

Company: Coral Software. **List price:** \$175.

Requires: IMB.



When costly graphics-oriented personal LISP machines were first introduced in the early 1980s, they were much more powerful than personal computers. But today the superiority of their development environments is not simply due to a difference in raw processing power. In fact, the Macintosh II is more powerful in terms of millions of instructions per second than some specialized LISP workstations (such as the Xerox 1186). Instead, the greatest strength of the LISP machines is a workstation-style programming environment with multiple windows and advanced software-development tools. Pearl Lisp implements some, but not all, of these tools.

Foremost among Pearl Lisp's tools is a program editor, based on EMACS, with many LISP programming features built in. Matching parentheses blink when the insertion point is near. A multi-item Clipboard (called the "kill ring") is accessible from the editor. More than 40 key and Option key combinations support rapid keyboard manipulation of program text.

Other tools include step and trace functions. Step is of limited usefulness because it cannot be implemented for functions that use Macintosh interface features. Trace, which notifies the programmer whenever a traced function is called, does not have this limitation. More useful is Stack Backtrace. When a break occurs, you can open a special window that depicts the function stack. The parameter bindings of each of the functions on the stack can be examined, but not altered.

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MacUser said, "If you can only buy one program for your Mac... buy SUITCASE," and gave us five mice, their highest rating. And they awarded us BEST NEW UTILITY PROGRAM. Since then, we've picked up the MacWorld WORLD CLASS AWARD and a MacGuide GOLDEN GAVEL, even before SUITCASE II was released!

When it comes to performance, praises and prizes, it looks like SUITCASE II has it in the bag.

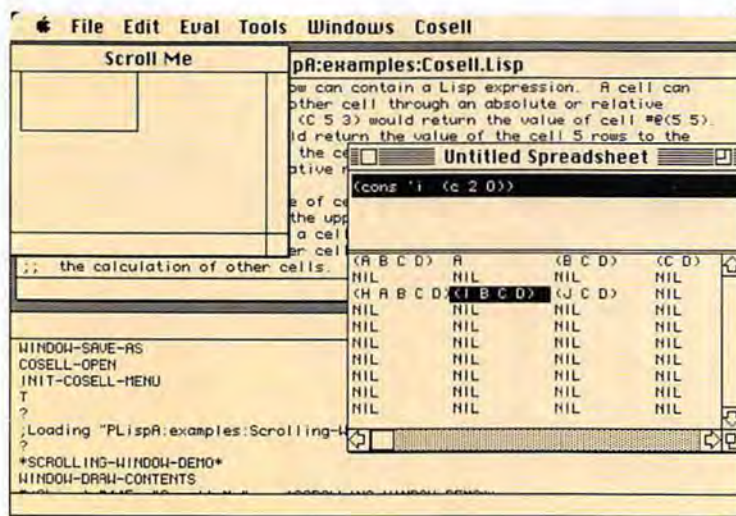
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Multiple Pearl Programs

Several Pearl Lisp programs can be open at the same time. Here Cosell, a spreadsheet that evaluates LISP expressions, is running in the active window.



Full workstation LISP machines offer the same types of features. Breaks in Xerox's Interlisp-D, for example, open special break windows on the screen. These windows have pop-up menus for backtracing, for resuming execution from an earlier element in the stack, and for opening editor windows for the functions in the stack. LISP workstations also have other exotic tools not available in Pearl Lisp, such as program analyzers that display a tree structure of function calls among a set of functions.

Unlike lean languages like Pascal or C, LISP dialects have hundreds or even thousands of built-in functions. There is a great deal for the novice to learn in Pearl Lisp. Fortunately, you can write your first programs knowing only a small subset of the language.

Object Orientation

Pearl Lisp makes it fairly easy to include the most common aspects of the Macintosh user interface in your programs. Using object-oriented programming features, you can include items such as scrolling windows, dialog boxes, and menus. In fact, if Pearl Lisp supports the interface features you want in your program, you will have an easier time implementing them than you would if you used Pascal or C.

Pearl Lisp allows you to define *objects*—entities that have both associated data and routines. The routines can usually be quite simple, because they need to apply only to a particular kind of data. In Pearl Lisp the draw-self function call in the statement (ask next-object [draw-self]) may call one of a number of draw-self routines, depending on what the *next-object* is when this line of code is evaluated.

Objects have *ancestor objects* from which they inherit data and routines. Pearl Lisp supports *multiple inheritance*—an object can inherit from two or more objects that are otherwise unrelated to each other.

Choose Your User Interface

Pearl Lisp programs can be designed either to run in the Pearl Lisp development environment or to be compiled as stand-alone applications. (Unfortunately, simple stand-alone applications created in Pearl Lisp may require a megabyte or more of RAM.) Sample LISP programs of both types are provided on disk. An elaborate sample program creates a spreadsheetlike window in which the cell formulas can be arbitrary LISP expressions. The documentation is a fine reference and provides a good intro-

duction to Pearl Lisp for those who already have some exposure to LISP.

Performance on a Macintosh Plus is reasonably interactive; on a Mac II it is very responsive. Pearl Lisp is compatible with MultiFinder, but it does not quit automatically when you choose Shut Down from the Finder. Color is supported on the Macintosh II.

Pearl Lisp is much less expensive than a full Common Lisp, such as Coral Software's own Allegro Common Lisp or Expertelligence's ExperCommonLisp. So, since many new LISP textbooks use Common Lisp, students of LISP programming and artificial intelligence may find that Pearl Lisp is a better bet than MacScheme+Toolsmith, a LISP programming environment based on the Scheme dialect of LISP.

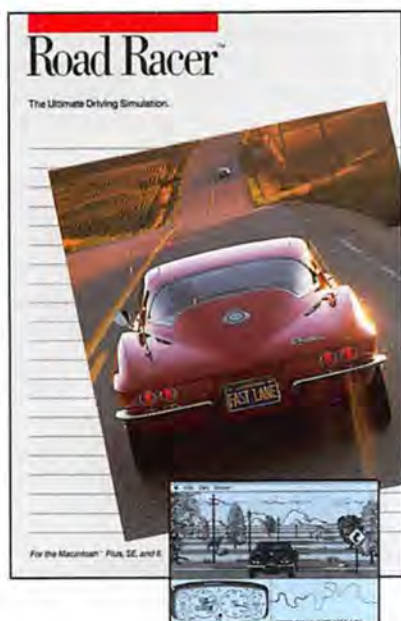
Pearl Lisp is an appropriate environment for application prototyping and in-house applications, especially if you use a Macintosh II with more than 1MB of RAM. Pearl Lisp's interactive development environment—in which new function definitions are immediately made part of the compiled environment—encourages a very tight cycle of code modification and testing. Object-oriented support of major Macintosh user-interface features also promotes rapid modifications and may help to ensure the maintainability of your code.

The absence of the Common Lisp Packages feature makes Pearl Lisp a personal LISP environment rather than a team-oriented programming tool. The Common Lisp Structures feature, similar to records in Pascal, would be useful in the development of complex programs. Pearl Lisp also lacks hash tables, one of the tools that programmers use to speed execution. Over 150 standard Common Lisp functions and macros—described in Guy Steele's *Common Lisp: The Language* (Digital Press, 1984)—are not included in Pearl Lisp, but the three mentioned here are the ones I miss the most.

Pearl Lisp is a good choice for prototyping applications, but a poor one for producing commercial software. Because it is based on Common Lisp and is reasonably priced, Pearl Lisp is a good choice for students of artificial intelligence and LISP programming.—Allen Munro

See *Where to Buy* for contact information.





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has just slammed
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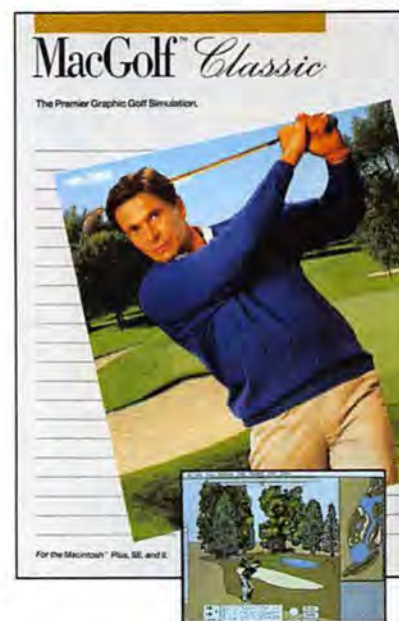
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Insight Expert Time Billing 2.0, Insight Expert Inventory 1.0

Time billing and inventory accounting programs. **Pros:** Programs meet the high standards of previous Insight modules; comprehensive documentation; excellent blending of the Macintosh interface. **Cons:** Insight Expert Accounts Receivable module required for generating statements and tracking bill payments. **Company:** Layered. **List price:** \$695 each. **Requires:** 512KE and hard disk for Time Billing; 1MB for Inventory.

Since 1986, Layered's Insight Expert Accounting Series has set the standard for high-end accounting on the Macintosh. Competing packages from companies such as Flexware, Great Plains, and SBT were originally written for MS-DOS, and at best, only adapt themselves to the Macintosh. Others, such as those from Circo Business Solutions, also offer multiuser capability, speed, and other features but lack a certain Macintosh distinctiveness. The Insight Expert Accounting Series, however, having been born and bred for the Macintosh, offers an excellent Macintosh interface in addition to the ability to computerize standard accounting forms and procedures. Two new modules in the series, Time Billing and Inventory,

meet the high standards of quality set by the General Ledger, Accounts Receivable, and Accounts Payable modules while extending the capabilities of the whole series.

When Time Is Money

The Time Billing module comes in four segments—Setup, Customers, Timesheets, and Invoicing. Setup enables you to identify your business, choose an invoice design from several templates, and select billing types such as time billings and reimbursals. You also determine how to track employee costs—for instance, either by salary alone or by salary plus the cost of benefits. You can establish up to six levels of hourly charges for employee classifications (in case you want to have separate introductory or special rate charges), and you can bill based on time and charges, cost plus, fixed fee, fixed fee plus reimbursables, or fixed fee on percentage of job completed. The program also tracks unbilled expenses that add to your cost but that you don't charge to clients.

In the Customers segment, you enter information (which Time Billing also includes in the invoice details) about customers and the jobs performed for them. The program keys jobs to job numbers; you can select job numbers (and customers) from special boxes in order to bring the information up on ledger cards. Anyone used to working with standard ledger cards will feel at home with the Insight modules.

In the Timesheets section, you enter specific time and reimbursement charges, which are then billed out to customers in the Invoicing segment you prepare, preview, and print

the invoices. The program lets you undo invoices, in case you make an error or want to change items. You can view invoice summary cards that summarize all transactions (see "Invoice Summary").

Time Billing provides a wide range of reports such as customer information, job information, preinvoice detail and summary sheets, time distribution, and profit margins.

One potentially significant problem with Time Billing is the handling of sales tax. If your state has a three-decimal sales tax (for example, 5.725 percent) on any billed items, the Time Billing Module will not accept it; it will accept only numbers with up to two decimal places. And if you want to track invoices and enter payments, you're out of luck unless you purchase version 2.10 of the Insight Expert Accounts Receivable module. (Layered will send a free update to a registered user.)

Insightful Inventory

Like Time Billing, the Inventory module starts with a setup procedure for defining your business. The setup includes identifying the business address, integrating data with Insight Expert's General Ledger (if applicable), setting up divisions or profit centers, and defining the products to be inventoried and their warehouse or store locations. You can value inventory in any of three ways: FIFO (first in, first out), LIFO (last in, last out), and Average Cost. The Inventory module also generously allows up to five decimal places in prices and quantities.

In addition to Setup and the usual Apple, File, and Edit items, the menu bar includes Window, for choosing among open windows; Report, for drawing reports; Action, for posting; Find, for locating specific items or customers; and Form, for bringing up specific forms. Specific forms can also be accessed via a palette at the bottom of the screen.

You define individual inventory items (costs, quantities, descriptions, and so forth) on Item Cards (see "Inventory Items"). You then track movement of the inventory, using the Receipts area when you buy additional items, Withdraw when you sell items, and Transfer when you move items around or between company locations. All entries can be reviewed as items are purchased, sold, or transferred.

(continues)

File Edit Form Action Report									
Invoice Summary									
Job Number	00-001	Job Name	Harris v. Harris						
Billed to	Harris Publications, Inc.				Tax Exempt	No			
Attention					Bulk Bill	No			
Address	129 Commonwealth Ave.				Print Class	Yes			
	Cambridge, MA 02110				Print Desc	Yes			
					Print Rate	Yes			
Set	Last Invoice				Opening Phrase	Opening			
Financial Summary					Display Based on Time and Charges				
Rate Group 0									
Fee Basis					Time and Charges				
Total Cost					1321.50				
Total Charges					2022.00				
Net					0.00				
000-001	02/02	Client Consultation	3.42 Hrs @ 190.00 per Hr						
000-002	02/02	Phone Consultation	58 Hrs @ 190.00 per Hr						
000-003	02/02	Legal Research	4.00 Hrs @ 190.00 per Hr						
000-004	02/03	Phone Consultation	2.00 Hrs @ 40.00 per Hr						
000-005	02/10	Interview Preparation	2.00 Hrs @ 190.00 per Hr						
000-006	02/10	Travel	12.00						
000-007	02/12	Report Preparation	2.00 Hrs @ 15.00 per Hr						
000-008	02/12								
000-009	02/12								
000-010	02/12								
000-011	02/12								
000-012	02/12								
000-013	02/12								
000-014	02/12								
000-015	02/12								
000-016	02/12								
000-017	02/12								
000-018	02/12								
000-019	02/12								
000-020	02/12								

Invoice Summary

A complete invoice summary is available for each customer and/or job. If you double-click on any one transaction, the program opens a window that displays the details of the transaction. You can then make any necessary changes in the detail window.

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Inventory Items

You set up the Inventory module by defining inventory items. The Item Card ledger form, reached from either the top menu bar or the bottom palette, is updated with each purchase, sale, or inventory transfer.

File Edit Window Form Report Action Find Setup									
Item Card									
Item Code LG54		Item Name Leather Gloves							
Product Line	APFRL	Division	ALL	Warehouse Code	1	Location	E1 A2	ABC Code	A
Inventory Asset G/L Account		10600 -000 -000		Taxable?		<input checked="" type="checkbox"/>		Commissionable?	
Inventory Clearing G/L Account		95000 -000 -900		Discount %		Commission %			
COGS G/L Account		40100 -000 -100		1		2.00			
Sales Revenue G/L Account		30100 -000 -100		2		5.00		2.00	
Vendor		CB		Buyer		Pat		3	
Vendor Cat.		LeatherGloves		4		10.00		1.80	
Lead Time		25		Purch Cost		20.00		5	
Reorder Qty.		1,000		Stocking UoM		Pair		Actual Unit Cost	
Minimum Qty.		200		Stocking Conv.				On Hand Quantity	
Maximum Qty.		2,500		Sales UoM		Pair		Inventory Value	
Last Price Date				Standard Cost		20.00		Costing Method	
Unit Sale Price		49.50		Last Cost		40.00		FIFO <input checked="" type="checkbox"/>	
Last Sale Date		07/31/87		Last Purch Date		06/01/87		LIFO <input type="checkbox"/>	
								Average <input type="checkbox"/>	
This information can be modified only by Change History.									
Units Rec'd		Units Sold		Sales (\$)		Costs (\$)		Gross Profit (\$)	
Month to Date		900		44,550.00		46,000.00		-1,450.00	
Year to Date		1,650		93,300.00		64,500.00		28,800.00	
Last Year		900		5,000.00		2,000.00		3,000.00	

An audit feature records all your tracking activities so that you can trace inventory movement. The Inventory module also lets you post notes on ledger cards to record the details, for example, of an exceptionally big order or transfer of merchandise.

The Reports menu allows two kinds of reports: standard reports on items, customers, vendors, and stock; and Expert reports, which let you view aging and history reports. Definition and Analysis windows help you interpret this data. One of the outstanding features of the Inventory module is the ability to double-click on report items to open a window showing the details of transactions. Many accounting packages do not allow this.

Not for Everyone

The Insight Expert Inventory and Time Billing modules are not for everyone. Although they come with good documentation, they are really tailored to the needs and capabilities of professional accounting and bookkeeping operations, or to those departments in large companies. The working manager who keeps books on the side will be better off using a package that has all of the modules on one disk, such as Insight OneWrite, Bedford's Simply Accounting, or CheckMark's MultiLedger.

Also, don't even think about using the Insight Expert modules unless you have at least a 20-megabyte hard disk—40MB is preferable. Each module in the Insight Expert series almost fills an 800K disk. Layered will, on request, send you programs that run on 400K drives, provided you have a hard disk.

Setting High Standards

While Layered lacks the wide selection of modules that its competitors offer, it's clear that the company is committed to building an accounting series that meets high standards of excellence. There is no doubt in my mind that as Layered releases Payroll and other modules and updates its present modules over the next few years, the Insight Expert series will be the premier package in high-end accounting on the Macintosh.—Alan Slay

See *Where to Buy* for contact information.

QuickMail 1.0

Electronic mail and conferencing program.

Pros: Supports multiple file enclosures, multiple address lists, and delayed sending of messages; includes online conferencing mode and software bridges to CompuServe and other mail systems, plus remote modem access to network mail server. **Cons:** Sender must know which mail center contains the intended recipient's address; users with multiple addresses must be carefully distinguished on address lists; manuals do not explain how to use software bridges. **Company:** CE Software. **List price:** \$300 for ten users. **Requires:** 512KE; hard disk recommended.

The increased use of networks has led to a proliferation of second-generation electronic mail (E-mail) products for the Mac, each with expanded capabilities. One, CE Software's competitively priced QuickMail, provides features not yet found in competing programs such as Microsoft Mail 1.35 and Symantec's InBox 2.0.

Service with a Smile

QuickMail can use such existing server software as AppleShare or TOPS, or it can run with its own QuickServer software. If you use an existing server, you'll have to decide which Mac will function as the centralized mail server; on the other hand, QuickServer can be installed on each user's Mac, eliminating the need for a dedicated machine.

The QuickMail Administrator program is your tool for creating what CE Software calls MailCenters. Each server can have multiple MailCenters, with different address lists and different functionality (remote access or phone dialing privileges, for example). One user is assigned the role of custodian and automatically receives daily or weekly logs that contain information on all mail traffic that's been handled by the MailCenter, including read and unread mail as well as remote connections to the MailCenter.

In an effort to expand QuickMail's versatility, CE Software is the first Mac developer to utilize the concept of software bridges. A standard MailCenter on a network would use what is called the Online Bridge; CE Software has also included bridges programmed for accessing such electronic services as CompuServe, GENie, and MCI Mail. (Future bridges for The Source, Delphi, and VAX/VMS Mail are planned.) And if that doesn't meet your needs, QuickMail includes a generic Telecom Bridge that you can control via a simple scripting language that's explained in the manual.

User Interface

A user's access to a MailCenter is controlled through a log-in dialog box. If

(continues)



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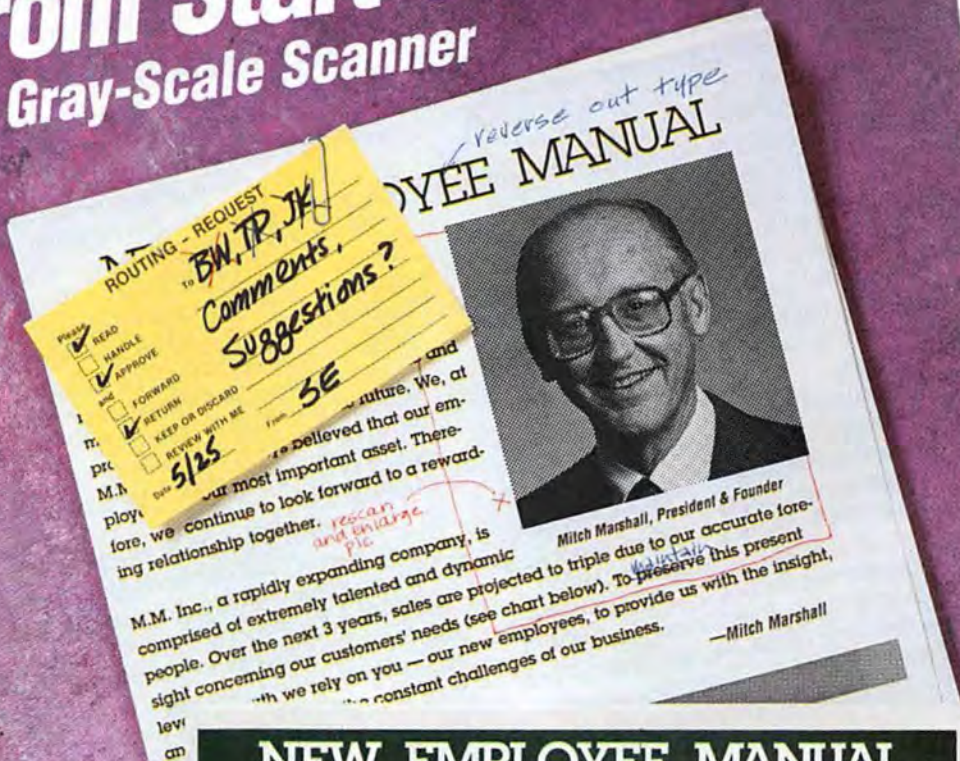
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Mitch Marshall, President & Founder

—Mitch Marshall

Our History



Back in 1968, in a small garage outside Bakersfield, California, Marshall Manufacturing was formed. Mitch Marshall perceived a growing market demand for electronic component boards for the burgeoning electronics and computer field. His perception proved right on target. Marshall Manufacturing, Inc., began production with a lean staff of 12. Today, with plants throughout North America and Europe, M.M. Inc. is the leader in providing hardware for the computer industry. As sales continue to grow, we will reach (cont. pg.4)

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you're the sole user of a Mac, however, QuickMail can store your name and password so you won't have to bother with a log-in screen each time. And since it's a desk accessory, you can use QuickMail from within any application.

QuickMail's clean-looking user interface for viewing and preparing E-mail makes good use of buttons and pop-up menus (see "Opening Your P.O. Box"). For example, the New button lists all forms that are included in the MailCenter, and another button on the message form itself can be used to change the priority status of the message. You can use QuickMail to create new folders and stuff your mail into them. Using the QuickForms application, you can design a new form for displaying your mail.

You can create groups of QuickMail addresses—for handling restricted mailings, for example. More general, system-wide messages can be sent by addressing them to Public, which is a feature not found in Microsoft Mail 1.35 or InBox 2.0.

Addresses for non-QuickMail users (such as recipients on CompuServe) will look the same on QuickMail as any other addresses, but those users have to be accessed through the appropriate bridge. If the recipients are on another mail system, their system names or account numbers are stored with their name; if they're not on any mail system, you can store their street addresses, direct the messages to a Printer Bridge, and then mail the hard copies to them. In order to use any of the soft-

ware bridges, the QuickMail Administrator must be running at the time of transmission, which may be an inconvenience if you're not running under MultiFinder.

Getting Together

Another unique feature of QuickMail is online conferencing, which functions just like a telephone conference call. When you enter the conference mode, QuickMail displays a list of all users currently online (this list can be extended across network zones). Simply by clicking on the users that you wish to address and typing your message in the Entry window, you can start a conference. The entire "conversation" (your messages and the other users' replies) is displayed in a Transcript window. If you plan to use the Transcript, you can either save it to a file or copy it to the Clipboard.

QuickMail has a QuickRemote application that you can use when you're on the road and require MailCenter access. With QuickRemote and a modem, you can call the phone number of a modem that's attached to the MailCenter and download your messages for reading. Messages that you've prepared with the QuickMail desk accessory can also be downloaded to the MailCenter using QuickRemote. Again, as with dialing out to another service, the QuickMail Administrator must be running on the MailCenter's Mac to enable remote access.

QuickMail's features should be enough to handle the needs of most of-

fices. Its system's support of software bridges to other mail systems, as well as its support of remote modem access to the MailCenters, are definite pluses that can make E-mail more useful within a business. If your office includes PCs or VAXes, though, you'll have to wait a little longer to tie them together using QuickMail.

—Dave Kosiur

See *Where to Buy* for contact information.

PCMacTerm 1.02

Mac-to-PC communications package.

Pros: Makes file transfers easy; lets you operate a PC remotely; allows coordinated work on the PC. **Cons:** Doesn't support graphics; some problems transferring files to the PC at very high baud rates. **Company:** Dynamic Microprocessor Associates (DMA). **List price:** \$99. **Requires:** 512K; Hayes-compatible modem or null-modem cable; PC running pcAnywhere 2.1 or later (\$145).



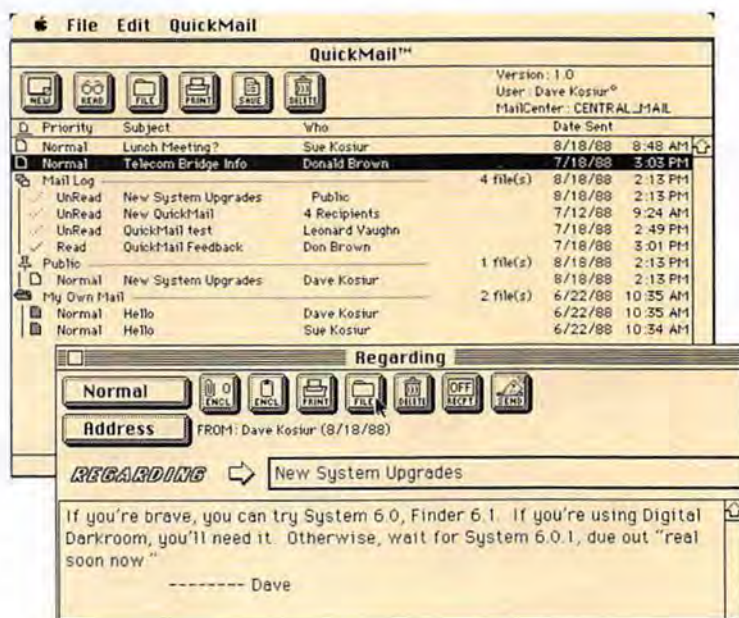
The old problem of transferring files between a Mac and an IBM PC has been solved in many ways—via telecommunications programs, networks, compatible disk drives, and so on. PCMacTerm is yet another solution, but one with a big difference: you can actually operate the PC from a window on the Mac screen. And you can even do some limited cutting and pasting in both directions. The result is complete control of a PC from a Macintosh, even if the PC is located halfway around the world.

PCMacTerm works in conjunction with another product from DMA called pcAnywhere. PCMacTerm runs on the Mac, while pcAnywhere runs on any IBM PC or compatible with 192K of RAM, DOS 2.0 or later, and a serial port. To use PCMacTerm, just launch it and connect it with a PC running pcAnywhere. That connection can be made via a modem, AppleTalk, or a direct cable. pcAnywhere functions in one of three modes: Active, in which it has complete control of the PC; Resident, in which it sits inactive in memory until you bring up the program to answer the phone; and Automatic, in which pcAnywhere sits in

(continues)

Opening Your P.O. Box

The main QuickMail window (in the background) lists five normal-priority messages. The Mail Log contains three unread messages. One system-wide message is stored under the pushpin icon labeled Public. A message has been created using a form called Regarding. Pressing on the Normal button would display a pop-up menu with other levels of priority (such as Urgent, ASAP, Junk).



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memory but answers the phone automatically. In the last two modes, a user can work on the PC and answer the phone while using an application.

PCMacTerm brings up a black window for displaying the PC's screen. As commands are entered and programs are run, the window is updated to reflect the PC's display. The update speed depends on the baud rate of the connection, which can vary from 1200 baud to 57,600 baud. The highest rate possible is recommended, but even at 1200 baud, performance is good. This is due in part to intelligent updating, such as scrolling the PC screen image on the Mac and adding a new line at the bottom or top. Choices of three font sizes (10-, 12-, and 14-point) let you adjust the PC screen to the Mac's display size. And if you're using a color monitor on a Mac II, the PC shows the appropriate text and background colors—even if the PC has only a monochrome display.

Who Runs the PC?

As for who's running the PC... you can configure pcAnywhere to determine user access. The Mac user can have sole control from the Mac; the PC operator can have sole control (in which case the Mac user merely watches); or both users can be copilot, that is, the PC accepts input from both of you. You can also bring up a conversation window at any time that allows the Mac user and the PC user to communicate without interfering with the application running on the PC. This means that both of you can work on an application si-



multaneously, chatting as often as you like via the conversation option.

You can easily send files from the PC to the Mac, or from the Mac to the PC. Of course, you are responsible for whatever cleanup is needed, such as removing or adding line feeds and other embedded characters. You can also print Mac files on the PC printer (within the printer's limitations) and print PC files on the Mac printer.

PCMacTerm is one of those programs that impresses by anticipating your needs and wishes, and it does so in the way you'd expect. Yes, the Option key acts as the PC's Alt key. Yes, you can use \mathbb{A} -I to "press" function key F1, and so on. Yes, you can transfer files between the Mac and the PC in background mode, if you're running under MultiFinder. Yes, there are special menus to provide any keys that your keyboard doesn't have. Yes, you can reboot the PC from the Mac—though the autoexec.bat

file on the PC had better restart pcAnywhere, or you'll lose the connection.

Sometimes, PCMacTerm works so well that you almost expect more than it can deliver. While using an editor on the PC via the Mac, I started to select (using the standard Mac click-and-drag procedure) some text to copy to the Mac. When I got to the bottom of the screen, I expected the PC editor to scroll text upwards so that I could continue the selection. Of course, the PC editor knew nothing of what I was doing on the Mac and so just sat there.

A Few Glitches

Did everything work perfectly? No. While there were no problems sending files from the PC to the Mac, there were a few glitches going the other way. Certain PCs can't handle incoming files at too high a baud rate; in this case, a Compaq 286 Portable worked fine up to—but not including—57,600 baud. Some random flakiness showed up at times, too. Once, text being typed into a Microsoft Word document on the Mac under MultiFinder started showing up in the PCMacTerm window (and being sent to the PC). Another time, PCMacTerm brought up an "Unable to make connection!" box, even though it had made and kept the connection. Also, pcAnywhere had a problem with my old Hayes Smartmodem 1200 in Automatic mode—it kept responding to nonexistent incoming calls—but the program had no such problem with a SupraModem 2400.

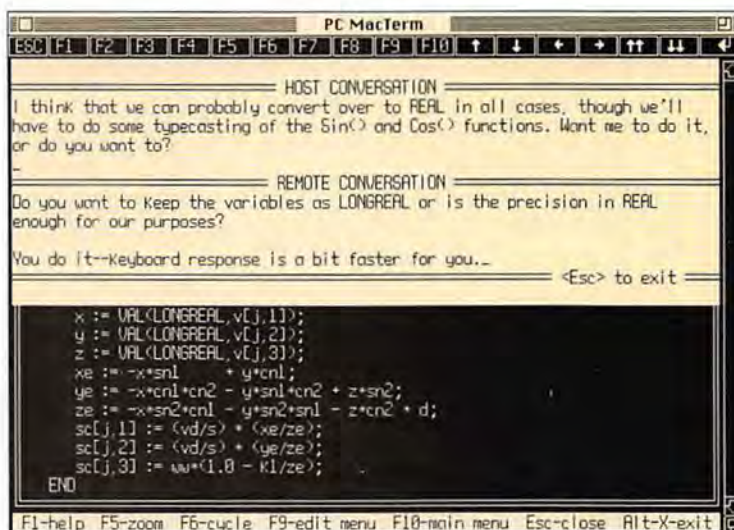
PCMacTerm has one major limitation: it doesn't yet support CGA (color graphics adapter) graphics. This means that you can't run any graphics-based applications on the PC host. Even so, the package worked well.

One last thought. Many government agencies and corporations require the computer systems they purchase to be compatible with MS-DOS. How many clever Mac fans will add a cheap PC clone (possibly sans monitor), along with a copy of PCMacTerm and pcAnywhere, to their purchase request for a Macintosh? In fact, if they're really devious, they might omit the PC clone and simply hook up to an existing MS-DOS system. In any case, they'll find that PCMacTerm and pcAnywhere form a real dynamic duo for anyone who needs to have Macs and PCs talk with each other.

—Bruce Webster

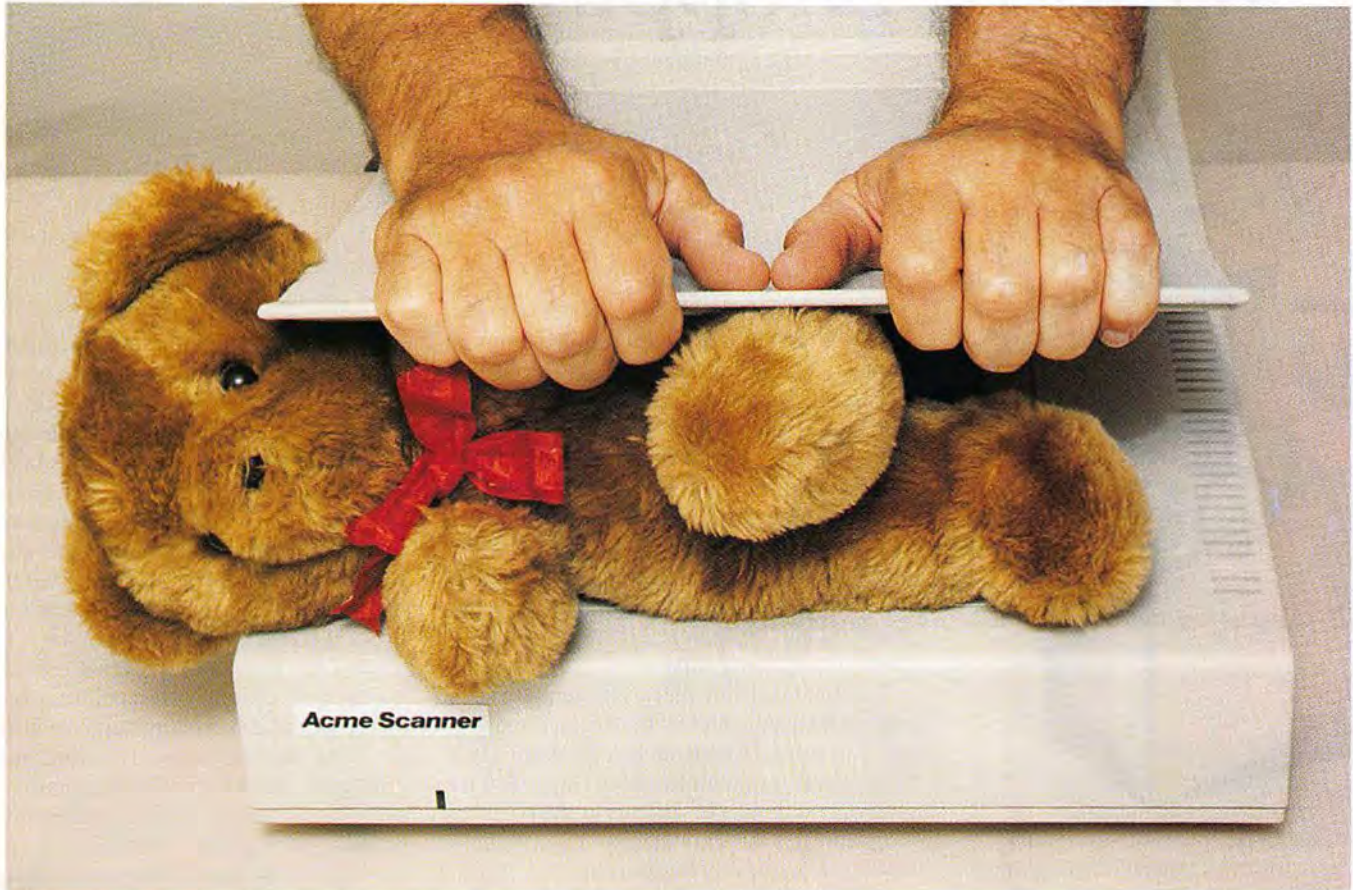
Chat While You Work

Here PCMacTerm allows a Modula 2 development system to run on a Compaq 286 Portable and a Mac simultaneously. The program also offers a chat mode, so that the PC user and the Mac user can collaborate on changes without disrupting the application.



See *Where to Buy* for contact information.

Trying to capture the impossible image?

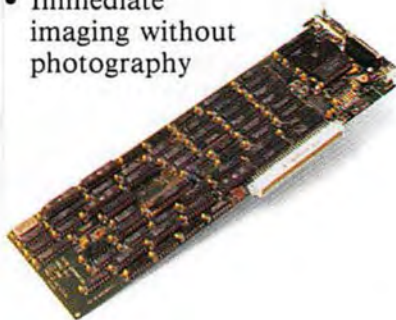


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Window Shopping



The number of people whose working lives began after the computer revolution is still small—most of us can remember how we did things manually. And while the Mac provides a level of efficiency and ease that we didn't dream of ten years ago, we're all hungry for more convenience. Among the products reviewed this month are one that eliminates a lot of mouse movements and one that makes small amounts of invoicing a little easier.

On Cue

A file launcher enables you to go from one application to another without passing through the Finder. It saves time not only because you don't have to mouse around, but also because it eliminates the need for the Mac to redraw the screen. Up to now, most file launchers have been shareware or part of a set of DAs such as TopDesk from Cortland Computer. On Cue (Icon Simulations, \$59.95) is, as far as I know, the first file launcher sold as a stand-alone package. A utility like this has to have a lot of features to justify having its own box. On Cue does.

First of all, On Cue is not a DA, but an INIT. Its icon sits as a permanent menu-bar

by **Lawrence Stevens**

item. Other file launchers require that you hunt through folders to find the application to launch. On Cue lets you install applications on its menu, so you can move from Excel to Word with one menu selection. You can even install documents on the menu. These appear as submenu items, and are displayed next to their corresponding application when the pointer reaches it. Applications and documents that are not installed can be selected through a standard Open dialog box.

A file launcher has a simple job to do, and there aren't a lot of preferences that you can think of setting. But Icon Simulations has thought about all of them. For example, you can have the menu drop down by pointing to it and clicking. Or you can have it drop merely by pointing to it. Or it can drop when you click on either upper corner of the screen, or when you press \mathbb{A} or Option or Shift and click. You can also make the menu bar icon invisible, or eliminate the icon that appears when you start your Mac.

On Cue can be used with MultiFinder. When you launch an application, the old application will remain resident, if memory permits.

This is one of those make-your-life-a-little-easier items. Get enough of them, and your life might really become a breeze, right?

MacInvoice

Only if your business is *very* small should you consider MacInvoice (Synex, \$69.95). Using it is much easier than writing invoices by hand or typing them. But in many ways, this program reminds me of a program for the 128K Mac. It's so feature-poor that my wish list for it is almost as long as my MasterCard bill.

The program provides a two-screen invoice. The first screen has blanks for your name and address, the salesperson, the billing and shipping addresses, order number, F.O.B. point, terms, and ship date.

You can use these headings or delete or change any of them. On the second screen, you fill in quantity, description, and unit price. The program automatically figures the total amount including sales tax.

MacInvoice has some nice features to help you save time filling out the invoice. You can restore data from the previous invoice to fill in all the blanks, to fill in one blank at a time, or to fill in all the blanks from the point where the cursor is to the end of the invoice. You can also create up to ten macros, each of which may contain such data as a company name or address.

But there is so much lacking in this program that when I first began using it, I thought I must be missing something. After reading the 24-page manual several times and trying all the options, I still found that you cannot see a screen display of the summary journal; it has to be printed. And you can only print one invoice at a time (the one that's displayed on the screen). Since the program does not support multiple windows, printing more than one invoice requires opening and closing documents.

MacInvoice also has a number of inexplicable quirks. For example, you can't print a summary journal unless an invoice is displayed on the screen. You can cut, copy, and paste, but you can't undo. And when you move desk accessory windows around, they wipe out the MacInvoice display like a MacPaint eraser (the display is redrawn when the DA is closed).

On the other hand, the program is inexpensive, it takes up only 55K, and it can be learned in 15 minutes. I rarely write more than seven or eight invoices a month, and I've been using Word for that task. But I'll probably switch to MacInvoice—at least it creates a smarter-looking invoice than I can with Word, and it gets the billing address in the right place so I can use window envelopes.

(continues)

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Inspiration

As a semiprofessional magician, I plan my shows using Microsoft Word's outliner. I have a friend who makes his living as a storyteller and musician. When he plans a show, he spreads a large sheet of drafting paper over his desk and draws a series of shapes and arrows to represent the sequence of songs, stories, and activities. The other day he unrolled a large sheet of paper. "My new elementary school show," he said proudly. I couldn't make head or tail of it.

I mention this because had it not been for my friend, I wouldn't have thought that anyone could use Inspiration (Ceres Software, \$149), which generates symbols and arrows to represent ideas and the relationships between them. But now I know there are some of you out there for whom this product can be very useful.

You begin by typing the main idea in the center of the screen. You can then select a tool that draws an arrow and a second shape, say, to the right of the main idea. Ideas typed in this shape are subordinate to the main idea. You can then radiate a third shape from the second shape creating a third level idea. Or you can go back to the main idea and radiate another second level idea, and so on. You can also type your ideas rapid-fire into one shape, and the program spreads those ideas around the shape like spokes on a wheel. Or you can create all the ideas first and link them later. Inspiration provides a number of shapes and arrows, and you can move them around easily. You can also attach up to two pages of notes to each idea.

The program has an outlining feature that turns the diagram into a standard out-

line similar to that in Word. Any change you make to the outline changes the diagram, and vice versa.

Inspiration works very smoothly. All the functions such as moving and reshaping symbols, accessing notes, and drawing arrows work very easily, and there are two or three ways to do everything. The only problem with using Inspiration on a standard Mac screen is that you can usually see only about seven or eight ideas at a time on a 1:1 ratio screen display, and a zoomed-out view is generally too small for comfort. With an outline you can see twice as many ideas, more if you hide some subordinate ideas.

Inspiration can also be used to create such things as visual displays of responsibilities or corporate structures. However, if you just need to display ideas and not create them, you might as well use a drawing program. But if you think you'd like to arrange your To Do list or plan a sales promotion by joining and rejoining shapes, you'll love this program.

Best Answer

Let's say you have \$10,000 to invest during the next eight quarters. You have five investment instruments to choose from, which range from time periods of six months to two years. The longer the time period, the higher the return. But the problem is complicated by the fact that you will need some of your money in varying amounts every quarter. So while some of your cash may be invested in a two-year CD, some of it will only be available from, say, the third to the fifth quarter of the period. Your goal is to maximize your return without ever having your cash on hand



drop below zero. If you're familiar with Excel or Works, you should be able to set up a worksheet that allows you to perform what-if operations to find the optimal portfolio-management strategy. But experimenting with the variables could take hours, and you may never be sure that you've hit the absolute maximum return.

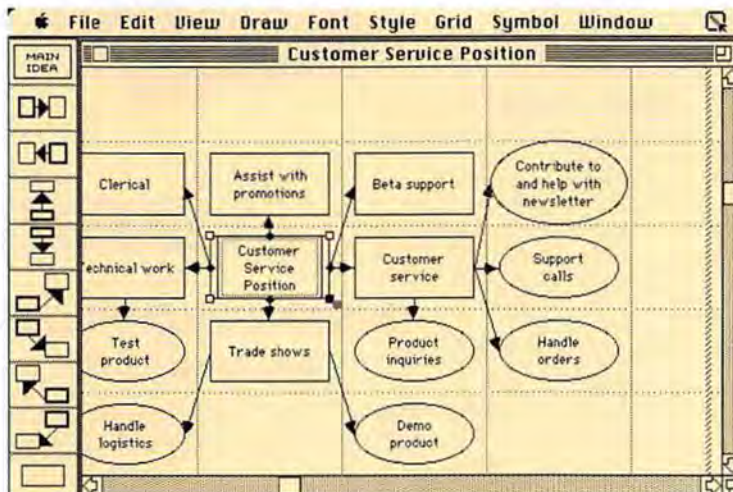
Best Answer (Heizer Software, \$99) automates that process using a technique called linear programming. The program takes imported Excel or Works worksheets (in SYLK format) and manipulates a set of up to 250 variables to find the maximum or minimum of a specific formula. As far as I can tell, it works.

To decide whether Best Answer can help you, you have to determine whether your problem has the three elements that the program works with—adjustables, constraints, and the objective. Adjustables are the variables that you want to experiment with (for example, the amount invested in the various instruments). The constraints are formulas whose results cannot go below zero (for example, the cash on hand). The objective is the formula whose result you want to maximize or minimize (for example, the total return on investment). If your problem contains those categories, Best Answer can solve it. But be warned: since the program does not help you to create the spreadsheet, you have to be a sophisticated Excel user to work with Best Answer. □

See *Where to Buy* for contact information.

Thinking Graphically

An Inspiration diagram and outline showing the responsibilities of a customer service employee. Although the program provides both an outline and a diagram view, its reason for existence is to allow a graphical representation of thoughts and ideas.

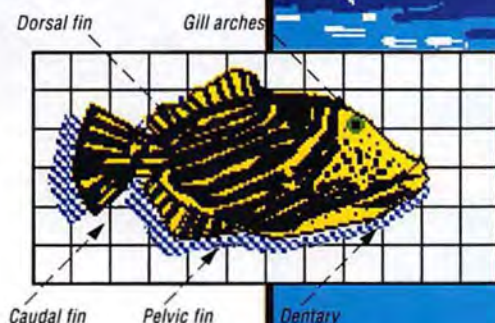


SuperPaint 2.0

Setting the Standard. Again.

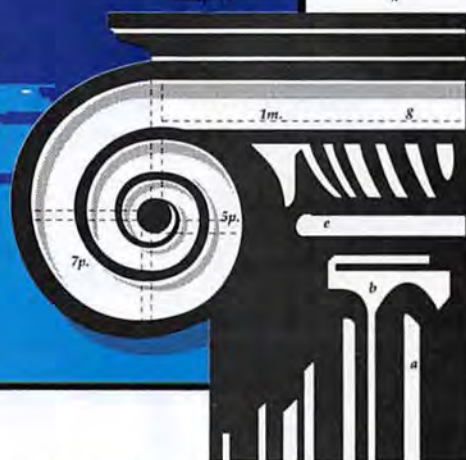
1 These faces were created using the freehand Bezier tool, which allows you to create editable Bezier paths quickly and easily. Color preview lets you design on screen and in color.

2 Both painting and drawing features were used to create this scientific illustration.



3 Special effects, such as these bubbles on the water, can be easily created with custom-programmed, plug-in paint tools.

4 The freehand Bezier tool provided the precise control necessary to draw this architectural column.



SuperPaint, the best-selling graphics program for the Macintosh®, has always set the standard against which other software is compared. And we just raised that standard.

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System requirements:
Macintosh Plus, SE or Macintosh II;
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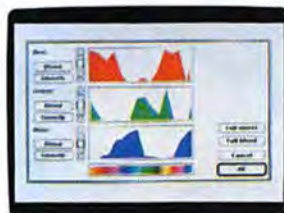
Spherize Art



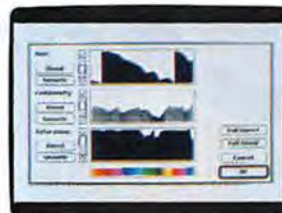
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New Products

*Information on the Mac's latest software,
hardware, and accessories*

Edited by Mary Margaret Lewis

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

Abratrak Job-applicant tracking system that handles correspondence with applicants, produces analytical reports, keeps track of open requisitions, and provides statistics. Built-in letter generator. 512K min. memory. Single-user license \$995; multiuser network version \$995 additional. Abra Cadabra Software, 813/525-4400.

Balance of Power: The 1990 Edition Players assume the role of President of the United States or General Secretary of the Soviet Union. Goals are to complete eight years in office without initiating a nuclear conflict and to accumulate more prestige points than the opposing superpower. 512K min. memory; requires 800K drive. \$49.95. Mindscape, 312/480-7667.

Claris CAD Two-dimensional CAD program. Accompanied by training videotape. Built on MacDraw II, with CAD features added. 1MB min. memory. \$799. Claris Corporation, 415/960-1500.

ClipShare Network utility that transmits users' clipboards within the network. Does not require the use of electronic mail or a network server. 512KE min. memory. Full network license \$195. Olduvai Corporation, 305/665-4665.

Colour Billiards Billiards software for entertainment and learning. Billiard balls interact according to the laws of physics. Color setting, collision sounds. Choice of six versions of billiards. 1MB min. memory. \$59.95. Soft Stream International, 609/596-4373.

Complete Font Librarian 500 Macintosh ImageWriter and LaserWriter fonts, cataloged by family and documented with a Guided Tour sampler of one-line listings. 128K min. memory. \$49.95 plus \$1.50 s/h. Showker Graphic Arts and Design, 703/433-8402.

Crystal Ball Forecasting and risk-management software that uses a spreadsheet interface. You construct a model, and the program forecasts possible results for the given situation. 1MB min. memory. \$395. Market Engineering Corporation, 303/893-0100.

DacEasy Light Home finance package that writes forms, checks, and invoices on the LaserWriter and ImageWriter and prints all windows. Issues personal finance statements; reflects the effect of changes, payments, withdrawals, and deposits on your net worth. 512K min. memory. \$69.95. Dac Software, 214/458-0038.

The screenshot shows the 'Write Check' window of the DacEasy Light software. The window has a menu bar with 'File', 'Edit', 'Checks', 'Credits/Debits', 'Invoices', 'Accounting', 'Reports', and 'Misc'. Below the menu bar is a toolbar with buttons for 'Check #', 'Receipt', 'Scan', 'Print', 'Clear', 'Delete Line', and 'Edit Field'. The main area is divided into several sections: 'Computer Check' with fields for 'in Bank Queue' and 'in Total Queue' (both 000000); 'Bank's Name (Checking)' with fields for 'Current Balance' and 'New Balance' (both 0.00); 'Check #' and 'Date' (05/31/88); 'Paid to' and 'Amount' (0.00); and a 'Memo' section with a 'Distribution' table with columns for 'Distribution' and 'Amount'.

DacEasy Light

dBFast/Mac Database language for Mac programmers and developers that combines dBase III Plus programming conventions with concurrent use of the mouse, pull-down menus, click-on buttons, and multiple windowing. 1MB min. memory. \$199. dBFast, 206/392-0368.

DeskDraw Desk accessory that creates, loads, edits, and saves graphic and text objects, bitmaps, and rotated PostScript text images. Has normal object-oriented graphic editing capabilities; supports free rotating of text and graphics. Bundled with DeskPaint 2.0. 512KE min. memory. \$129.95 (free to registered owners of DeskPaint). Zedcor, 800/482-4567, 602/881-8101.



DeskPaint 2.0 with DeskDraw

Desktop Architect Detailing system that functions as a database for MiniCad, MacDraft, and other Mac CAD applications. Incorporates predrawn components into

(continues)

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Macintosh Today
June 20, 1988 / page 28

"This program is so good that if it's the first one you test, I can almost guarantee you it will be the only one you test."


"Computer Output" column
Oshawa Times (Toronto)

"My favorite all-around accounting program is CheckMark Software's MultiLedger/Payroll set. It was the simplest and most logical program I examined that provided a reasonably full set of accounting capabilities. Its price/performance ratio represents an excellent value."

Macworld
September 1988 / page 169

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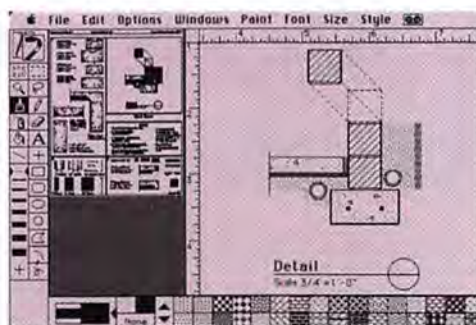
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Desktop Architect

Drawing Table Precision drawing software equipped with rulers and polygon-editing tools. Supports importing of EPS, PICT, and Paint files. Includes clip art libraries. 1MB min. memory. \$129.95. Brøderbund Software, 415/492-3200.

Dr. B. Careful Instructional program designed to teach children (ages 6 to 11) about AIDS. Uses graphics and synthesized speech. Organized into five sections: definition, transmission, prevention, treatment, and questions. 512K min. memory. \$69 plus \$5 s/h. Computer Spirit Graphics, 716/881-6706.

Deluxe Forms Pak Set of computerized templates for generation of continuous business forms from within Microsoft Works. Combines word processor, spreadsheet, database, and communications capabilities. 512K min. memory. \$29.95. Deluxe Computer Forms and Supplies, 800/833-3820.

EasyBillr Vertical-market software for property- and casualty-insurance agencies. Includes invoicing, statements, aged accounts receivable by client and invoice date, and integrated estimated billing. 1MB min. memory. \$495. Choices, 617/592-0700.

EndNote Reference database- and bibliography-maker compatible with Microsoft Word, MacWrite, and WriteNow. Combination desk accessory and application program. Automates bibliography building and formatting. 512KE min. memory. \$129. Niles & Associates, 415/655-6666.

Family Matters Intuitive database for maintaining family records and information with HyperCard. Organizes data in a tree structure and includes address book, directory, and calendar. 512KE min. memory. \$49.95. Springboard Software, 612/944-3915.

Fleet Manager Monitors scheduled maintenance needs of fleet vehicles; provides theft-detection report; performs various resource allocation, performance analysis, and mechanical diagnostic functions. 1MB min. memory. \$1495. Software Development Group, 504/343-8437.

Full Impact Presentation-oriented spreadsheet that merges text, data, and graphics on a single page without using other applications. Supports color, supports multiple fonts and point sizes, and provides navigational aids. 1MB min. memory; 2MB to run with MultiFinder. \$395. Ashton-Tate, 213/329-8000.

HyperKRS Search-and-retrieval program for HyperCard. Available for CD ROM and magnetic media applications. Includes indexing program for HyperCard databases; offers ten search modes. Customizable on-screen help feature. 1MB min. memory. \$3000. KnowledgeSet Corporation, 415/968-9888.

HyperShopper HyperCard-based mail-order database for unique, difficult-to-find merchandise and products that sell for at least 30 percent below retail. Lists information on more than 1000 discount mail-order companies and factory outlets. Dials

(continues)



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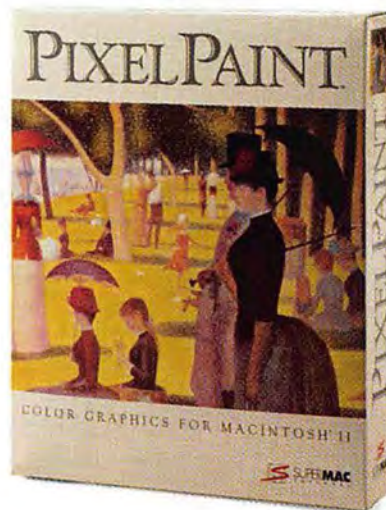
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O.K., it's true. PixelPaint puts the full repertoire of a minicomputer paint program in the palm of your hand. And it runs on the friendly Macintosh® II, making it both incredibly fast and easy to use. You just grab the mouse, point and paint. Yes, you can instantly experiment with a huge range of colors and effects. We admit it.

You can even import an image from any source by scanning it in. Then change, colorize and save it. Or, design with variable brush and pencil strokes, airbrushes, fills, drop shadows, customized palettes, and more.

The results? Computer designs with glowing color and brilliant effects are no longer just pie in the sky.

Obviously, the word is out. So, if you've been watching computers become hot art tools, wondering when and how to get started, we suggest you visit your local computer store. Ask to see PixelPaint for yourself. It's really the easiest solution.



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New Products

the company for you with help of modem or tone dialer. 1MB min. memory. \$19.95. Camtronics Software, 503/445-2824.

Hyperworks Tools Aid for developers of HyperCard stackware. Consists of three Tools Cards: Object Tools, Script Tools, and Text Tools. Gives editing capabilities to text field routines that hold and modify button scripts. 1MB min. memory. \$59.95. Hyperworks, 818/893-4155.

Individual Training for PageMaker Step-by-step exercises cover basic through advanced features of PageMaker. You can switch between tutorial and PageMaker program to gain practical experience. 1MB min. memory. \$69.95. Individual Software, 415/595-8855.

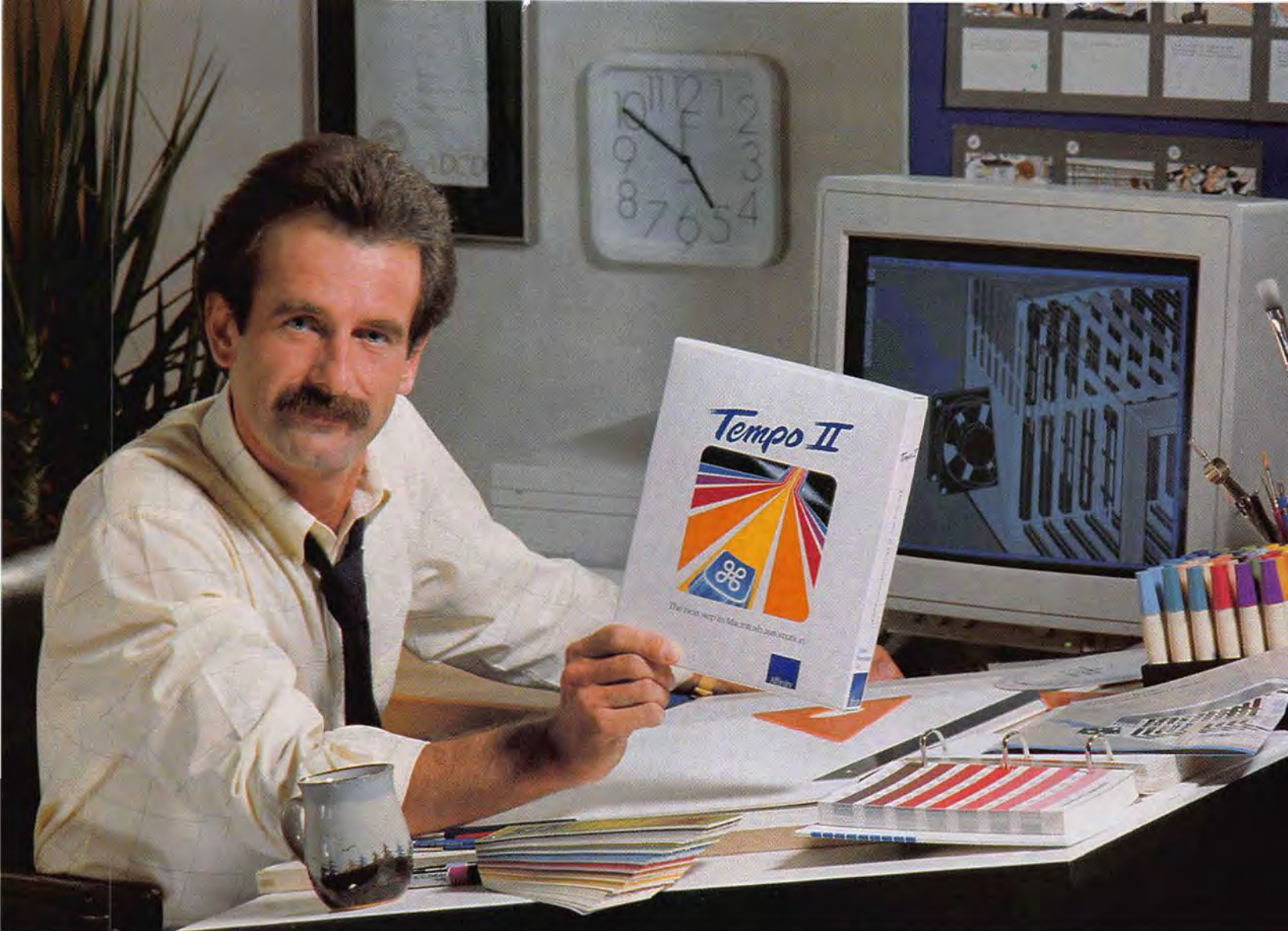
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Instant-Expert Plus Software development tool for creating customized expert systems. Uses a system of IF/THEN rules to build a decision-making program. Does not require familiarity with LISP or Prolog. 512K min. memory. \$498. Human Intellect Systems, 415/571-5939.

Just Enough Pascal Add-on learning tool for Think's Lightspeed Pascal programming environment. Teaches the fundamentals of Pascal programming by letting you build an application using Think's Lightspeed Pascal environment. Online interactive instructions and explanations. 1MB min. memory. \$75. Symantec, 415/963-6400.

MacFontware Typeface Packages Typefaces in bitmapped and outline forms; compatible with all printers that use PostScript or QuickDraw. Ten packages available, each containing four typefaces. 512K min. memory. \$195 for each package. Bitstream, 617/497-6222.

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For example, I’ve got a huge list of fonts in a long hierarchical menu, but a single keystroke selects Zapf from it. I select a line, hit a key, it’s Zapf.

Pow, it’s greeked

When I need some text to greek in, a keystroke plays an Autopaste macro that simply pops in my text. It looks good and works fast!

Another example? This odd-sized page layout I’m constantly creating. A

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My Mac works, I create

Tempo II can’t have my ideas for me. But it can free me from the drudgery, speed up the boring parts, and give me more time for the fun stuff.

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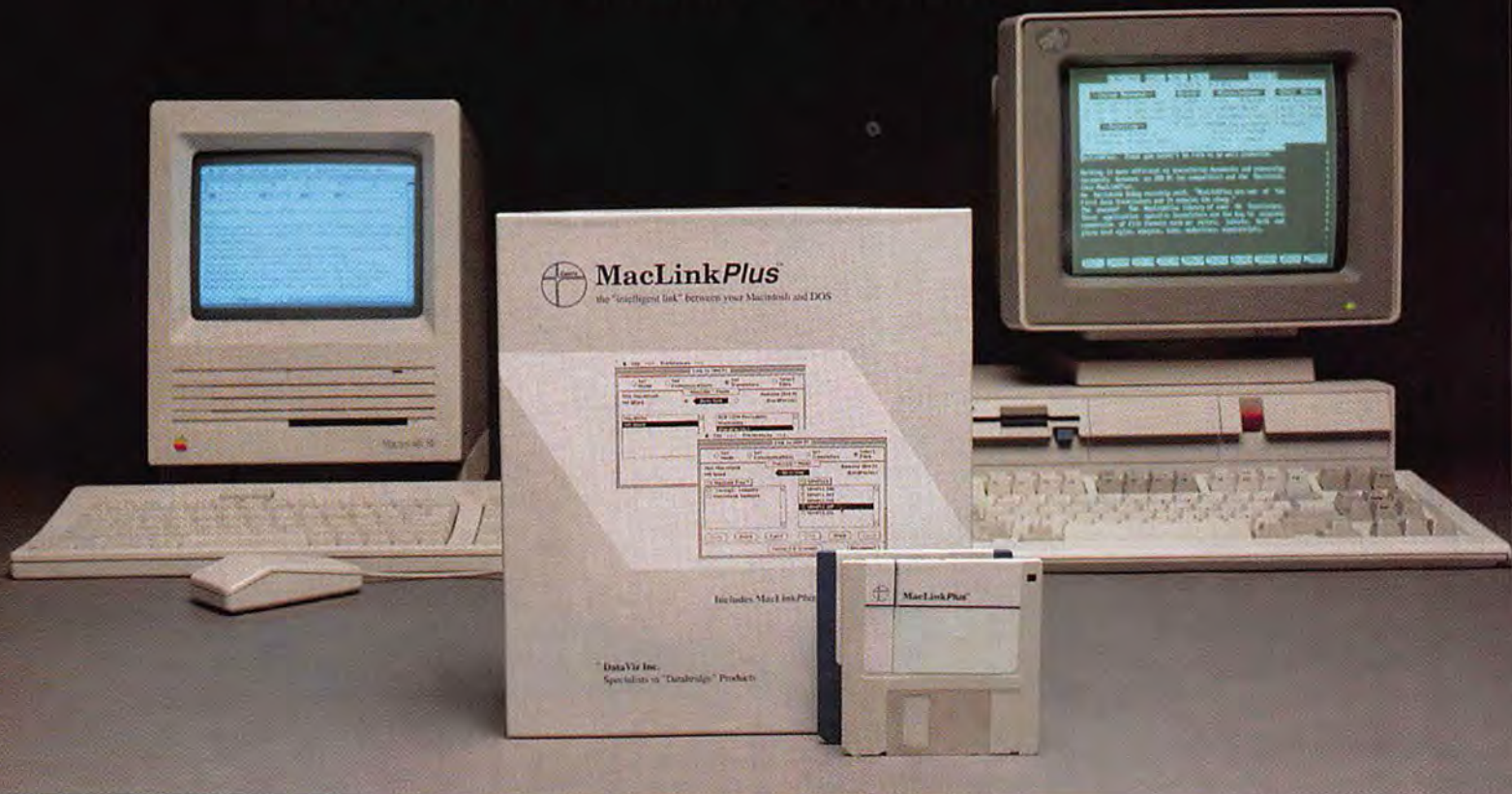
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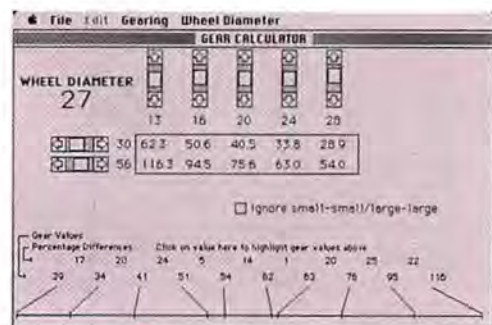
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MacHerbal Database of traditional Chinese herbal medicine. Search and comparison of key medical aspects for more than 300 commonly used herbal substances in the Chinese materia medica. 1MB min. memory; requires two 800K drives or hard disk. \$295. Summerland Press, 508/693-6930.

Mac Man Patterned after Pac-Man, Mac Man gobbles apples in each maze while escaping PCs in pursuit. A variety of 16 mazes with animated intermissions. Joy-stick adapter included. 512K min. memory. \$35.95. Soft Stream International, 609/596-4373.

Nashbar Gear Calculator Bicycle gear calculator provides display of gear ratios and percentage of difference between ratios, instant flagging of crossovers, and the ability to block unusable combinations. 512K min. memory. \$19.89. Bike Nashbar, 216/782-2244.



Nashbar Gear Calculator

NoteWriter for the Mac Music notation program with QuickScrawl mode lets you sketch notes onto music staves with the mouse. Automatically converts scrawled notes into musical symbols. Notes can be entered sequentially or can be placed anywhere on a page regardless of the order in which they were played. 512KE min. memory. \$295. Passport Designs, 415/726-0280.

NovaCount Single-entry job costing and accounting system for service-oriented businesses that bill for time and materials. Incorporates automated accounts payable, accounts receivable, job costing, payroll, and general ledger functions, and standard reports. 2.5MB min. memory; requires 20MB hard disk. \$4500. Aba Count, 612/641-0030.

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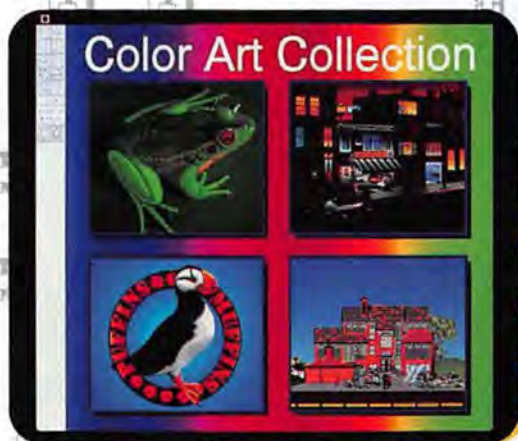
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On Cue File-launching utility lets you move from one program to another without having to return to the desktop. Compatible with both Finder and MultiFinder. 512KE min. memory. \$59.95. Icom Simulations, 312/520-4440.

Optimage Image processing and analysis software for the Mac II. Modular tool box designed for applications such as optical microscopy, scanline microscopy, radiology, geology, and so on. Runs on Mac II with 256-color display. 2MB min. memory; requires 20MB hard disk. \$2999. GTFS, 707/579-1733.

Persuasion Desktop presentation software with outlining, word processing, drawing, charting, and layout capabilities. Creates presentations in color or black and white. Automatically formats outline text into slides or overheads; produces speaker notes and audience handouts. 1MB min. memory; requires hard disk. \$495. Aldus Corporation, 206/622-5500.

PhotoMac Color photodesign software that performs color image processing and separations in-house. Provides ability to combine text from page-layout applications with full-color (24-bit) images. Lets you manipulate, retouch, and color-correct images and print color proofs. 2MB min. memory. \$695. Avalon Development Group, 617/661-1405.

Pisces Aquaculture research program that automatically calculates oxygen saturation, estimated biomass, recommended feeding percentage, and amount to feed sea life being studied. Interactive error checking and continuous feedback. 1MB min. memory. \$185; demo disk \$15. Software Development Group, 504/343-8437.

PixelPaint Professional Color painting and design program that searches through a full array of Pantone colors interactively. Enables user to manipulate colors through dithered blending. Built-in color separator and scanning utility. 2MB min. memory. \$595. (Current owners of PixelPaint 1.0 or 1.1 will be notified of upgrade policy.) SuperMac Software, 415/964-9694.

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MICROSEEDS' Screen Gems

a collection of screen utilities for the Macintosh II

ColorDesk

Stop yawning at that dull gray desktop! ColorDesk, by Paul Mercer, is a cdev that personalizes your screen by displaying a background picture (any PICT file, color or black-and-white) of your choice in place of the usual gray desktop pattern. (At least 2 MB of memory recommended for ColorDesk).

Dimmer

This great utility by Chris Derossi "dims" your screen while you're not using it, to prevent burn-in. Other "screen saver" utilities erase the screen, but Dimmer simply darkens the screen. Specify the time delay before dimming (1-120 min), and the dimming level (0% - 100%). Dimmer supports multiple monitors.

Switch-A-Roo

Bill Steinberg's handy FKEY quickly switches between two user-defined screen modes without the inconvenience associated with the Monitors Control Panel device.

TN-3

This wonderful utility by Dave Winzler allows you to choose coordinated color sets for the Finder's Color menu.



MICROSEEDS PUBLISHING

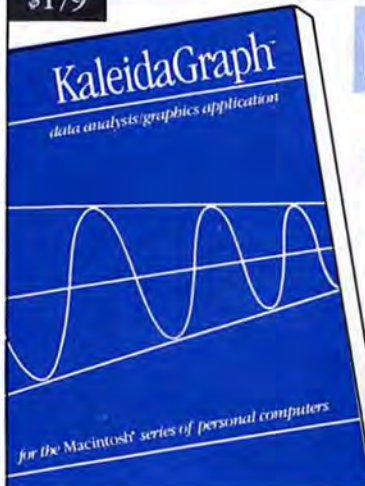
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New Products

ing programs for the Mac. Cartoons represent the collaborative effort of artist/ animator Jon Wokuluk and writer Paul Harwitz. (Will be available on a monthly subscription basis.) 512K min. memory. \$49.95 per edition. ByteType, 213/828-8750.

Render Dimensions High-end software rendering package. Phong and Ghouroud shading with flat or smooth surfacing options and multiple light sources. Has the ability to vary shininess and light reflectivity of objects, and to generate unlimited number of surfaces. 1MB min. memory. \$895. Visual Information, 818/918-8834.

Sargon 4 Chess software that offers 16 levels of difficulty. Board can be customized to "suggest" moves, or skills can be sharpened using speed-chess option. Pieces can be customized. Viewing in 3-D or 2-D graphics. 512K. \$49.95 Spinnaker Software, 617/494-1200.

Sculpt-Animate 4D Ray-tracing animation software for interactive design and generation of 3-D animation on the Mac. Rendering options include wire-frame, polygonal shading, scanline, or ray tracing for photorealistic effects. 1MB min. memory. Modules from \$500 to \$2500. Byte by Byte, 512/343-4357.

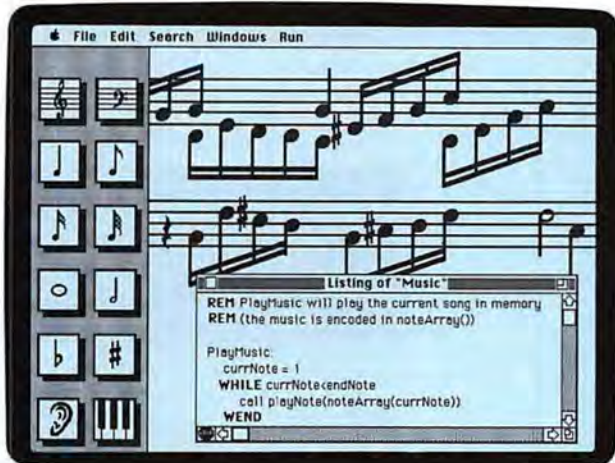


Sculpt-Animate 4D

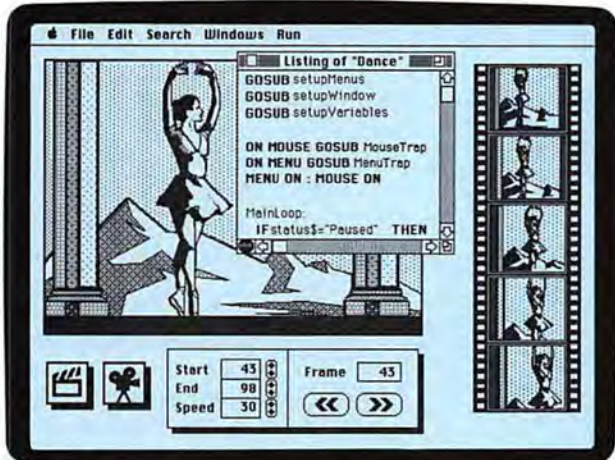
Services Rendered Billing and customer-tracking system tailored to the needs of small to medium-size businesses. Includes payment dispersal, account aging, and bill configuring functions. 1MB min. memory. \$1200. Software Development Group, 504/343-8437.

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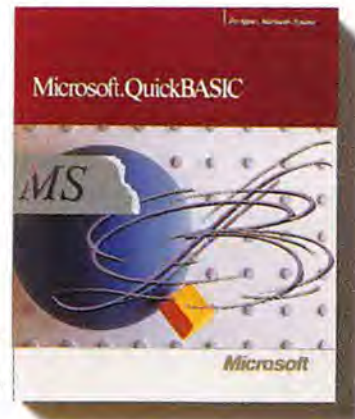
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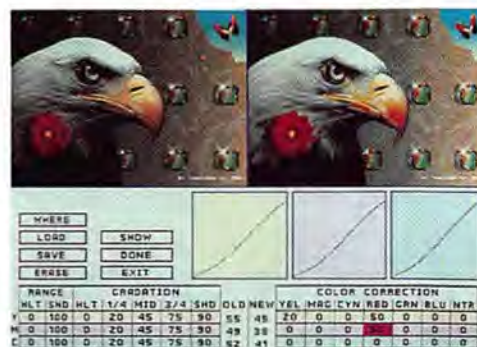


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Sky Travel Astronomy program for beginning and expert star watchers. Lets you observe the night sky, travel through time to view skies of the past or future, plot star maps, trace constellations, and emulate solar and lunar eclipses and phases of the moon. 512K min. memory. \$69.95. Micro-Illusions, 818/360-3715, 800-522-2041.

SpectreMatch I Color-correction software for printing professionals. Images scanned in with 300- to 1000-dpi scanner are corrected and stored in RGB TIFF on the Mac. Can store parameters for later use. 4MB min. memory. \$3000; price may vary depending on configuration. Pre-Press Technologies, 619/753-0194.



SpectreMatch I

Springboard Publisher Desktop publishing package designed for DTP nonexperts. Integrates page-layout control, word processing, and a set of built-in graphics tools. 1MB min. memory. \$199.95. Springboard Software, 612/944-3915.

Talking Tiles Animated Talking Tutor synchronizes lip motions to emphasize individual letters as words are pronounced. Provides visual clues to show how phonics works. Word and matching picture dictionary for preschool through adult literacy programs. 1MB min. memory. \$129.95. Bright Star Technology, Inc., 14450 NE 29th Pl., #220, Bellevue, WA 98007.

TextPert Expert text reader software interface for Macintosh-compatible scanners using the Mac. Reads an unlimited number of fonts and type styles (including hand-

(continues)



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I connected my Macintosh to the Cambridge Z88 with MacLink, then held my breath. I use my Macintosh for just about everything—accounting to graphics—and real Mac portability would make a big difference. Everything worked beautifully, easily exporting work files from my Mac to the Z88, then sending them back!

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Compact, the Cambridge Z88 portable features a slim



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design that weighs under two pounds. The size of a piece of paper (8.25" x 11.5"), the Cambridge Z88 is less than an inch thick.

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The AIDS Stack AIDS informational resource includes glossary, symptoms, precautions, diagnosis, audio/video resources, and bibliography sections. 1MB min. memory. \$25 single edition; \$75 one-year subscription (updated quarterly); free to persons with AIDS or ARC. Artists Against AIDS, 213/936-6738.

The Art Generator HyperCard stack that uses AI and random generation to create new art, variations on existing art, and special effects. Provides ability to save and browse computer-generated artwork. 1MB min. memory. \$29.95 plus \$3 s/h. Leister Productions, 717/697-1378.

The Colony Interactive space adventure in which you take the role of a space marshal assigned to investigate disappearances at a frontier outpost. Explore the homes and workplaces of missing colonists to solve the puzzle. Digitized sound effects, 3-D modeling and animation. 512K min. memory; requires 800K drive. \$49.95. Mindscape, 312/480-7667.

Typography and Page Design Interactive training program for beginners in desktop publishing. Contains more than 200 information screens. Teaches students the basic principles of font, type size, and style selection. 1MB min. memory. \$95. PPT. Limited, 801/265-1049, 800/444-0017.

HARDWARE

16-Inch Color System ColorBoard 108 combined with 16-inch Trinitron monitor with 72-dpi display operates at a vertical scan rate of 66 Hz, provides a flicker-free screen, and displays actual-size images. \$4590. RasterOps, 408/446-4090.

FastNet III EtherTalk-compatible Ethernet adapter for the Mac II. Provides support for a variety of LAN protocols. \$549. Dove Computer Corporation, 919/763-7918.

Mac 'n Touch Snap-On Kit Touch screen that snaps onto the front of the SE. Includes driver and controller. Compatible with Apple Desktop Bus (ADB) and all Mac software. \$595. Microtouch Systems, 617/935-0080.

MagniView 342 LCD computer display panel for the Mac. Acts with overhead projector as an electronic transparency, allowing real-time monitor data to be projected onto a screen. Includes 512-by-342-pixel display for image sharpness, and 4:3 aspect ratio to eliminate image distortion. \$1395. Dukane Corporation, 312/584-2300.



MagniView 342

MSF-300Q 64 Gray Scale Scanner Two scan modes: single-bit-per-pixel for logos, line drawings, and photos; and multi-bit-per-pixel for printing with PostScript-equipped laser printers (including high-resolution printers such as Linotronic 100 and 300, and Varityper VT600) and gray-scale graphics editing. \$2295. Microtek Lab, 213/321-2121.

Nutmeg Kodak Datashow Nine-inch diagonal LCD projection pad. Projects oversize computer-generated images on walls or screens. Works with standard overhead projectors. Interface can be installed with Mac case intact. Mac Plus and SE versions \$1695; Mac II version \$1995. Nutmeg Systems, 203/966-3226.

PageView Full-page display monitor for the SE. Has 15-inch portrait-mounted monitor with an 8-by-10.7-inch viewing area and two resolution modes. \$999. Sigma Designs, 415/770-0100.

SilverView 21-inch gray-scale monitor for the Mac II. Displays up to 256 shades of gray. Has high refresh rate, flat screen, and tilt-and-swivel base. Available in three configurations: SilverView M (monochrome black-and-white only), SilverView S4 (16 levels of gray), SilverView S8 (256 shades of gray). SilverView M system \$1999; SilverView S4 system \$2499; SilverView S8 system \$2999. Sigma Design, 415/770-0100.



SilverView

Sniffer Network protocol analyzer that supports all layers of AppleTalk protocol model. Designed to aid the integration of Macs into corporate networks that use IBM and DEC systems. Sniffer unit base price \$15,000; AppleTalk protocol option \$995. Network General Corporation, 415/965-1800.

Teleflex Programmable, customizable telephone task handler. Performs order entry, telemarketing, text support, and voice mail tasks. 1MB min. memory. \$2995. Magnum Software, 818/700-0510.

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The Big Picture Z21

Video Color Converter Stand-alone device for Mac IIs configured with Pixelogic Pro-Viz Color Digitizer. Allows input of color images on Mac II with standard video camera. Transforms composite color images generated by video camera or VCR into RGB signal. \$595. Pixelogic, 617/938-7711.

ACCESSORIES

Avery Laser Printer Labels Automatic-feed labels for laser printers. Mounted on specially formulated paper stock with heat-resistant adhesive, guaranteed not to interfere with printer parts. For use with Apple LaserWriter Plus and II, HP LaserJet Plus and II, and other laser printers. 25-pack of 1-by-2 $\frac{3}{8}$ -inch labels \$8.25; 100-pack of 8 $\frac{1}{2}$ -by-11-inch labels \$27.85; contact Avery for other sizes available. Avery Corporation, 818/915-3851.

Leather 3.5" Disk Portfolio Leather disk holder lined with nonrip, antistatic material; seals tightly with Velcro. Holds six to ten disks. Burgundy, black, brown, London tan. \$24.95. Remember When, 508/685-4504.

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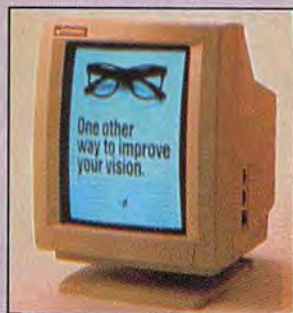
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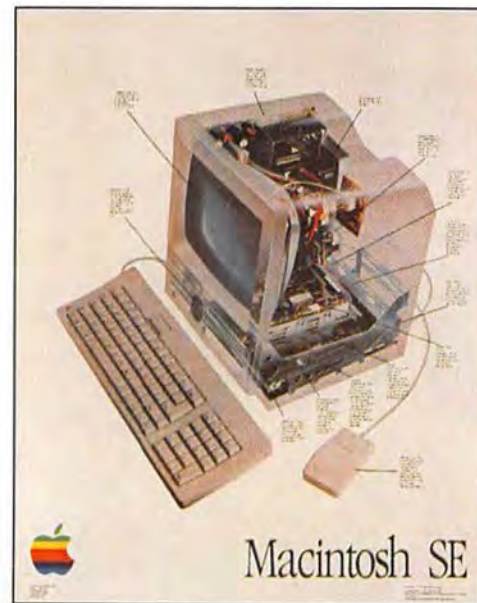
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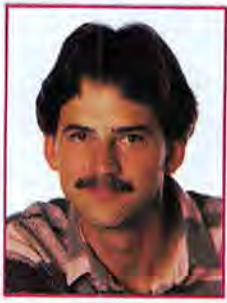
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Quick Tips

Answers to your questions

by Lon Poole

Some word processing applications, such as MacWrite, offer a limited number of font sizes. With MacWrite, however, you can get around this limitation by copying text of the desired size from another MacWrite document, such as the public domain program Fonts 4 to 48, and then pasting that text into your current document. But in between copying and pasting, do not quit the application or switch to a different application using MultiFinder, warns Efrem G. Mallach of Needham, Massachusetts. Quitting or switching transfers the contents of the application's proprietary clipboard to the Mac's Clipboard, usually destroying font, size, and style information in the process. The same warning applies to WriteNow and other word processors.

To create a document containing non-standard text sizes for copying, use any application that can create text in the desired sizes and can save it in a format compatible with the application you'll be using. For example, Microsoft Word 3.0x can create any size text and can save a document in MacWrite format, which WriteNow can also open.

Another approach, suggested by Bill Layman of La Crescenta, California, is to install the desk accessory WriteFontSize (available for trial from most user groups and online information services, or send \$7 [\$10 outside the United States] and a blank disk to its author, Jeffrey Shulman, Box 521, Ridgefield, CT 06877-0521). WriteFontSize lets you type a character in any size, copy the character, and paste it into

any document without losing font or size information. After pasting, you select the character and start typing to replace it with the text you want.

Quick Info

If you've read the documentation that comes with HyperCard 1.2 or later versions, you know it has built-in shortcuts for viewing and editing the stack script, background script, and card script. (Press **⌘-Shift-S** for the stack script, **⌘-Shift-B** for the background script, or **⌘-Shift-C** for the card script.) However, HyperCard has no built-in shortcuts for accessing the Stack Info, Bkgrnd Info, and Card Info dialog boxes. You can add three short handlers to the stack script of your Home stack to install two-key shortcuts for each dialog box (see "Info Shortcuts"). The handlers use doMenu commands to display the Info dialog boxes: you press S and then Return for stack Info, B and then Return for Bkgrnd Info, or C and then Return for Card Info.

From Illustrator via Clipboard

You can't use ordinary copy-and-paste methods to transfer artwork from Adobe Illustrator to another application. Illustrator, like most applications, maintains its own clipboard, but unlike most applications, it does not automatically convert artwork on its clipboard to the Mac's Clipboard (in standard PICT format) when you switch applications.

To copy Illustrator artwork via the Clipboard to another application, select the artwork in Illustrator, press Option while choosing Copy from the Edit menu, switch applications, and then choose Paste from the Edit menu. Pressing Option while choosing Copy converts the selected artwork to PICT format with encapsulated PostScript (EPS). In this form, the artwork is compatible with any application that accepts graphics from MacDraw. (However, text rotation and a few other special effects

(continues)

```
--Adds a keyboard shortcut for stack info
--Press S and then Return
on s
  if the userLevel > 3 then doMenu "Stack Info..."
  else beep
end s

--Adds a keyboard shortcut for background info
--Press B and then Return
on b
  if the userLevel > 3 then doMenu "Bkgrnd Info..."
  else beep
end b

--Adds a keyboard shortcut for card info
--Press C and then Return
on c
  if the userLevel > 3 then doMenu "Card Info..."
  else beep
end c
```

Info Shortcuts

To install keyboard shortcuts for HyperCard's Stack Info, Bkgrnd Info, and Card Info commands, place these three handlers in the stack script of the Home stack. Similar handlers can be used to create keyboard shortcuts for other menu commands.

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).



Novell presents a net 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.

So when Novell set out to network the Macintosh with PCs, it was with one clear caveat: preserve the Mac environment. Create network software that would feel right to the pickiest of all Macintosh users. And none are pickier than the ones at Apple.

Full AppleTalk compatibility. Working directly with Apple, Novell's programmers created a version of NetWare® that is compatible with the AppleTalk File Protocol (AFP). It's an

achievement hailed by Apple President and CEO John Sculley as "a very significant event for the industry." And it means that Mac users can now get all the power and flexibility of the number one local area network in the world, without sacrificing any Macintosh functionality.

AFP compatibility also means that NetWare for Macintosh will be fully compatible with future Macintosh hardware and operating system versions. So you can take advantage of new Macintosh product releases as soon as they become available.

Freedom to choose. NetWare for Macintosh lets you connect Macs with a

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

InfoWorld, June 20, 1988

work made to satisfy Macintosh user.

myriad of PC, minicomputer and mainframe environments, including OS/2. So you can choose the workstation environment that best suits your needs while communicating easily between dissimilar operating systems and sharing files and peripherals.

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How To/Quick Tips

print correctly only from an application that supports EPS.)

Names at the Top

The various suggestions in earlier issues regarding naming files and folders so that they appear in the much-coveted first position of the Open dialog box (see *Quick Tips*, November 1987, April 1988, and August 1988) prompted John Buonassisi of New York City to write: he has always typed Option-Space bar as the first character of names he wants to appear at the top of the list. Caution: some INITs, notably QuickFolder 2.0 and Findswell, won't work properly if renamed.

New Recipes for SIMM Leftovers

Goodwill Industries hasn't yet recognized the market for used and surplus Macintosh parts, but Pre-Owned Electronics Inc. has (30 Clematis Ave., Waltham, MA 02154; 617/891-6851 or 800/274-5343). Stephen McClure of Atlanta says the company will buy SIMMs left over after upgrading your Mac Plus or SE to 2.5 or 4 megabytes or your Mac II to 8 MB. The price depends on current market conditions and chip speed, but at this writing it was \$20 per 150-nanosecond 256K SIMM and \$35 per 120-nanosecond 256K SIMM.

Q Disk Life

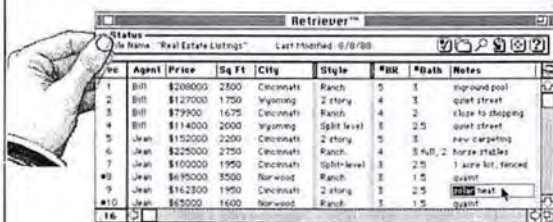
What is the shelf life of a floppy disk, and how long might the disk remain usable?

Ken Jago
Earlville, Australia

A Floppy disks have an indefinite shelf life, as long as they're kept in pleasant surroundings. To a disk, pleasant means clean, dry (between 8 and 90 percent relative humidity without condensation), between 39°F and 127°F (4°C and 53°C), and away from magnetic fields.

Floppy disks wear out over time because various parts of the drive mechanism touch the disk surface while the disk rotates. Eventually, the disk coating wears off. Most manufacturers design their 3.5-inch disks to the same longevity specifications: to operate without dropouts (that is, without loss of signal amplitude) for 10 million

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passes with the drive head positioned over one track.

Practically speaking, an average disk lasts two years. This average is subject to wide variations. With light use in clean surroundings, they may last five or ten years. But bake them in the sun, transport them on the car floor, use them in a smoky or dusty environment, or submit them to other physical indignities and they may perish after six months. Because there is no guaranteed safe time limit, you should regularly copy your valuable documents onto backup disks.

Q Sluggish Hard Disk

My external 30-megabyte hard disk has been slowing down. I have a small desktop file, so I assume the slowdown is due to file fragmentation. Is there a cure or prevention?

*Stephen Hau
Piedmont, California*

A File fragmentation occurs inevitably over time as you remove files, add new files, or change file sizes. The only way to prevent it is to never delete or change anything. The prevention is worse than the disease.

However, you can cure fragmentation by using a utility such as Disk Express (AL-Soft, 713/353-4090) or the HD Tuneup feature of Symantec Utilities for Macintosh (Symantec Corporation, 408/253-9600).

Q Narrowing the Margins

I am fairly new to the Macintosh and my ImageWriter II printer, and I have trouble centering the pin-fed paper. When I adjust the paper for a 1-inch left margin, I end up with a right margin of almost 2 inches. How can I get longer lines centered on the paper?

*William L. Martin
Gainesville, Georgia*

A Check the margin settings in your application software. Most word processing applications, for example, have formatting rulers with margin markers you drag left and right with the mouse. In a few applications, you use the Page Setup command to specify margins.

You can fit more characters per line—regardless of the font and font size settings—by selecting the Tall Adjusted option. Usually you do that with the Page Setup command, but in Microsoft Word 3.0x and a few other applications, you set the Tall Adjusted option with the Print command. Incidentally, the Tall Adjusted option changes the character spacing on an ImageWriter to match the spacing on a LaserWriter.

Q Excel Window Size

How can I change the size of an Excel window from the keyboard (rather than by clicking the window's grow box or double-clicking its title bar)? How can I change the size of an Excel window and save that change?

*Dan Eggleston
Austin, Texas*

A To save an Excel window's size, save the document displayed in it. When you open an Excel document, Excel automatically creates the same number of windows, each in the same size and position, as existed the last time the document was saved.

To change a window's size from the keyboard, create a macro that uses the Full or the Size function and possibly the Move function. Also, designate a key to use with the Option and ⌘ keys as a shortcut for that macro. As long as the Excel macro sheet that contains that macro is open, you can resize the active Excel window by pressing Option-⌘ with the key you designated.

Excel's macro recorder can create the macro for you. In Excel 1.5, for example, choose the Record command from the Macro menu. In the dialog box that appears, specify the key you want to use with Option and ⌘ for the keyboard shortcut, and click OK. Next resize and reposition the window as you want the macro to do. Excel records your actions as a macro on a new macro sheet. Then choose Stop Recorder from the Macro menu. Repeat the entire procedure for every different window size you want. Finally, bring the macro

(continues)



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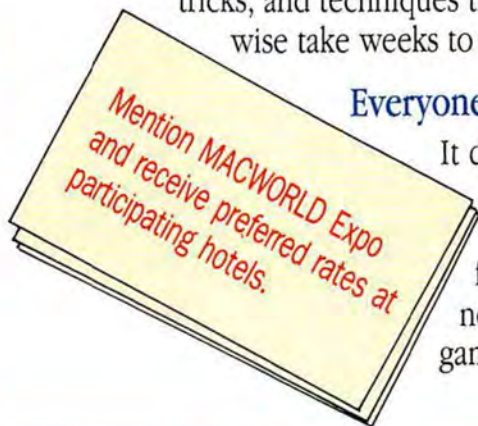
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- u. ☐ Other (specify) _____

Size of your organization (number of employees national/international)

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- x. ☐ 100-499
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- aa. ☐ Over 5,000

Which personal computer(s) do you own/or use?

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- gg. ☐ Apple IIe
- hh. ☐ Apple IIc
- ii. ☐ Apple III
- jj. ☐ Apple II GS
- kk. ☐ None
- ll. ☐ Other (specify) _____

Where will you be staying while at MACWORLD Expo/San Francisco?

- mm. ☐ Home
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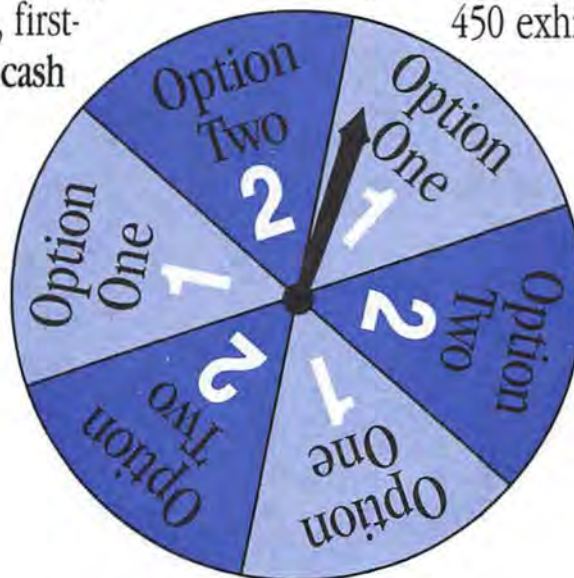
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Holiday Decorations

The scene in *Dark Castle's* Great Hall changes to include a Christmas tree when the date according to the Macintosh clock calendar is December 25.



window to the front (use the Window menu) and save the macro sheet on disk.

Christmas at the Castle

Tip: It is Christmas Day and being a bit tired from all the preparations, I decide to try to defeat the Black Knight of Dark

Castle. To my surprise, I am not the only one in the house who has been preparing for Christmas. In the Great Hall of the castle, the small, armored man at the right corner of the room has been replaced by a beautifully decorated Christmas tree (see "Holiday Decorations").

Carlos Merino
Daly City, California

Other Silicon Beach games sport similar yuletide finery. In *Airborne*, a tree appears on the battlefield. In *Beyond Dark Castle*, two stockings are hung over the fireplace at the start of play, and you see a decorated tree after passing through the fireplace.

Page Numbers in Linked Documents

Tip: Word 3.0x lets you link documents for printing, automatic indexing, and automatic table-of-contents building. Contrary to the Word manual's instructions, you do not have to determine and set each document's starting page number. Instead, use the Page Setup command on each linked document and make sure the Start Page Numbers At option is empty (select it and press Delete or Backspace). Word will then automatically number pages consecutively throughout the series of linked documents.

Mary Kroening
Newton, Massachusetts

(continues)

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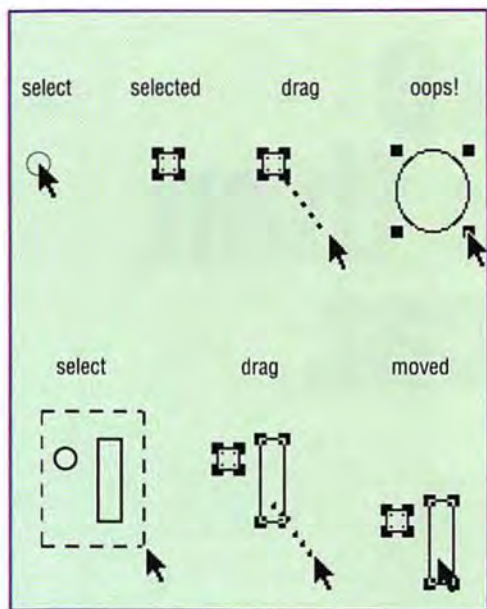
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Drag Together

When trying to drag a very small object, you often end up accidentally enlarging it (top). Instead, use a large object as a tow bar (bottom).

Dragging Tiny Objects

Tip: It can be hard to move a little object in an object-oriented drawing program such as MacDraw. In trying to drag a small object, you may inadvertently drag one of its handles, resizing the object instead of moving it. You can work around this difficulty by selecting a large object along with the small one (for example, press Shift while clicking the additional object). Drag the large object, and the small one will follow along (see "Drag Together").

*Daniel Jibouleau
St. Georges Est, Beauce,
Quebec, Canada*

Color World

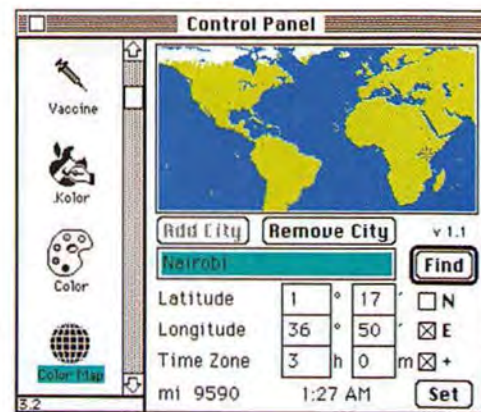
Tip: You can colorize the world map in the Map utility that comes with System Software 6.0 and higher (see "Colorized Map"). Select Map in the Control Panel and choose Copy from the Edit menu. Then open a new document in PixelPaint or another color-painting application and choose Paste from the Edit menu. Colorize the map, choose Copy from the Edit menu, select Map in the Control Panel again, and finally choose Paste from the Edit menu.

*Daniel Stinson
Tukwila, Washington*

Following Style

Tip: Microsoft Word 3.0x resets the paragraph style each time you press Return at the end of a paragraph. The Followed By specification for the current paragraph style (set using the Define Styles com-

(continues)



Colorized Map

Use a color-painting application to colorize the world map in the Control Panel's map utility. Transfer the map to and from the painting application with the Copy and Paste commands.


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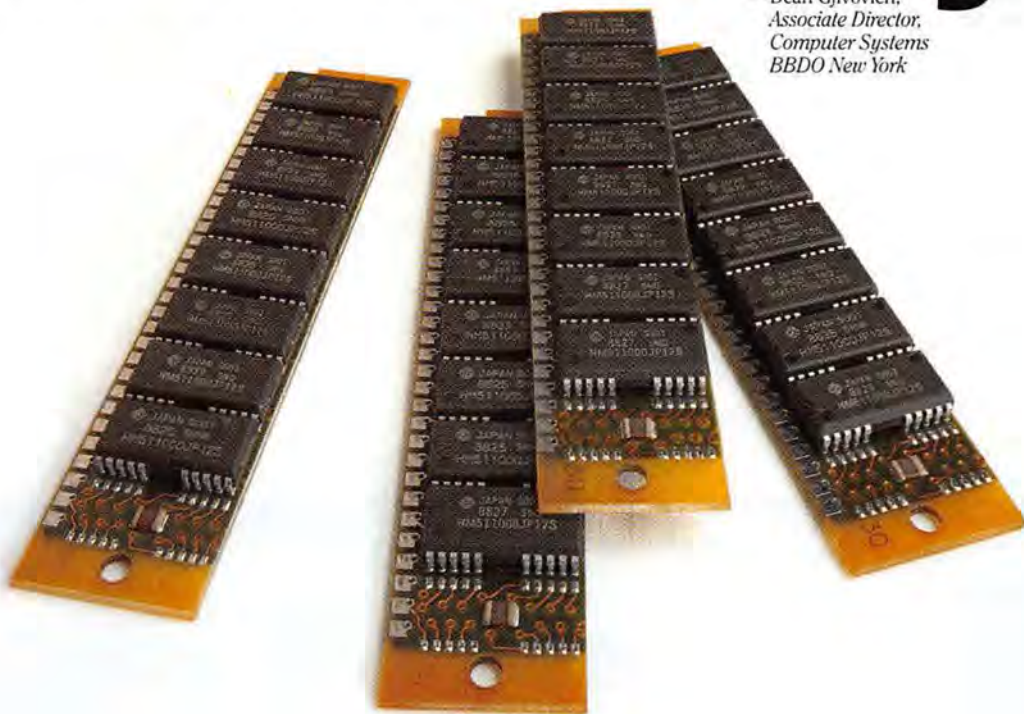
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mand) determines the new paragraph style. For example, a heading style like Level 1 is usually followed by Normal style.

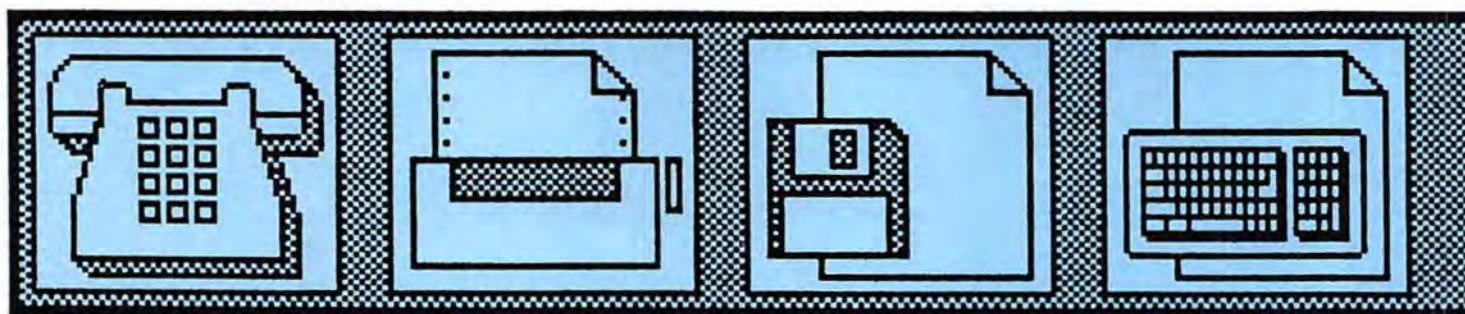
You can retain the current paragraph format in the next paragraph, bypassing the Followed By style specification altogether. Upon reaching the end of the current paragraph, type a blank space; next press the Left Arrow key; then press the Return key. Because the insertion point is not at the end of the paragraph when you press Return, Word ignores the Followed By specification. Instead it uses the current paragraph style for the new paragraph. At the end of that new paragraph, simply press Return to continue the style. When you want the next paragraph to use the Followed By style, use the mouse, the Right Arrow key, or any other method to move the insertion point to the end of the current paragraph. Then press Return. Because the insertion point is at the end of the paragraph, Word uses that paragraph's Followed By style specification for the next paragraph.

Jungle Payne
Santa Barbara, California

Custom Dialog and Definition Table

This custom dialog box serves as an entry form for a database in an Excel 1.5 worksheet. The accompanying table contains the dialog box specifications, including the default (initial) values shown here.

	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			101
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			8/26/88
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	



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	A	B
1	Initialize & Display Checks Dialog Box	Option-Command-d
2	ECHO(FALSE)	
3	=SET.VALUE(J4,INDEX('Checks!Database,ROWS('Checks!Database),1)+1)	Set Trans. No. field default
4	=SET.VALUE(J6,"")	
5	=SET.VALUE(J8,TEXT(NOW(),"m/d/yy"))	Set Date field default
6	=SET.VALUE(J10,"")	
7	=SET.VALUE(J11,2)	Set Type group default
8	=SET.VALUE(J14,1)	Set Acct. group default
9	=DIALOG.BOX(D2:J18)	Display dialog box
10	=RETURN()	End of macro

Resetting Custom Dialog Defaults

This Excel macro resets the default values in the custom dialog box shown in "Custom Dialog and Definition Table." The macro function in cell A9 displays the dialog box according to the specifications in the definition table in cells D2 through J18.

Excel Dialog Defaults

Tip: In Microsoft Excel version 1.5, you can display custom dialog boxes using DIALOG.BOX macro functions with tables containing dialog box specifications. A dialog box definition table contains specifications for each item in the dialog box—static text, edit boxes, buttons, and so on (see "Custom Dialog and Definition Table"). The last column of a definition table specifies the initial, or default, value of each item that can have a user entry or selection. Excel replaces those initial values with the entries and selections you make when you actually use the dialog box.

The macro that displays a dialog box can reset the dialog's initial values by copying them from another part of the worksheet and pasting them into the last column of the dialog box definition table. Alternatively, the macro can use the SETVALUE macro function to restore the initial values (see "Resetting Custom Dialog Defaults").

For general information on custom dialog boxes, see "Insights on Excel," *Macworld*, October 1988, or see the "Arrays, Functions, and Macros" manual that comes with Excel 1.5.

Judith Mynbier
Louisville, Kentucky

Odd Paper

Tip: I typically use 6-by-9-inch paper to write personal letters on an ImageWriter II, but the paper is not wide enough to track evenly and it either skews or prints crookedly. The answer to this problem is to manually feed in a standard-size sheet of paper along with the narrow piece. Before inserting the two pieces of paper, align their top and left edges. Feed the two sheets into the printer with the large sheet nearest the platen.

M. C.
San Diego, California

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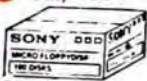
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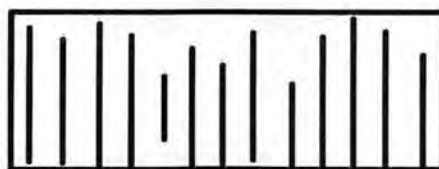
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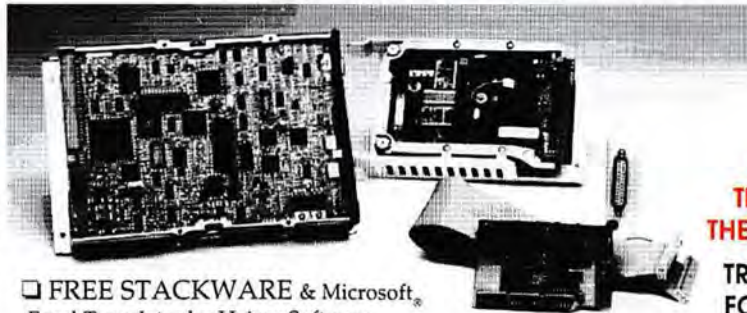
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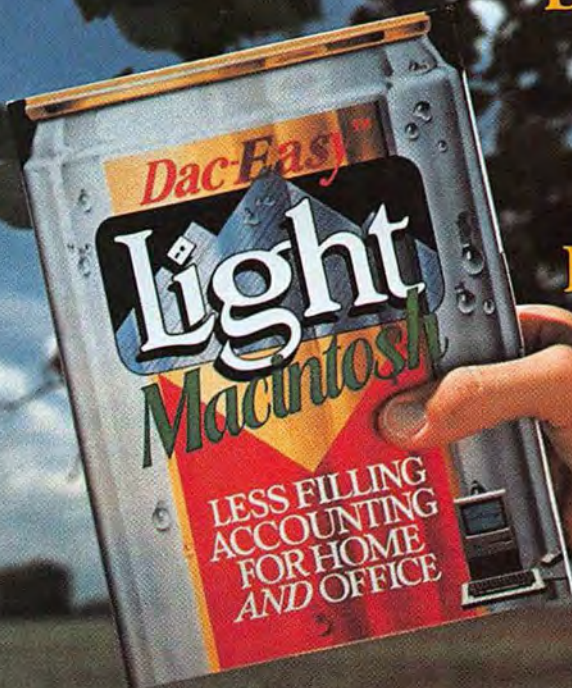
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CODE 301





Getting Started with Mass Storage

From assessing your storage options to managing megabytes, a primer on choosing and using high-capacity storage devices

by Jim Heid

The Mac is a remarkable machine, but the minute the juice is turned off, it becomes a dark and silent box, and your efforts leave its memory chips like air from a bursting balloon.

Because memory forgets, computers have always been paired with *mass-storage* devices—originally punch cards, then paper or magnetic tape, and now the current standard: magnetic disks. Storage devices hold the documents you create and the applications you use. This month, we tour the mass-storage world, with a focus on high-capacity disks. “Driving Accessories” lists some software that the best-dressed drives are wearing.

Disk Basics

I explored the workings of disks in the December 1986 *Getting Started*, but I’ll review them briefly here. When you initialize a disk, the Mac magnetically inscribes 80 concentric circles on both sides of the disk. These circles are called *tracks*, and each one is divided into wedges, or *sectors*. (If you have a 128K or 512K Mac or if you choose the One-Sided button in the disk-initialization dialog box, the Mac uses only one side of the disk.) During initialization, the Mac reserves some disk areas for its own use. One vital area, the *directory*,

Jim Heid is a Macworld contributing editor who focuses each month on a different aspect of Mac fundamentals.



Mass-Storage Media Compared

Three types of high-capacity removable media and an external hard disk (left to right): a 12MB Eastman Kodak Verbatim disk; a 45MB Syquest removable hard disk cartridge; a 20MB Iomega Bernoulli cartridge; and a 140MB Jasmine hard disk in the background.

MARK JOHANN

lists the name and location of the files on the disk. When you erase a file, the Mac removes its directory entry; this frees the file’s sectors for future use.

In the late seventies, floppy disks replaced slow, unreliable cassette tapes as the standard storage device, transforming the microcomputer storage world by allowing random access to data. To appreciate that, compare a record album to a cassette tape. To find a particular song on a cassette, you have to proceed sequentially by fast-forwarding and rewinding, but you can plop a turntable’s tonearm in place at any point. Similarly, a computer can access any spot on a disk almost immediately by moving the drive’s head to that point.

Driving in the Fast Lane

With its truck-size storage capacity and speedy data transfer, the hard disk is rapidly transforming floppies into a medium for backups and software distribution only. The 20-megabyte hard disk, with its ability to put the contents of 25 floppies on tap, used to be the power user’s choice. But these days it’s at the bottom of the totem pole, as 30MB, 40MB, and even larger drives become more popular and affordable (see “Twenty Megabytes and Spinning” for a comparison of 20MB hard disks.)

(continues)

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How To/Getting Started

Driving Accessories

Whether you're shopping for stocking stuffers or outfitting your own system, here's a sampling of useful utilities you should consider.

■ **Backup software.** Many drives include backup programs, but some lack the speed or flexibility of products such as SuperMac's DiskFit and Fifth Generation's FastBack. Just be sure the product works with your drive before buying.

■ **Repair utilities.** 1stAid Software's 1st Aid Kit, Symantec Corporation's Symantec Utilities for Macintosh, and Central Point Software's Copy II Mac

can resurrect deleted files, reconstruct damaged ones, and perform other magnetic miracles. 1st Aid Kit's troubleshooting manual is worth its weight.

■ **Security software.** Listen up, Colonel North. Encryption programs such as SuperMac's Sentinel scramble files according to a password you supply.

■ **Organizational aids.** Symantec's HFS Navigator searches folders to find files. (Don't forget the Find File desk accessory, included with the Mac.) William & Macias's Disk-Finder and Ideaform's Disk-Quick print disk catalogs.

A hard disk owes its stellar speed and capacity to several factors. First, its magnetic surface isn't a sheet of flexible plastic but a polished, precision-machined metal *platter* whose magnetic particles (and therefore, your data) are packed closer together than a floppy's. Most hard disks contain several platters, stacked like records in a jukebox and sealed in a dust-free enclosure (see "Inside a Hard Disk"). In most drives, the platters spin at 3600 rpm—six to nine times faster than a floppy disk. And finally, hard disk platters spin continuously; a floppy stops when it isn't being accessed and takes about a half-second to get back up to speed when the next access begins.

Unlike those of a floppy drive, a hard disk's read-write heads don't touch the disk's surfaces but ride a hairbreadth above them. If a hard disk's head *does* touch the surface, you've got trouble. That's known as a *head crash*, and it can occur when something jostles the drive during use, or even when a speck of dust gets between the platter's surface and the head. A head crash used to damage the platter, as the head dug a ditch in the platter's coating. Improved platter surfaces, such as *thin film* coating, make today's drives more durable. Another safety feature is *automatic head-parking*, which retracts the drive's heads to a safe area when you shut down.

A hard disk can live inside or outside a Mac. Internal drives don't use any desk space, and they make moving the Mac more convenient. But besides adding extra heat inside the Mac, an internal drive usually requires dealer installation, and if it breaks, your entire Mac must go to the shop. I'm partial to external drives. They don't change the climate inside the Mac; they move from one Mac to another in a flash; and with long cables, you can bury them out of earshot under your desk or in a nearby closet. And you don't have to part with your Mac if the worst happens.

Megabytes to Go

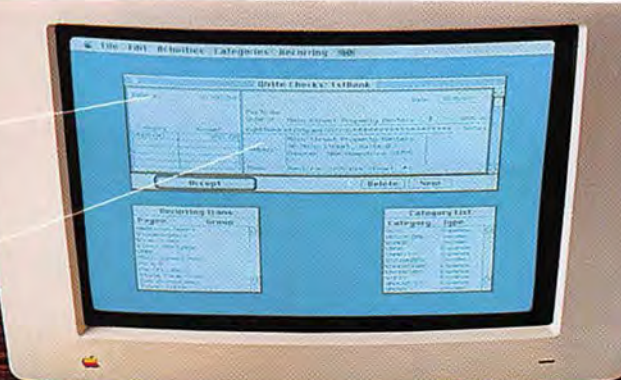
But a hard disk's biggest drawback is that it lacks the portability and security of floppies. You can't pop an internal drive into your briefcase or lock it in a safe at night. External drives are a bit more portable and protectable, but moving one still means fussing with cables and transporting a delicate mechanism. And once you fill a hard disk, you face an electronic spring cleaning, throwing away or copying musty old files and applications to floppies to free up disk space.

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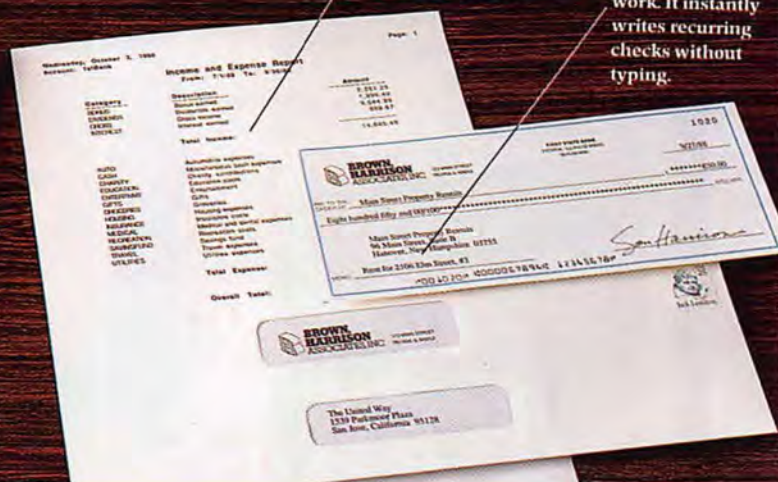
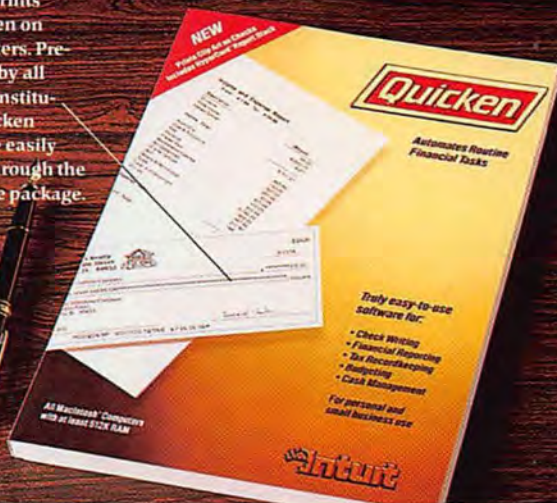
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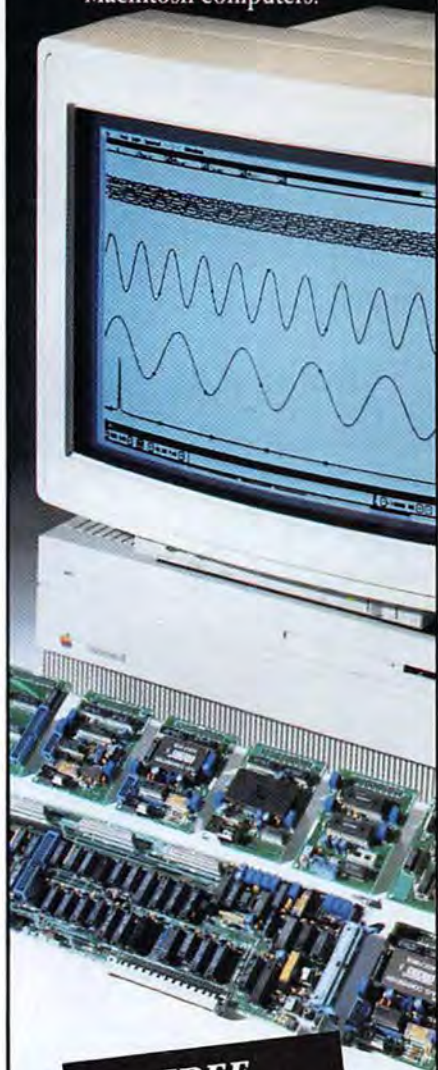
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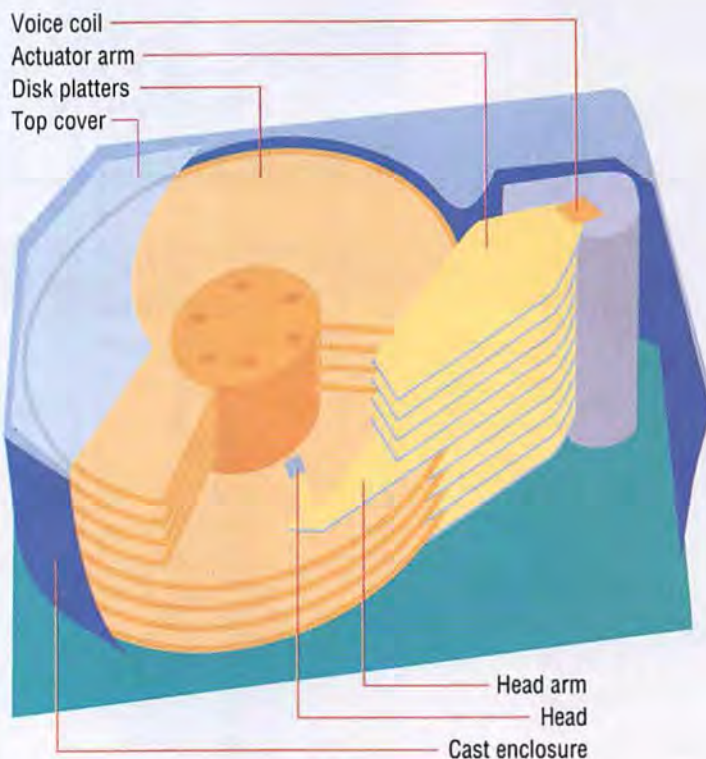
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How To/Getting Started



Inside a Hard Disk

The fastest and most common high-capacity storage device, a hard disk, uses rigid, stacked platters sealed in a dust-free case. The heads ride just above the platters, which spin at 3600 rpm.

Happily, there is a way to combine the security and portability of floppies with the capacity of a hard disk. Several manufacturers offer *removable-media* drives, whose disks are encased in lightweight plastic cartridges.

The veteran of the removable-media world is Iomega Corporation, whose Bernoulli Box drives have been around for over five years. A Bernoulli Box uses principles of fluid dynamics discovered by an eighteenth-century mathematician and physicist named Daniel Bernoulli (pronounced *burn-oo-ly*): the pressure of fluid or air decreases when it's moving. In a Bernoulli cartridge, a rush of air draws a flexible disk, spinning at 1835 rpm, to within a few thousandths of an inch of a rigid metal plate located in the drive (see "Inside a Bernoulli Box"). The disk floats firmly within this air flow, flexing no more than $\frac{1}{1000}$ inch.

Until an intruder comes along. Because the disk is flexible, a foreign intruder isn't as threatening as it is to a hard disk. When something comes between a Bernoulli disk and its head, the disk flexes and the air flow blows the intruder away. The result is a temporary disk error that the Mac can detect and often correct.

The first Bernoulli Boxes used 8-inch disks enclosed in an 8½-by-11-inch cartridge. Iomega has since downsized the disk to 5¼ inches without sacrificing capacity. The Bernoulli Box II is available in single- or dual-drive models selling for between \$1650 and \$2550. Iomega's \$149 Bernoulli File Exchange program lets the Mac read Bernoulli cartridges formatted on Iomega's IBM PC Bernoulli Boxes.

Iomega also sells its drives to other manufacturers, who package them in various forms. Bering's Totem series uses 5¼-inch Bernoulli cartridges. SuperMac Technology offers best-of-both-worlds packages that combine Bernoulli drives with hard disks. You can use both drives for day-to-day storage, or use Bernoulli cartridges as a fast, secure backup medium.

Other Removable Options

Bernoulli cartridges aren't the only way to cache and carry. Eastman Kodak's Verbatim drive has removable media that

(continues)

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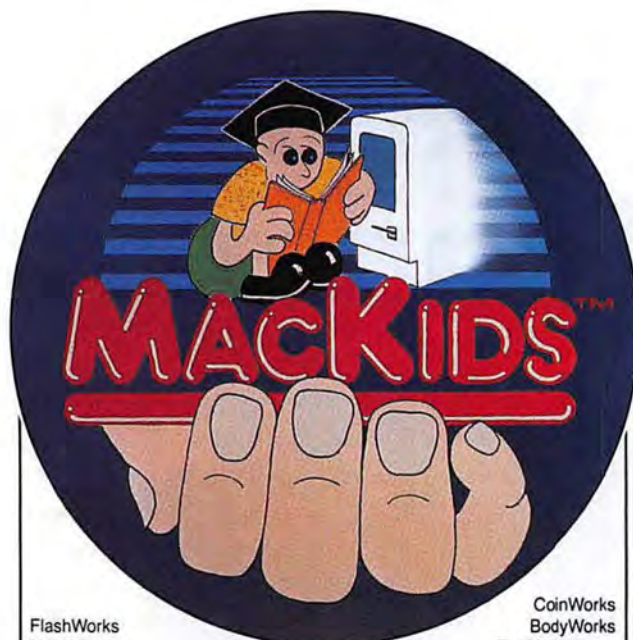
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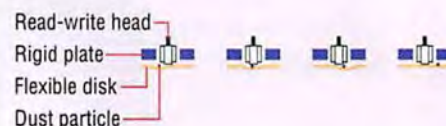
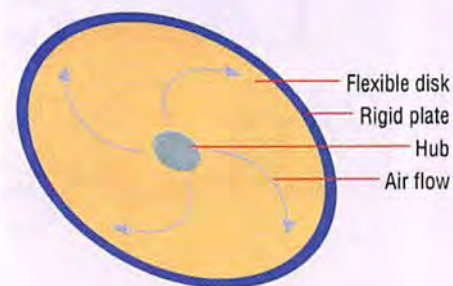
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How To/Getting Started



Inside a Bernoulli Box

An Iomega Bernoulli drive uses a removable cartridge whose flexible disk spins within a controlled airflow that gives it rigidity. Invasion by a dust particle (bottom), however, breaks the flow, causing the disk to pull away from the head. Although slower than most hard disks, Bernoulli drives are popular for the security, reliability, and convenience their cartridges provide.

resemble floppy disks but store roughly 10MB. Two read-write heads actually rest on the disk surface. Each disk itself is a 5¼-inch flexible circle encased in a vinyl jacket, much like IBM PC floppies. But unlike those disks, its vinyl jacket is enclosed in yet another plastic shell with a metal shutter (see "Mass-Storage Media Compared").

How can a cousin to the floppy store 10 megs? The secret lies in the method the drive uses to position its heads. In a conventional floppy drive, the drive's electronics instruct a *stepper motor* to move the heads to a given track, but the electronics can't tell if the heads have really reached that exact place. Thus, the tracks on the disk must be wide enough to provide a margin of error.

The Verbatim drive uses special signals recorded on the disk to position the heads to within 1/10,000 inch. Technically, it's

called *closed-loop, embedded-servo* head positioning. Simply stated, the heads tell the electronics where they are as they move, and the electronics fine-tune the heads' position to ensure that they hit each track dead-center. As a result, the Verbatim disk can pack 333 tracks per inch, versus the Mac disk's 135.

At 600 rpm, a Verbatim drive's disk spins faster than a floppy, and the disk stops spinning only after a few minutes of inactivity, not after every access. These points, combined with data being packed more tightly on the Verbatim cartridge, make Verbatim drives far faster than conventional floppies. Still, they're much slower than hard disks or Bernoulli cartridges. I wouldn't use a Verbatim-based product such as Jasmine's MegaDrive as my sole drive, but one would make an excellent hard disk backup device and could be pressed into emergency service if needed.

A much faster removable-media drive is made by Syquest and used in, for example, Mass Micro's DataPak. The Syquest drive borrows from the hard disk camp, using a single 5¼-inch rigid platter (spinning at 3280 rpm) that holds 45MB. Putting a platter in a removable cartridge sounds as safe as playing with matches in a fireworks factory, but I found the DataPak's speed and reliability impressive (see *Reviews, Macworld*, September 1988). Century Data uses a similar platter-in-cartridge scheme in its PhD drive (see *Reviews, Macworld*, May 1988).

Speed Thrills

The speed at which a disk spins and the density of the data in its tracks are two factors that contribute to performance, but they aren't the only ones. If you're drive shopping, you'll encounter a bevy of tech specs.

Average access time—measured in milliseconds—specifies how long it takes for the drive's heads to locate a given spot on the disk. The lower the value, the better the access time.

Data transfer rate measures how quickly the drive can shuttle bytes to the Mac. The higher the value, the better, but only to a point. Mac SEs and Pluses, for example, can't handle as high a transfer rate as Mac IIs.

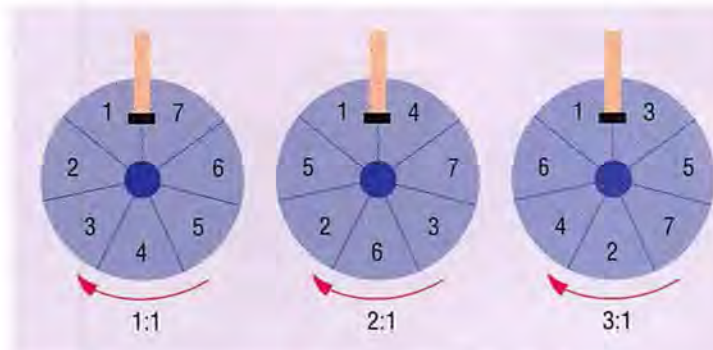
The **interleave ratio** describes the organization of sectors in each track (see "Understanding Interleave"). Generally, the lower the interleave ratio, the better. A 1:1 ratio is best because it means the Mac can read each sector consecutively. With higher ratios, the Mac must read every second or third sector, which slows down performance (for more information on interleaving see the sidebar "Moving Heads" in the article "Twenty Megabytes and Spinning," in this issue). Drives that use Apple's standard SCSI driver can use a 1:1 ratio only with the Mac II. The SE needs a 2:1 ratio; the Plus, a 3:1 ratio. But some drives include modified SCSI drivers that allow a 1:1 interleave with all Macs. Others provide built-in **data caching**—the drive reads an entire track and stores it in a small reserve of memory. When the Mac requests subsequent sectors from that track, the drive sends the data from the cache.

In day-to-day use, the differences between most drives are minor. And if you're used to floppies, you'll be pleased with the performance of any drive.

Managing Your Megabytes

What's more, you can make any drive more efficient by taking advantage of the Mac's ability to organize files and programs

(continues)



Understanding Interleave

On a disk with a 1:1 interleave, the sectors are numbered and accessed in sequence. With a 2:1 ratio, the heads read from, or write to, every other sector. With a 3:1 ratio, every third sector is accessed.



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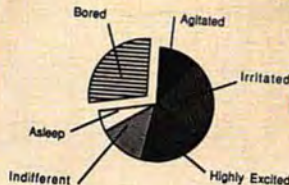
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A recent tracking study performed by Numerical Understanding Methods Bureau, Inc. has determined that constant and prolonged exposure to spreadsheet output may result in cases of extreme drowsiness and lethargy. Contributing factors have been numbers with no context, lack of graphic elements, and limited abilities in the treatment of text.



SPREADSHEET USAGE

User Category	WEST	SOUTHWEST	NORTH	EAST	SOUTHEAST	TOTAL
Records	21	30	93	65	32	249
Analysis	43	47	26	38	43	197
Budgeting	26	64	39	93	45	277
Cost Acctg	24	45	84	48	73	274
Scratch Paper	11	81	58	19	18	187
Tranquilizer	52	13	76	46	44	231
Fishwrap	24	53	73	63	92	305
To Impress Boss	14	41	83	27	38	203

ARE SPREADSHEETS EFFECTIVE?

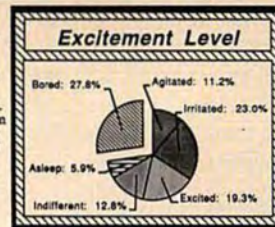


As seen in the Usage chart above, the NUMB study has demonstrated that people in fact use spreadsheets for a wide variety of purposes. As a general rule, excitement levels tend to increase in correlation with the more non-traditional uses.

A subset of the findings of the preliminary data from the largest universe of the NUMB research has shown that spreadsheets are used for a wide variety of purposes. As a general rule, excitement levels tend to increase in correlation with the more non-traditional uses.

How Spreadsheets Communicate #3 IN A SERIES

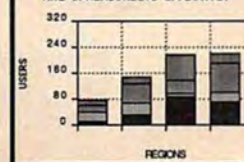
A recent tracking study performed by Numerical Understanding Methods Bureau, Inc. has determined that constant and prolonged exposure to spreadsheet output may result in cases of extreme drowsiness and lethargy. Contributing factors have been shown to be an emphasis on raw numbers with no context, lack of graphic elements, and limited abilities in the treatment of text, (and, in some instances, an over-reliance on dry language, like this).



SPREADSHEET USAGE

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ARE SPREADSHEETS EFFECTIVE?



As seen in the Usage chart above, the NUMB study has demonstrated that people in fact use spreadsheets for a wide variety of purposes. As a general rule, excitement levels tend to increase in correlation with the more non-traditional uses. A subset of the findings of the preliminary data from the largest universe of the NUMB research has shown that spreadsheets vary greatly in effectiveness (see graph at left). Why this may be is outside the purview of this fictitious research; however, a tracking study conducted by the Sorbonne N-Enterprises Research and that (see page 27)

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Line, Rectangle, Oval Drawing Environment	Yes	No
"C"-like procedural macro language	Yes	No

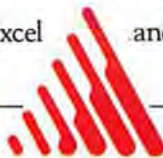
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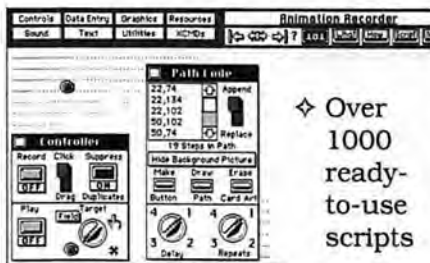
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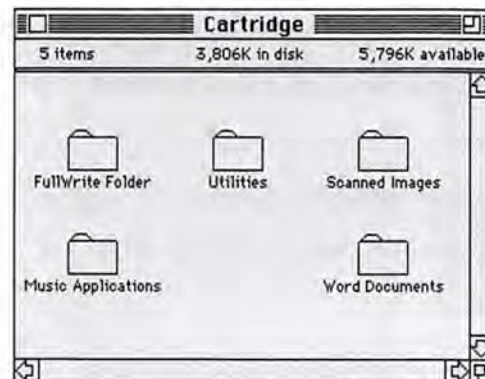
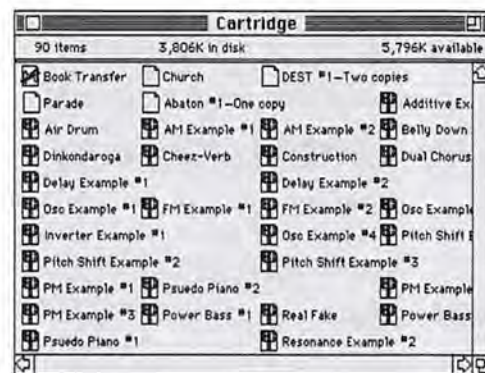
within folders. A hard disk lets you create a storage hierarchy similar to that of a file cabinet—the disk is at the top level of the hierarchy, with folders nested within it.

Beneath the Mac's friendly folder metaphor lie some technicalities that influence performance. When you open a disk's icon by double-clicking on it in the Finder, the Mac scans the disk in order to display its contents. The more files you store at the top level of the disk's hierarchy—that is, not within folders—the longer it takes for the Finder to display the disk's window. This also applies when you choose an application's Open command: to display a list of available files, the Mac must scan all the files in the current level of the disk's hierarchy. The more files present there, the longer the scanning process takes.

The Mac ignores files stored in a folder until you open the folder. So, by grouping documents and applications into folders, you boost the Mac's performance by reducing the number of files it has to scan at once. And there's the convenience factor: instead of having to electronically paw through dozens of word processor files, for example, you can go directly to the proposals folder, the memos folder, or the seedy novel folder, and quickly locate the file you need (see "Storing in Folders").

Another way to streamline storage involves using *partitioning* software, which electronically divides a drive into a number of smaller *logical volumes*. You can mount and unmount these volumes as though you were inserting and ejecting separate disks. Many hard disks include partitioning software, most of which lets you assign passwords to partitions, giving you a secure place to hide sensitive files.

To keep a drive running at top performance, keep *fragmentation* in check. In its zeal to reuse space freed by deleted files, the Mac may scatter newly saved or copied files across noncontiguous tracks. The longer you use a disk, the more likely it is to contain many fragmented files. Because the drive's heads must then spend so much time tracking down all the pieces, performance suffers. Two solutions exist: back up the entire disk, reformat it, and then recopy the files, starting with the System Folder and the applications you use most often. Or, run a defragmentation utility, such as DiskExpress or the Symantec Utilities for Macintosh, which moves files around to make them contiguous. With the



Storing in Folders

The Mac uses mass-storage devices more efficiently when you group files into folders by category. Sloppy disk organization (top) leads to delays when you open the disk icon in the Finder or choose an application's Open command. By minimizing the number of files the Mac has to scan at once, folders simplify file location.

latter route, back up the drive first; the disk's contents can be damaged if something goes wrong—such as a power failure or a system crash—during defragmentation.

Speaking of backing up, *do it*. Electrocuting aside, loss of data is the most painful experience a computer peripheral can cause. It's an agony you can avoid by backing up faithfully.

But don't let me scare you. Hard disks and removable drives are reliable, and as programs grow larger, they're becoming indispensable. How indispensable? Last month I said that a scanner was one of the last peripherals you should consider. Let's just say a mass-storage device is at the other end of the must-buy spectrum. □

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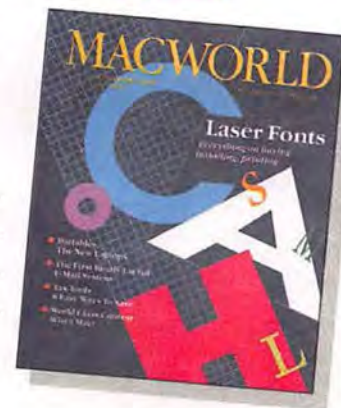
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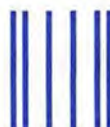
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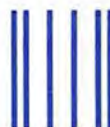
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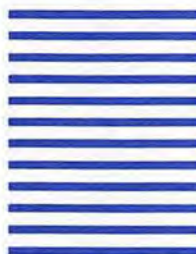
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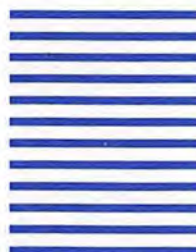
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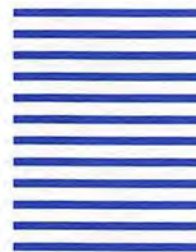
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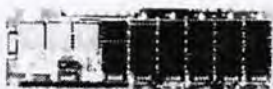
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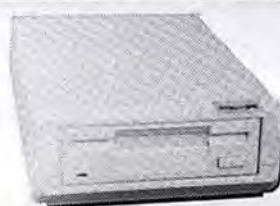
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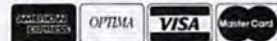
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Updates

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.

Anatool version 3.0 targets users in multiple-analyst environment. MIX utility lets you create and maintain a master data dictionary, enabling you to incorporate information from several documents into a single master dictionary. You define title and author for documents. Optional footer provides date-and-time stamping, and imports a company logo. Export file of mini-specifications has been added. Export file matches import format of MacDesigner. Advanced Logical Software, 9903 Santa Monica Blvd., #108, Beverly Hills, CA 90212; 213/653-5786. \$35; \$925 new.

AutoCalc version 2.0 allows quotations to be saved to disk and to a client file, with the number of quotes that can be saved limited only by disk space. Choices, Lynnfield Woods Office Park, 200 Broadway, #203, Lynnfield, MA 01940; 617/592-0700. \$95; \$495 new.

Back to Basics: Professional version 2.0 adds Invoicing module to this simplified accounting software. Designed for business users with minimal accounting background. Documentation rewritten with the needs of small service-oriented businesses and home offices in mind. Includes four modules: General Ledger, Accounts Payable, Accounts Receivable, and

Invoicing. Peachtree Software, 4355 Shackleford Rd., Norcross, GA 30093; 414/564-5700. \$75; \$199 new.

CompuServe Navigator version 2.1 includes Quick Quote and Market Snapshot features that let you check your financial portfolio. Scripting has been improved so you can customize automatic sessions and control the automatic log on process. Other features include capacity for different font sizes during sessions and automatic shutdown for unattended sessions. Releases more CPU time to other tasks without decreasing performance for concurrent applications. CompuServe, 5000 Arlington Center Blvd., P.O. Box 20212, Columbus, OH 43220; 800/848-8199. \$5 plus s/h; \$2.50 plus s/h for documentation supplement only; \$79.95 off the shelf; \$59.95 for CompuServe subscribers who order it online.

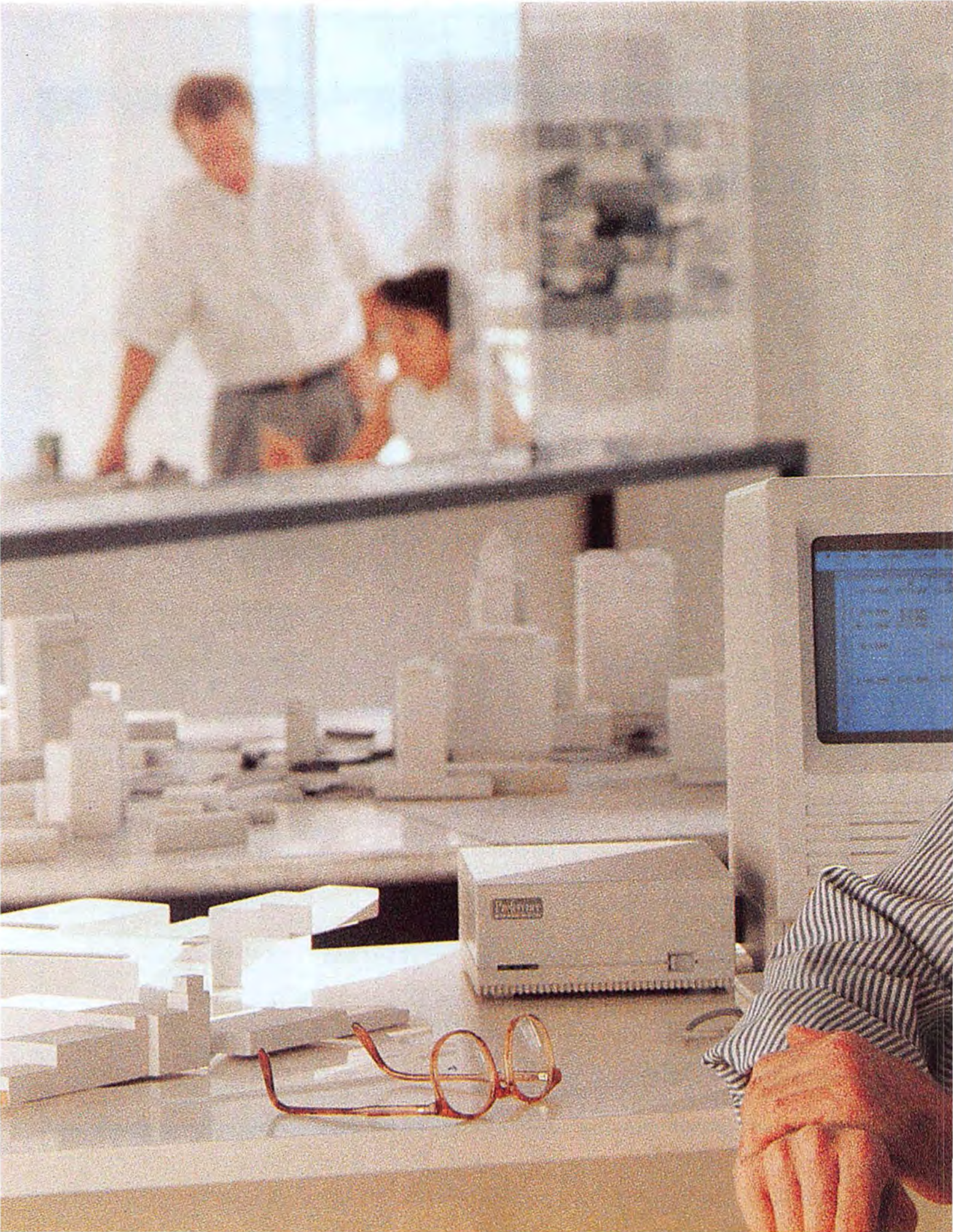
Design Dimensions version 2.0 adds a dialog box that lets you set rotational points, flip x,y,z coordinates, and assign cost values to material elements within a group. Renders objects with mirror, glass, and illuminated surfaces. Offers random breakup of solid surfaces so you can see through them. Smooths surfaces of coarse objects. Outputs wire frames instead of surfaces. Visual Information, Inc., 16309 Doublegrov, La Puente, CA 91744; 818/918-8834. \$50 if purchased before March 1, 1988, otherwise free; \$1595 new.

DeskPaint version 2.0 traces bit-mapped images to PICT objects using Auto Trace facility. Also adds features such as Air Brush, Charcoal, Duplicate, and Distort. One- and two-point perspective, Cropping, Transparent and Inverse Paint, and Halftoning effects also featured in this version. Selections can be scaled from 1 percent to 3999 percent. Has utility to convert Mac TIFF files to IBM PC TIFF and vice versa. Comes bundled with DeskDraw. Zedcor, 4500 E. Speedway, #22, Tucson, AZ 85712-5305; 602/881-8101, 800/482-4567. Free; \$129.95 new.

1st Aid Kit version 2.5 adds Quick Cure feature for quick recovery. Disk-scanning technique permits nearly instant access to files on a damaged disk. Cuts time required to diagnose damage to a large hard disk from hours to minutes. Increased speed without advanced installation or preparation. 1st Aid Development Inc., 42 Radnor Rd., Boston, MA 02135; 617/783-7118. \$99.95 new.

HyperLibrary version 2.0 includes date-and-time stamping for online note cards, expanded help feature, online description of HyperCard's search commands, modified HyperCard properties, revised documentation, Quick Directory, embedded ⌘-key functions, and compatibility with HyperCard version 1.2. Friedman Computing & Publishing, 2347 Pine Terr., Sarasota, FL 34231; 813/924-3238. Free with return of original disks and \$1.50 s/h; \$15 new.

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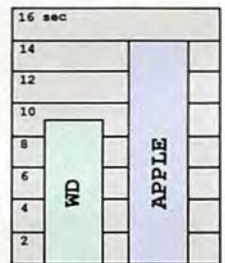
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Language Systems FORTRAN

Compiler version 1.1 runs up to 80 percent faster than the original version. This upgrade also adds Cycle and Leave while in DO loops; Union and Map, which together allow you to set up an area in memory that can be looked at in various ways, such as a Quick-Draw or Rect; and Jsizeof, which lets you determine how much memory a record occupies. Language Systems News Corporation, 441 Carlisle Dr., Herndon, VA 22070; 703/478-0181. Free; \$345 new.

MacLine version 3.0 lets you run file transfers in the background in MultiFinder. It's fully compatible with the Mac II and SE. Seven new commands have been added such as Go To for branching, Accept for user input, and Display to show script progress. Technical and user documentation have been revamped. Touchstone Software Corp., 909 Electric Ave., #207, Seal Branch, CA 90740; 213/598-7746. \$25; \$149 new.

Mac n' Med II enables user to enter patient information (including insurance and financial) and post charges and payments on an open-item basis. Uses HCFA 1500 form to print insurance claims according to Medicare and Blue Cross requirements. Features automatic first and second insurance billing, default fee schedule, automatic default payments, custom CPT code tracking, and financial analysis. Somerville Associates, 31 Gooden Ave., Dover, DE 19901; 302/678-2131. Free; \$599.95 new.

MindWrite version 2.0 includes integration of Spellswell spelling checker and proofreader. Reads and writes Microsoft Word, MacWrite, ThinkTank outlines, and text only documents directly. Has faster pagination and search and replace. Allows you to select text and navigate an outline with arrow keys, and has additional ⌘-key equivalents. User defined labels and color support. Access Technology, Inc., 200 Heritage Harbor, Ste. G, Monterey, CA 93940-2434; 408/648-4000 or 800/367-4334. \$35 plus s/h if purchased before May 1, 1988; free thereafter; \$195 new.

Modern Artist version 2.0 has an antialiasing tool to give more direct support for video applications. Smooths jagged edges on text to reduce jaggies on video. ColorSep feature allows you to produce prepress proofs from any image, using a LaserWriter or Linotronic. A Stain All But feature has been included in the Stain tool to let you selectively stain areas of an image. Computer Friends, Inc., 14250 N.W. Science Park Dr., Portland, OR 97229; 503/626-2291. \$150; \$495 new.


Pyro version 3.0 is now being sold separately from Suitcase and PowerStation. Will not interfere with other functions the Mac is performing, such as printing or calculating. Contains a real-time clock that moves around the screen as an alternative to the fireworks display. Fifth Generation Systems, Inc., 11200 Industriplex Blvd., Baton Rouge, LA 70809; 504/291-7221. \$10; \$24.95 new.

LightspeedC version 3.0 includes the first Macintosh style source-level debugger available for C programming language on the Mac. Source view allows you to debug code directly in C. You can set break points and trace execution line by line or function by function. Data view is used to view or set the values of variables, arrays, and structures while the program is running. Support for TMON or Macsbug is provided for low-level debugging. Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014-2132; 408/253-9600. Free if purchased after January 31, 1988; \$69 if before; \$175 new.

Trapeze version 2.1 supports multiple fonts, sizes, and styles within a selected text block; adds a background calculation mode under MultiFinder; and has a tear-off Tool Palette. Access Technology, Inc., 200 Heritage Harbor, Ste. G, Monterey, CA 93940-2434; 408/648-4000, 800/367-4334. \$35; \$295 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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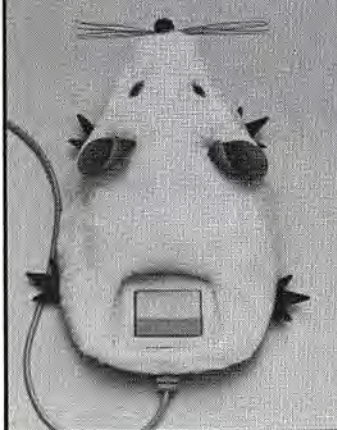
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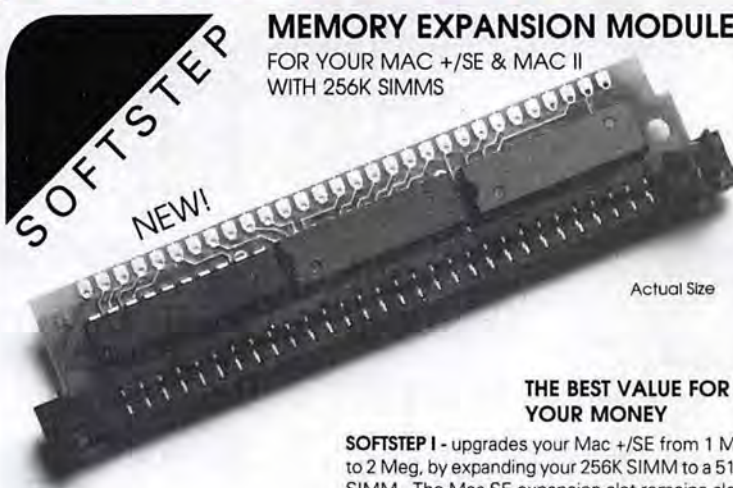
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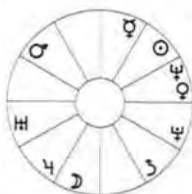
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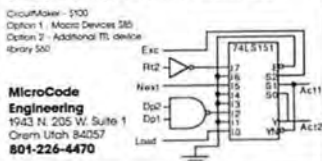
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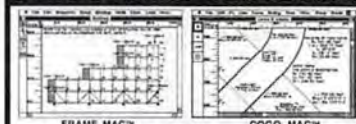
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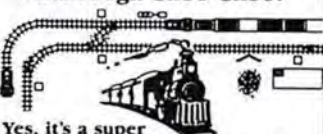
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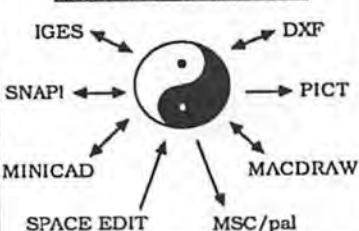
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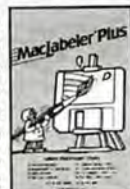
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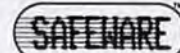
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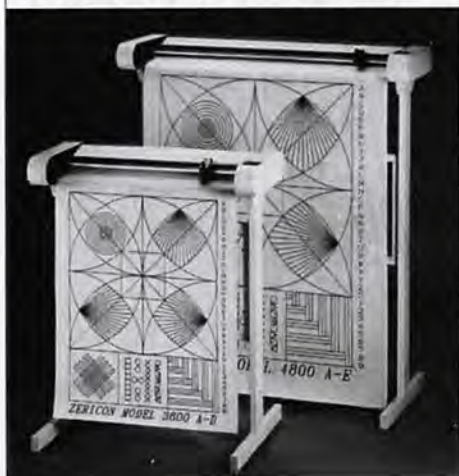
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Circle 267 on reader service card

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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.

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

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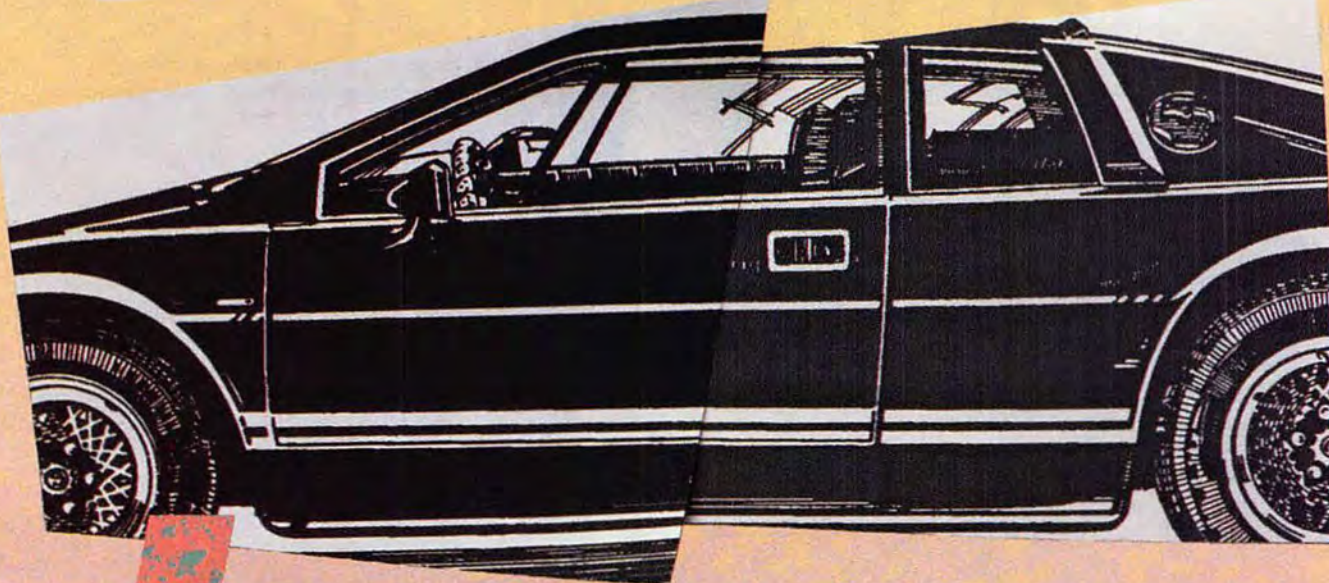
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Circle 351 on reader service card





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printer's new Canon® SX® print engine covers solid areas and prints fine detail better than previous-generation engines.

Fast start, strong finish You can adorn your documents with one or all of the 35 Adobe typefaces. Thanks to PostScript, there's an infinite number of font variations available. You can also make type as large or as small as you want. And put it anywhere on the page. In fact, with PostScript you enjoy total control over the design of your page. It gives you the complete desktop publishing power to do things that would otherwise be virtually impossible. So you get high-quality output exactly how you want it.

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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laser
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Circle 104 on reader service card

Where to Buy

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

- * **Acknowledge.** SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043; 415/964-8884.
- 751 **Acta.** Symmetry Corp., 761 E. University Dr., Ste. C, Mesa, AZ 85203; 602/844-2199, 800/624-2485.
- 752 **Apache Strike.** Silicon Beach Software, Inc., P.O. Box 261430, San Diego, CA 92126; 619/695-6956.
- 753 **Archicad.** Abvent, Inc., 23331 El Toro Rd., #209, El Toro, CA 92630; 714/380-0333.
- 754 **Arkanoid.** Discovery Software International, 163 Conduit St., Annapolis, MD 21401; 301/268-9877.
- 755 **Author/Editor.** SoftQuad, Inc., 720 Spadina Ave., #200, Toronto, Ontario, Canada M5S 2T9; 416/963-8337, 800/387-2777.
- 756 **AutoCAD Release 10.** Autodesk, Inc., 2320 Marinship Way, Sausalito, CA 94965; 415/331-0356.
- * **Autographix.** Autographix, 100 Fifth Ave., Waltham, MA 02154; 617/890-8558, 800/548-8558.

B

- 757 **Bede Tech Printer Silencer.** Bede Tech, 8327 Clinton Rd., Cleveland, OH 44144; 216/631-4214, 800/772-4536.
- * **Bernoulli Box.** Iomega Corp., 1821 W. 4000 S, Roy, UT 84067; 801/778-1000, 800/777-6654.
- 758 **Best Answer.** Heizer Software, 1941 Oak Park Blvd., #30, Pleasant Hill, CA 94523; 415/943-7667, 800/225-6755.
- 759 **Beyond Dark Castle.** Silicon Beach Software, Inc., P.O. Box 261430, San Diego, CA 92126; 619/695-6956.
- 760 **Beyond Zork.** Infocom, Inc., 125 CambridgePark Dr., Cambridge, MA 02140; 617/492-6000.

C

- 761 **CD-ROM.** Laser Optical Technology, 1803 Mission St., #403, Santa Cruz, CA 95060; 408/426-7171.
- 762 **Chuck Yeager's Advanced Flight Trainer.** Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404; 415/571-7171.
- 763 **Clip 3D Library.** Enabling Technologies, Inc., 600 S. Dearborn St., #1304, Chicago, IL 60605; 312/427-0386.
- 764 **The Colony.** Mindscape, Inc., 3444 Dundee Rd., Northbrook, IL 60062; 312/480-7667, 800/221-9884.
- 765 **Colorizer.** Palomar Software, Inc., P.O. Box 120, Oceanside, CA 92054; 619/721-7000.
- * **CompuGraph.** Klex Software, 25633 Branchaster, Farmington Hills, MI 48018; 313/477-6800.
- 766 **CompuServe Navigator.** CompuServe, Inc., 5000 Arlington Centre Blvd., Columbus, OH 43220; 614/457-0802, 800/848-8199.
- 767 **Computer Tool Kit.** Curtis Manufacturing Company, Inc., 30 Fitzgerald Dr., Jaffrey, NH 03452; 603/532-4123.
- 768 **Crystal Quest, Crystal Quest with CritterEditor.** Casady & Greene Inc., P.O. Box 223779, Carmel, CA 93922-3779; 408/624-8716.

D

- * **DataFrame XP60+B.** SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043; 415/964-8884.
- 769 **Data Pak.** Mass Micro Systems, Inc., 550 Del Rey Ave., Sunnyvale, CA 94068-3528; 408/522-1200, 800/522-7979.
- 770 **Dimensions.** Visual Information, Inc., 16309 Doublegrove St., La Puente, CA 91744; 818/918-8834.
- * **Dinosaur Bytes.** A.A.H. Computer Graphics Productions, P.O. Box 610667, San Jose, CA 95161; 408/980-7363.
- 771 **DiskFinder.** William & Macias, Inc., S. 3707 Godfrey Blvd., Spokane, WA 99204; 509/458-6312, 800/752-4400.
- * **DiskFit.** SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043; 415/964-8884.
- 772 **DiskQuick.** Ideaforms, P.O. Box 1540, Fairfield, IA 52556; 515/472-7256.
- 773 **Double Helix.** Odesta Corp., 4084 Commercial Ave., Northbrook, IL 60062; 312/498-5615.
- * **DynaPerspective.** Dynaware, 1163 Chess Dr., Ste. J, Foster City, CA 94404; 415/349-5700.

E

- 774 **Easy3D.** Enabling Technologies, Inc., 600 S. Dearborn St., #1304, Chicago, IL 60605; 312/427-0386.
- 775 **EMAC 20DL.** Everex, 48431 Milmont Dr., Fremont, CA 94538; 415/498-1111, 800/821-0806.

Where to Buy

Reader
Service

F

- 776 **Falcon.** Spectrum HoloByte, 2061 Challenger Dr., Alameda, CA 94501; 415/522-3584.
- 777 **FastBack for the Macintosh.** Fifth Generation Systems, Inc., 11200 Industriplex Blvd., Baton Rouge, LA 70809; 504/291-7221, 800/225-2775.
- 778 **FilmPrinter.** Mirus Corp., 445 S. San Antonio Rd., Los Altos, CA 94022; 415/949-5544.
- 779 **1stAid Kit.** 1stAid Software, 42 Radnor Rd., Boston, MA 02135; 617/783-7118, 800/843-3497.
- 780 **Fontastic Plus.** Altsys Corp., 720 Ave. F, #109, Plano, TX 75074; 214/424-4888.
- 781 **Full Impact.** Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502-1319; 213/329-8000.

G

- 782 **Gourmet Cheese Mouse Pad.** H&H Enterprises, 4069 Renate Dr., Las Vegas, NV 89103; 702/876-6292.
- 783 **Grappler LQ.** Orange Micro, Inc., 1400 N. Lakeview Ave., Anaheim, CA 92807; 714/779-2772, 800/223-8029.

H

- 784 **Hard Disk 20SC.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014; 408/996-1010.
- 785 **Hard 20 Plus.** Relax Technology, 3101 Whipple Rd., #22, Union City, CA 94587; 415/471-6112, 800/848-1313.
- 786 **HFS Navigator.** Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014; 408/253-9600.
- 787 **Hints and Answers to The Fools Errand.** Miles Computing, Inc., 7741 Alabama Ave., #2, Canoga Park, CA 91304; 818/341-1411.
- 788 **HyperDrive FX/20.** GCC Technology, 580 Winter St., Waltham, MA 02154; 617/890-0880, 800/634-9737.
- 789 **HyperTools #1 and HyperTools #2.** Softworks, Inc., P.O. Box 2285, Huntington, CT 06484; 203/926-1116.

I

- * **ImageWriter II Rainbow Ribbon.** I/O Design, Inc., P.O. Box 156, Exton, PA 19341; 800/241-2122.
- 790 **In-CAD.** Infinite Graphics, 4611 E. Lake St., Minneapolis, MN 55406; 612/721-6283.
- 791 **Insight Expert Inventory and Insight Expert Time Billing.** Layered, Inc., 529 Main St., Boston MA 02129; 617/242-7700.
- 792 **Inspiration.** Ceres Software, Inc., 9498 S.W. Barbur Blvd., #103, Portland, OR 97219; 503/245-9011.
- 793 **inTalk.** Palantir Software, 12777 Jones Rd., #100, Houston, TX 77070; 713/955-8880, 800/368-3797.

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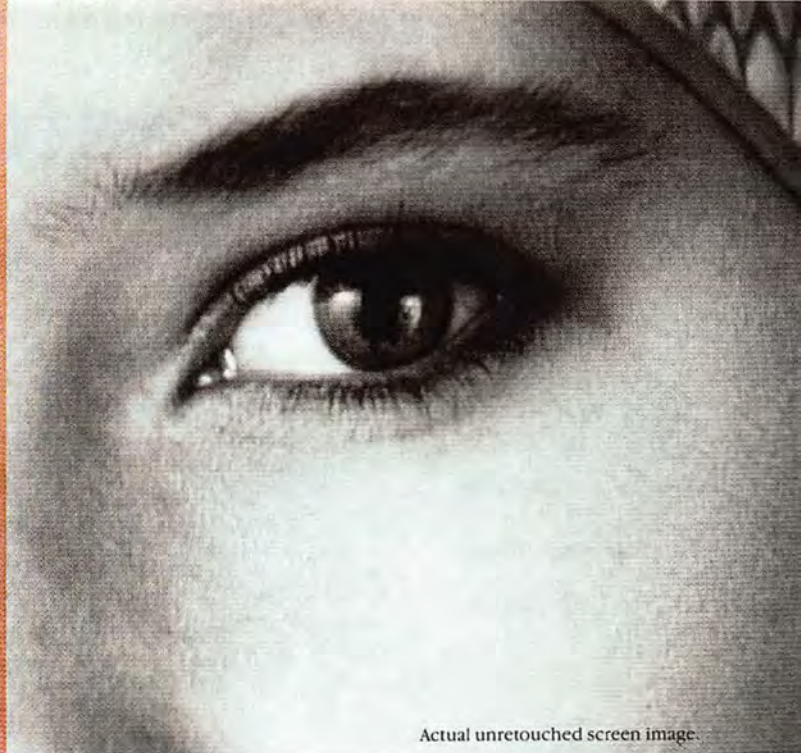

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- HyperCard Software
- Diskettes-Box of 10
- Computer Paper-Pkg of 500
- Dust Cover for Macintosh SE
- Dust Cover for ImageWriter II
- Mouse Pad

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Sony CDP1303 RGB	\$ 675
E-Machines T16	\$2779
E-Machines C20	\$4295
Monitorm Viking 2400	\$1999

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(prices include required cable)

Apple ImageWriter II	\$ 499
Image II Sheetfeeder	\$ 189
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Image LQ Sheetfeeder	\$ 239
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Parallon PhoneNet	\$ 49



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Apple

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2400SA Modem (2400 Baud)	\$189
2400SA with Cable & Microphone	
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Data Desk 101 Keyboard-Plus w/Masterkeys Software	\$159
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Kensington Turbo Mouse-Plus	\$109
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MCS A+ Mouse ADB	\$ 85
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- Dust Cover for Extended Keyboard
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- Apple High-Res RGB Monitor
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- Mouse Pad
- Dust Cover for Computer & Keyboard
- Dust Cover for ImageWriter II
- Diskettes - Box of 10

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- 2 Megabyte Upgrade (Mac SE or Plus) \$ 849
- 4 Megabyte Upgrade (Mac SE, Plus or Mac II) \$1698
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- MacSnap 524S (Mac 512E) \$429
- MacSnap 548 (Mac 512) \$629
- MacSnap 548E (Mac 512E) \$619
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- SE Accelerator \$585

Diskettes & Storage

- Sony 3.5" DSDD \$18
- Sony 3.5" 1.44 \$49
- Kalmar Teak Case 45 \$15
- Kalmar Teak Case 90 \$22

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- Apple 3.5 Disk Drive \$349
- Central Point 3.5 Disk Drive \$195
- Cutting Edge 800K Disk Drive \$185
- Wedge XL30 \$629
- Wedge XL45 \$829



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- EMAC 20D (38ms) \$ 529
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- EMAC 40 Impact (28ms) \$ 835
- EMAC 40+ Impact (19/12ms) \$ 859
- EMAC 60 Impact (29ms) \$ 995
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- EMAC 60 TL 60 Meg Tape \$ 899

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- EMAC 40iD (28ms) \$ 799
- EMAC 60iD (29 ms) \$ 999
- EMAC 80iD (19/12ms) \$1499

CMS Enhancements

- Compact SC30 (38ms) \$629
- Compact SC45 (29ms) \$789
- MacStack 20 SD20 (65ms) \$549
- MacStack 30 SD30 (38ms) \$599
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- Internal SE PRO-30 (38ms) \$599
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- 796 **MacAmber Screen Enhancer.** Sideways Solutions, 1516 Oak St., #309, Alameda, CA 94501; 415/865-5357.
797 **MacArchitron.** Gimeor, Inc., 1815 H St. NW, Washington, DC 20006; 202/223-4373.
* **MacBottom HD21.** Personal Computer Peripherals Corp., 4710 Eisenhower Blvd., Bldg. A4, Tampa, FL 33634; 813/884-3092, 800/622-2888.
798 **MacCarols.** Park Row Software, 4640 Jewell St., #101, San Diego, CA 92109; 619/581-6778.
799 **MacAccessories Tilt/Swivel.** Kensington Microware, 251 Park Ave. S, New York, NY 10010; 212/475-5200, 800/535-4242.
* **Mac Chimney.** BMUG, 1442A Walnut St., Berkeley, CA 94709; 415/849-9114.
800 **MacCrate 20.** Crate Technology, 6850 Vineland, Bldg. M, North Hollywood, CA 91605; 818/766-4001.
801 **MacGolf Classic.** PCAL, 1304 Jefferson Hwy., Champlin, MN 55316; 612/427-4789.
802 **MacInvoice.** Synex, 692 Tenth St., Brooklyn, NY 11215; 718/499-6293, 800/447-9639.
* **Mac/LFR.** Lasergraphics, 17671 Cowan Ave., Irvine, CA 92714; 714/660-9497.
803 **MacPerspective.** B. Knick Drafting, Inc., 1275 S. Patrick Dr., Ste. P, Satellite Beach, FL 32937; 407/777-0275.
804 **Mac-Screen Overhead.** Ask LCD, Inc., 5 Dunwoody Park, #116, Atlanta, GA 30338; 404/399-5208, 800/255-1379.
805 **MacSpeaker.** Infotek, Inc., 56 Camille, East Patchogue, NY 11772; 516/289-9682.
* **MacSurf.** Chance & Company, Inc., 37 Pratt St., Essex, CT 06426; 203/767-2161.
806 **MacTell.** Baseline Inc., 838 Broadway, New York, NY 10003; 212/254-8235, 800/242-7546.
807 **Mac3D.** Challenger Software Corp., 18350 Kedzie Ave., Homewood, IL 60430; 312/957-3475.
808 **MagicDrive 20.** MacProducts USA, 8303 Mopac Expwy. N, #218, Austin, TX 78759-8369; 512/832-0335, 800/622-3475.
809 **Mathematica.** Wolfram Research, Inc., P.O. Box 6059, Champaign, IL 61821-9902; 217/398-0700, 800/441-6284.
* **MicahDrive XT20.** Micah Storage Systems, 60 N. College Ave., Ste. B, Newark, DE 19711; 302/731-0430, 800/782-0097.
810 **MicroPhone II.** Software Ventures Corp., 2907 Claremont Ave., #220, Berkeley, CA 94705; 415/644-3232.

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Where to Buy

Reader
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- * **Microsoft PowerPoint.** Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717; 206/882-8080, 800/426-9400.
- 811 **MiniCad.** Diehl Graphsoft, 8370 Court Ave., #202, Ellicott City, MD 21043; 301/461-9488.
- 812 **MiniMate 20.** Relax Technology, 3101 Whipple Rd., #22, Union City, CA 94587; 415/471-6112, 800/848-1313.
- 813 **ModelShop.** Paracomp, 123 Townsend St., #310, San Francisco, CA 94107; 415/543-3848.
- 814 **Montage FR1/ImageMaker Plus.** Presentation Technologies, 743 N. Pastoria Ave., Sunnyvale, CA 94086; 408/732-2828.
- 815 **Mouse Pad Imprinting.** Computer Expressions, 3833 Chestnut St., Philadelphia, PA 19104; 800/443-8278.
- 816 **My Personal Life History Disk.** StarCom Microsystems, Windsor Park E, 25 W, 1480 N, Orem, UT 84057; 801/225-1480.
- N**
- 817 **'Ncryptor.** Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301; 818/991-6540.
- O**
- 818 **Ogre.** Origin Systems, 136 Harvey Rd., Londonderry, NH 03053; 603/644-3360.
- 819 **On Cue.** ICOM Simulations, Inc., 648 S. Wheeling Rd., Wheeling, IL 60090; 312/520-4440.
- 820 **Orbital Mech.** Studio Zero, 6212 Samuel Blvd., #153, Dallas, TX 75228; 800/752-9222.
- P**
- 821 **PageMaker 3.0.** Aldus Corp., 411 First Ave. S, Seattle, WA 98104; 206/622-5500.
- 822 **PageTutor.** Personal Training Systems, P.O. Box 54240, San Jose, CA 95154; 408/559-8635.
- 823 **PCMacTerm.** Dynamic Microprocessor Associates, 60 E. 42nd St., #1100, New York, NY 10165; 212/687-7115.
- 824 **Pearl Lisp.** Coral Software Corp., 336 Windsor St., Cambridge, MA 02141; 617/547-2662, 800/521-1027.
- 825 **Pegasys Expert.** IGC Technology Corp., 305 Lennon Ln., Walnut Creek, CA 94598; 415/945-7300.
- 826 **Pegasys II.** IGC Technology Corp., 305 Lennon Ln., Walnut Creek, CA 94598; 415/945-7300.
- 827 **PhD.** Century Data, Inc., 1270 N. Kraemer Blvd., Anaheim, CA 92806; 714/632-7500.
- * **Photon 20.** Warp Nine Engineering, 2644 Patton Rd., Roseville, MN 55113; 612/633-3255.
- 828 **Pinball Construction Set.** Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404; 415/571-7171.
- * **Planit.** CompServeCo, 800 Freedom, Slidell, LA 70458; 504/649-0484, 800/272-5535.
- 829 **Police Quest.** Sierra Software, P.O. Box 485, Coarsegold, CA 93614; 209/683-4468.
- 830 **Practica Musica.** Ars Nova Software, Box 40629, Santa Barbara, CA 93140; 805/564-2518.

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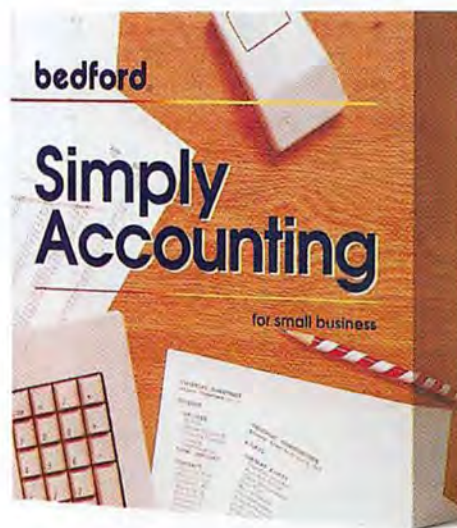
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- 831 **ProColor.** Matrix Instruments, Inc., 1 Ramland Rd., Orangeburg, NY 10962; 914/365-0190, 800/852-8533.
- 832 **Pro3D.** Enabling Technologies, Inc., 600 S. Dearborn St., #1304, Chicago, IL 60605; 312/427-0386.
- * **Puppy Love.** Addison-Wesley Publishing Co., Rte. 128, Reading, MA 01867; 617/944-3700.
- Q**
- 833 **QuickMail.** CE Software, Inc., 1854 Fuller Rd., West Des Moines, IA 50265; 515/224-1995.
- R**
- 834 **Reach for the Stars.** Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404; 415/571-7171.
- 835 **Red Ryder.** Freesoft Co., 150 Hickory Dr., Beaver Falls, PA 15010; 412/846-2700.
- 836 **RenderMan.** Pixar, 3240 Kerner Blvd., San Rafael, CA 94901; 415/258-8100.
- S**
- 837 **Sculpt-Animate 4D.** Byte by Byte Corp., 9442 Hwy. 360 N, #150, Austin, TX 78759; 512/343-4357.
- 838 **SD20.** CMS Enhancements, Inc., 1372 Valencia Ave., Tustin, CA 92680; 714/259-9555.
- 839 **SE Silencer.** Mobius Products, 6020 Adeline St., Oakland, CA 94608; 415/654-0556.
- * **Sea Life.** A.A.H. Computer Graphics Productions, P.O. Box 610667, San Jose, CA 95161; 408/980-7363.
- * **Sentinel.** SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043; 415/964-8884.
- 840 **Shufflepuck Cafe.** Brøderbund Software, Inc., 17 Paul Dr., San Rafael, CA 94903-2101; 415/492-3200.
- 841 **SmartCom II.** Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348; 404/441-1617.
- 842 **Smash Hit Racquetball II.** Primera Software, 650 Cragmont Ave., Berkeley, CA 94707; 415/525-3000.
- 843 **SpaceEdit.** Abvent, Inc., 23331 El Toro Rd., #209, El Toro, CA 92630; 714/380-0333.
- 844 **Sun Clock.** MLT Software, P.O. Box 98041, 6325 S.W. Capitol Hwy., Portland, OR 97201; 503/245-7093.
- 845 **Super Expert.** Softsync, Inc., 162 Madison Ave., New York, NY 10016; 212/685-2080.
- 846 **Super 3D.** Silicon Beach Software, Inc., P.O. Box 261430, San Diego, CA 92126; 619/695-6956.
- 847 **SupraDrive 20.** Supra Corp., 1133 Commercial Way, Albany, OR 97321; 503/967-9075.
- 848 **Swivel 3D.** Paracomp, 123 Townsend St., #310, San Francisco, CA 94107; 415/543-3848.

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- * **Technical Introduction to the Macintosh.** Addison-Wesley Publishing Co., Rte. 128, Reading, MA 01867; 617/944-3700.
- 849 **TellStar.** Spectrum HoloByte, 2061 Challenger Dr., Alameda, CA 94501; 415/522-3584.
- 850 **Tetris.** Spectrum HoloByte, 2061 Challenger Dr., Alameda, CA 94501; 415/522-3584.
- * **Think Fast.** BrainPower Inc., 24009 Ventura Blvd., Calabasas, CA 91302; 818/884-6911, 800/345-0519.
- 851 **3D Works.** MacroMind, Inc., 1028 W. Wolfram, Chicago, IL 60657; 312/871-0987.
- 852 **Totem II.** Bering Industries, 240 Hacienda Ave., Campbell, CA 95008; 408/379-4300, 800/237-4641.
- 853 **Trust & Betrayal: The Legacy of Siboot.** Mindscape, Inc., 3444 Dundee Rd., Northbrook, IL 60062; 312/480-7667, 800/221-9884.
- * **T-Shirt Factory.** I/O Design, Inc., P.O. Box 156, Exton, PA 19341; 800/241-2122.
- 854 **20 Plus.** Rodime Inc., 851 Broken Sound Pkwy., Boca Raton, FL 33431; 407/994-5585.
- Universal Copy Stand.** Kensington Microware, 251 Park Ave. S, New York, NY 10010; 212/475-5200, 800/535-4242.
- Verbatim Series Media.** Verbatim Corp., 1200 W.T. Harris Blvd., Charlotte, NC 28213; 800/538-1793.
- 857 **VersaCAD/Macintosh Edition.** VersaCAD Corp., 2124 Main St., Huntington Beach, CA 92648; 714/960-7720.
- 858 **VersaTerm-Pro.** Computers, Peripherals & Supplies, Inc., 2457 Perkiomen Ave., Reading, PA 19606; 215/779-0522.
- World Class Leader Board.** Access Software, 545 W. 500 S, #130, Bountiful, UT 84010; 801/298-9077.
- Zoom.** Abvent, Inc., 23331 El Toro Rd., #209, El Toro, CA 92630; 714/380-0333.

Public domain software and shareware are available through online information services; user groups (call 800/538-9696 ext. 500 for information on a local user group); or mail-order clearinghouses such as Budgetbytes (800/356-3551 for orders, 913/271-6022 in Kansas), Educomp (800/843-9497, 619/259-0255 in California), or the Public Domain Exchange (800/331-8125, 408/496-0624 in California).



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Macworld Best-Sellers

Months on chart	Last month	This month	
Business Software			
22	3	1	Microsoft Works <i>Microsoft</i>
43	1	2	Microsoft Word <i>Microsoft</i>
34	2	3	Microsoft Excel <i>Microsoft</i>
30	4	4	PageMaker <i>Aldus</i>
3	5	5	WordPerfect for the Macintosh <i>WordPerfect</i>
19	—	6	MacWrite <i>Claris</i>
3	6	7	Adobe Illustrator <i>Adobe Systems</i>
4	—	8	QuarkXpress <i>Quark</i>
20	7	9	SuperPaint <i>Silicon Beach Software</i>
33	—	10	MacDraw <i>Claris</i>

Education Software			
26	3	1	MathBlaster <i>Davidson & Associates</i>
10	1	2	Reader Rabbit <i>The Learning Company</i>
24	4	3	KidsTime <i>Great Wave Software</i>
23	2	4	Typing Tutor IV <i>Simon & Schuster Computer Software</i>
9	5	5	MacEdge II <i>Think Educational Software</i>

Entertainment Software			
6	4	1	Beyond Dark Castle <i>Silicon Beach Software</i>
26	1	2	MacGolf <i>PCAI</i>
8	2	3	Falcon <i>Spectrum Holobyte</i>
22	5	4	Dark Castle <i>Silicon Beach Software</i>
1	—	5	Crystal Quest <i>Casady & Greene, Inc.</i>

Networking/Data Communications			
22	1	1	TOPS <i>TOPS</i>
18	2	2	AppleShare <i>Apple Computer</i>
26	4	3	LocalTalk (formerly AppleTalk) <i>Apple Computer</i>
13	3	4	PhoneNet <i>Farallon Computing</i>
23	—	5	MacServe <i>Infosphere</i>

Months on chart	Last month	This month	
Hard Disks*			
2	1	1	MacStack SD 30 <i>CMS Enhancements</i>
1	—	2	EMAC 20 External <i>Everex</i>
10	—	3	FX20 General Computer
1	—	4	FX40 General Computer
13	1	5	Macintosh Internal 20SC <i>Apple Computer</i>

Add-in Boards			
13	1	1	Radius Accelerator <i>Radius</i>
13	4	2	Apple 2MB Memory Expansion Kit <i>Apple Computer</i>
13	5	3	Apple 1MB Memory Expansion Kit <i>Apple Computer</i>
7	2	4	Macintosh II Video Card <i>Apple Computer</i>
1	—	5	Radius Interface Display <i>Radius</i>

Product Watch

Editors' choice: other recent or forthcoming products of particular interest.

FileMaker 4.0 *Claris* database software

OmniPage *Caere* OCR software

QuickMail CE Software E-mail software

Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order suppliers. Covers sales during August 1988.

* Does not include hard disks installed at the factory.

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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!



T/Maker.

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



"This baby is loaded with extras..."

Kristi Coale,
MacUser magazine

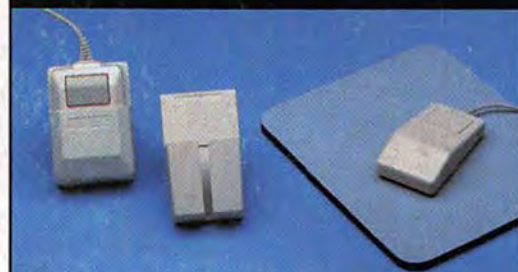
Master Piece® Mac II, \$159.95



System Saver® SE, \$79.95



Apple® Security System, \$49.95



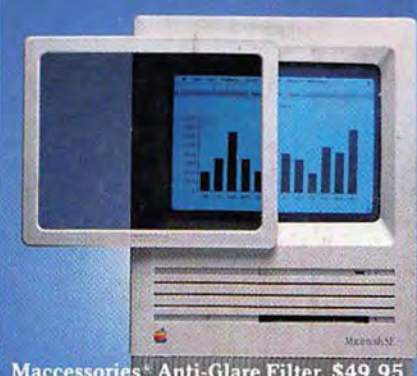
Mouseway, Mouse Pockets, \$9.95 ea.



Maccessories SuperBase™, \$49.95



Macintosh® II Stand and Cables, \$29.95 to \$49.95



Maccessories® Anti-Glare Filter, \$49.95



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Power Backer™ UPS's, \$399 to \$1,399

When Kristi Coale of MacUser magazine looked at our Master Piece® Mac II, she had expected it to have extra outlets, individual and master switches, surge suppression, and noise filtering. But she was impressed to find modem surge suppression and a swivel base, too. All for \$159.95.

And we were delighted with her comment, since that's exactly what we aim for when we design accessories for the Mac—to build in the most benefits at the best price possible.

That's how we came to feature a fan in our System Saver Mac. How we slipped an extra shelf under our SuperBase. And popped a paper catcher in behind our Printer Stand.

In fact, we've figured out so many ways to enhance and protect your Macintosh, we can't fit them all on one page.

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