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
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, spreadsheet, 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! As a great value, it includes an animated training program written in HyperCard format.

Microsoft Works 2.0 is one program that can handle a myriad of business needs. It's that simple.
Everything you see above was created using some combination of the five tools within Micros of Work 2.0: word processing, spreadsheet, database, drawing and communication. As you can see, the real power of Microsoft Works 20 comes into play when all the tools are used together.
On the Cover
This month's cover art was accomplished through the combined efforts of photographer Mark Jouban and Joe Sparks of Para-comp, who rendered the 3-D images of the table and lamp using Swivel 3D.

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Like an air bag, Guardian stays out of sight, loading automatically every time you turn on your Mac. It protects invisibly by updating a "map" of your hard disk data. So that, in a crash, your data is safe. Because Guardian uses the "map" to locate it easily.

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Other recovery programs work only after a crash without a current "map." That means they have trouble even finding your data. Much less recovering it.

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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 1593 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 half tones, 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 boldface 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 33 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 SlideMaker, 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 interactive 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 3 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 information, contact Apple Computer, 408-996-1010.

Color It Mac

Adobe is now shipping a hard disk containing the entire Adobe Type Library, which includes over 500 typefaces. The Adobe Font Folio is a 25MB, high-performance disk selling for $900 (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 415/361-4100.

MacMusic Fest 2.0

NeXT, Finally

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 213/563-0240.
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WriteMove Portable Printer

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The Abaton scanning duet, our Scan 300/S scanner and C-Scan Plus™ software, orchestrates your scan so every image is a command performance. Scan in true grayscale and your favorite desktop publishing software can edit and resize the scanned image without distortion. Now you can really take advantage of high resolution output devices.

Abaton's medley of software packages power the Scan 300/S. C-Scan Plus scans in multiple resolutions and gives you a full repertoire of painting and editing tools to dress up your halftone and line art scans.

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Most people wouldn't change a thing about their AppleTalk® network. Except to make it faster. Now you can do that — easily and inexpensively. With FlashBox.

Simply plug FlashBox into the back of any networked Macintosh. And in a flash, information will speed along your existing twisted-pair cabling (such as Apple's LocalTalk™ or regular telephone wire) at the FlashTalk™ speed of 770Kbps — up to three times the AppleTalk data rate.

What's more, FlashBox is only $189 per node, and can be installed on only those Macs you want. And because FlashBox can communicate at both FlashTalk and AppleTalk rates, it will automatically select the right speed to talk to any other Mac, PC, LaserWriter® or peripheral on your network.

In fact, you don't even need to be running TOPS— FlashBox can also quicken the pace of AppleShare®, InBox™ and multi-user applications. And networked PCs equipped with a FlashTalk compatible card (such as the TOPS FlashCard™) can talk with Macs at FlashTalk speed.

Only FlashBox can make AppleTalk faster without putting you through major changes.

So call your nearest TOPS dealer. Just dial 800-445-OPS (or 415-769-8700 from outside the U.S. and Canada). Or drop a card to TOPS, 950 Marina Village Parkway, Alameda, CA 94501.
Soar to New Highs, Effortlessly

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

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

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

MicroPhone II is so revolutionary that PC Magazine was moved to say: "MicroPhone II is arguably the best comm software ever written." We won't have it any other way. MicroPhone II. The freedom to be yourself. At the top.

Critics' Choice

Stewart Alsop, P.C. Letter:
"MicroPhone ... sets the standards that general-purpose communications software will have to follow."

The New York Times:
"MicroPhone is a breakthrough in communications software . . . "

Let's Get Technical

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

Now You See It, ...

Ordinarily, there's only so much I'm interested in knowing about a company's insides—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 corporate shakeups is like 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 straightforward 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. □
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.

Introducing Presentivity.

**Presentivity means presentations—Automatically!**

Everyone wants their software to be easy to use. Cricket Presents 2.0 goes one step beyond. Our new AutoPresents feature actually produces your presentation for you! Simply create an outline, select a frame style and AutoPresents does all the work. If you can use a keyboard, you can create professional-looking presentations fast!

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**But if you are an artist...**

...you'll really appreciate our wide variety of drawing tools and precision alignment and layout features. With Cricket Presents 2.0, you can create presentations comparable to those done on console-style computers costing hundreds of thousands of dollars.
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Tired of the frenzy associated with creating a presentation, the last minute changes and hefty rush charges? With Presentivity you can sleep easy. Cricket Presents 2.0 is so versatile, yet so easy to use, everyone involved with presentations can save significant time and money. And that means greater productivity and better profitability.

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

Chances are your bosses don't have a full appreciation of your Macintosh. It's powerful, nice to look at, and it's great with graphics—they'll grant you that much. But does it have a way with words?

Well now, thanks to WordPerfect for the Macintosh, you can finally put their minds at ease. It's a new, powerful, easy-to-use word processor from the world leader in word processing. A word processor designed specifically for the Mac.

So give your Mac the word processing power to be its best. For more information, write to WordPerfect Corporation, 1555 North Technology Way, Orem, Utah 84057. Or call (801) 225-5000.
(In Canada, call 1-800-267-2499.)

WordPerfect CORPORATION

Circle 126 on reader service card
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 phone number of MIT Software, maker of Sun Clock (New Products, September 1988), is 508/245-7093.


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 LaserFX (Postcraft, 818/718-1598), LetraStudio (Lettasets, 201/845-6100), LP Text (London Pride, 203/866-4806), and TypeStyler (Broderbund, 415/492-3200). You can put existing fonts into Fontographer (Alisys, ...)
FOUR INDIVIDUALS WERE GIVEN AN HOUR WITH THREE WENT BANANAS. ONE ATE THEM.

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.
How an architect, an MBA, and an art director developed instant talent in precision drawing. While Koko developed a mild stomach ache.

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Use Auto-Tracing to save countless hours by converting existing bit-mapped images - pictures like clip art or scanned graphics - into easily manipulated Canvas 2.0 objects.

Work across unlimited layers. View, print or save them in any combination. Draw in millions of colors, or with Postscript gray scales and patterns.

Experience heart-stopping accuracy (64,000 DPI) and fineness of line (1/1000"). Zoom around from 3% to 3200% of original size. Draw continuously up to 9 feet square. Import and export freely, using PICT, PICT2, TIFF, MacPaint or MacDraw " formats. Output to any Mac compatible printer, typesetter, or film printer you want.

Like we said: go bananas.

But do it soon. While we're still throwing in Canvas 2.0 DA for free. It's a special desk accessory version that puts some 80% of these features right under your Apple menu.

And if all this hasn't convinced you that Canvas 2.0 is the drawing program you've been waiting for, send us $9.95 to receive a fully featured Demo Copy. With which you can finish convincing yourself.

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

If scary old castles aren’t your taste, picture yourself strapped into an attack helicopter with a do-or-die mission behind enemy lines. Now you’re ready for Apache Strike. This arcade-style game pits you against defending tanks and helicopters as you fly your chopper through the urban canyons of enemy cities. You get help from L.I.N.D.A., the sweet-voiced onboard 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 scenes, more sounds finale combine to make to Dark Castle.

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

Silicon Beach Software, Inc.
P.O. Box 251430
San Diego, CA 92126
(619) 695-6956

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Games Division

Circle 268 on reader service card
It'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 is more or less the same words all the time. But then, sameness is not exactly a highly regarded concept amongst Macintosh users.
Thank goodness there's an alternative. A program designed to help you forge ahead into brave new worlds of verbal individuality. With Merriam-Webster at your side.

**Spelling Coach Professional** A program applauded regularly over the years, by reviewers and users alike. Many felt Coach's powerful and cleverly interwoven spell checking, dictionary definition and thesaurus functions were unbeatable. Hypertext taken to the final frontier.

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Welcome to Déjà Vu II, an exciting, state-of-the-art thriller in the fine tradition of the original. Play at your own risk!

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
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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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   Our other two monitors incorporate Ikegami display technology—highly regarded by leading video professionals worldwide.

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   Or, if you need a big, photoquality display but don’t need color, you’ll be very impressed with the **SuperMac 19" Gray Scale Monitor.**

2. **Choose a video card.**

   If the Apple 13" display is your choice, our **SuperMac ColorCard** has significant advantages over the Apple card. For starters, you get 8-bit video for up to 256 colors or gray shades, standard. For greatest reliability, the video RAM comes soldered to the board,

   not slipped in as an upgrade.

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

   If you ever want a bigger display you’ll want a **Spectrum card.**

   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.
about Mac II video:

And you get PixelPaint, free.

Our Spectrum/24, with 24 bits per pixel, provides the most realistic richest color display available. You see the results in the image shown on the SuperMac Trinitron 19" Color Monitor above. You can literally display as many colors as there are pixels on the screen, so that images have a photorealism that 256 colors just can't achieve.

Naturally, the Spectrum/24 is compatible with all standard Mac II software, driving any of the monitors shown above. And it includes PixelPaint.

3. Get PixelPaint. (It's free with SuperMac video cards.)

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PixelPaint is included, free of charge, with our video cards. That's value.

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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

Letters should be mailed to Letters, Macworld, 501 Second St., San Francisco, CA 94107, or sent electronically to CompuServe (70370,702) or MCI Mail (addressed to Macworld). Include a return address. Due to the high volume of mail received, we regret that we’re unable to respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of Macworld. □
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—Rick Coombs, Mac II Review

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Circle 145 on reader service card
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 (continue)
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Just point and click to compose and record drum and percussion tracks with all the beat, soul, snap, and sizzle of a pro. Choose from 35 available instruments—cymbals, congas, hi-hats and snares, handclaps, cabasas, timbales and toms, even a samba whistle. Each one has been digitally recorded to sound incredibly real.

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Six interactive software programs lead you from drill-and-practice, to melodic exercises, to designing your own sound waves. Customize any sessions; work only on the areas you choose. Use your computer’s 4-voice synthesizer or your MIDI keyboard.

The 120-page textbook gives you a comprehensive introduction to music theory. And the 55-page workbook tests your new knowledge with questions and exercises.

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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 Bandley 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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It just took HP to

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The HP ScanJet scanner puts you several steps ahead of other Macintosh-compatible scanners. Because our desk accessory approach lets you scan, edit and paint images all together on the screen, without having to jump from one application to another. HP's Desk Gallery software makes it all possible. So you can add the impact of photographs, illustrations and logos to your presentations, proposals, sales.
make it this easy.

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LASER QUALITY FOR UNDER $1000

Affordable Macintosh Publishing
In the past, Macintosh users had to choose between printers they could afford and output that looked good. Laser quality, previously out of reach, is now available to everyone regardless of his budget. The new DeskJet 300 DPI printer from Hewlett Packard provides the solution.

With a retail price of only $995, the DeskJet offers quality matching that of the Apple LaserWriter IISC, at a cost below that of the ImageWriter LQ. At only 14 lbs., the DeskJet easily follows you to where the work is. Additional features include easy front paper loading, affordable and convenient ink cartridges, and envelope printing. If you need top quality output for the home, school, or small business, the DeskJet delivers.

The DeskJet and the Grappler LS
Until recently, the only problem with the DeskJet was that it didn't work with the Mac. Now the Grappler LS printer interface provides a complete solution, allowing the DeskJet to print from the Macintosh at a professional 300 DPI. Now your letters, homework, proposals, and every document you produce can have that laser quality desktop publishing look.

<table>
<thead>
<tr>
<th>Quick Draw Printer</th>
<th>Resolution</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple LaserWriter IISC</td>
<td>300 DPI</td>
<td>$2,799</td>
</tr>
<tr>
<td>Apple ImageWriter LQ</td>
<td>216 DPI</td>
<td>$1,399</td>
</tr>
<tr>
<td>Hewlett Packard DeskJet</td>
<td>300 DPI</td>
<td>$995</td>
</tr>
<tr>
<td>Apple ImageWriter II</td>
<td>144 DPI</td>
<td>$599</td>
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</tbody>
</table>

The Grappler LS is the latest Macintosh interface solution from Orange Micro. The Grappler LS connects the HP DeskJet or any HP compatible serial laser printer to the Macintosh Plus, SE, or II and drives it at its full 300 DPI resolution. To achieve this, the Grappler uses a standard Apple printer driver and translates the output for your printer, allowing compatibility with hundreds of popular packages.

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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 nerd 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 actually 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...
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Global Manufacturing Company

Financial Report To Division Managers

The first quarter numbers are in...

<table>
<thead>
<tr>
<th></th>
<th>Three Months Ending</th>
<th>Six Months Ending</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>March 31, 1988</td>
<td>March 31, 1987</td>
</tr>
<tr>
<td><strong>SALES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S.</td>
<td>4,857,770</td>
<td>8,766,900</td>
</tr>
<tr>
<td>Europe</td>
<td>3,726,216</td>
<td>7,013,520</td>
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<tr>
<td>Asia</td>
<td>931,553</td>
<td>1,723,380</td>
</tr>
<tr>
<td>Net Sales</td>
<td>9,515,539</td>
<td>17,513,800</td>
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<tr>
<td><strong>OPERATING EXPENSES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of sales</td>
<td>2,081,761</td>
<td>3,823,584</td>
</tr>
<tr>
<td>Selling, general, and administrative expenses</td>
<td>764,439</td>
<td>971,806</td>
</tr>
<tr>
<td>Research and development</td>
<td>465,495</td>
<td>896,671</td>
</tr>
<tr>
<td>Income from operations</td>
<td>3,123,844</td>
<td>5,853,865</td>
</tr>
<tr>
<td>Equity in loss of K.C. operations</td>
<td>156,915</td>
<td>218,134</td>
</tr>
<tr>
<td>Interest income</td>
<td>73,473</td>
<td>108,177</td>
</tr>
<tr>
<td>Income before federal income taxes</td>
<td>3,084,402</td>
<td>5,743,902</td>
</tr>
<tr>
<td>Provision for federal income taxes</td>
<td>1,135,000</td>
<td>2,175,000</td>
</tr>
<tr>
<td><strong>Net Income</strong></td>
<td>1,949,402</td>
<td>3,560,902</td>
</tr>
<tr>
<td><strong>Net Income per share of common stock</strong></td>
<td>50.17</td>
<td>50.06</td>
</tr>
</tbody>
</table>

...and they look very good.

In the first quarter of 1988 each division took advantage of strong economic conditions in their respective territories to post sales figures well in excess of their goals. Rigorous cost cutting combined with the new distribution system have helped keep our operating expenses in line. Net income, however, increased 265% over the same period last year. There is every indication that these results will continue through the next quarter.

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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
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Byte Magazine Review, January, 1988

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Macintosh Buyer’s Guide Comparison Test, Fall 1988

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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 cracking 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 her salespeople persuading would-be buyers of $500 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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Designing a superior display for the Macintosh II system was smart. Offering it for $300 less, that's very smart.

MAGNAVOX
Smart. Very smart.
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 work 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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Manx Software Systems
Aztec C 75.
Aztec C+SDB 115.
Microsoft
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QuickBasic 69.
SmathersBarnes
Prototyper 74.
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Illustrator 88
A professional-level graphics program that contains unique and powerful drawing techniques — autotrace, airbrushing, shading, masking, blending, color separations, and printing. (desktop publishing) $319.

Wedge XL 45 Plus
Cutting Edge's 45MB compact wedge-shape 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 drive) $629.

HyperTools #1 & #2
(Software) — 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 software for data entry, visual presentation of data, and field formatting. Each includes 16 tools and the latest version of HyperCard. (hyperware) $65 each.

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.

Innovative Data
MacDraft 1.2a (power drafting) $155.

Micro CAD/CAM
MGMSation (professional CAD) Call.

FINANCIAL AND ACCOUNTING SOFTWARE
Aatrix
Payroll 3.01 ................................. 99.

Bedford
Simply Accounting ...................... 219.

Chang
Flags to Riches 3 Pak ........................ 289.

Intuit
Quickken ........................................ 35.

MECA
Managing Your Money ........................ 129.

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

Monogram
Business Sense ............................. 279.

Dollars & Sense .................. 81.

ShopKeeper Software
Bill II 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.


BrainPower
StatView 512+ (requires 512k) ........ 175.

D2 Software
MacSpin 2.60 ................................. 155.

Odesta
Data Desk Professional ............ 295.

Select Micro Systems, Inc.
Exstaxl ........................................ 219.

MUSIC AND SOUND
Code
MacDrums ................................... 35.

Electronic Arts
Deluxe Music Construction 2.0 .......................... 61.

Farallon Computing
MacRecorder (record sound) ........ 145.

Great Wave
ConcertW "- MIDI 4.0 .......................... 79.

Implus
Impulse Audio Digitizer w/SoundWave ........ 149.
### DATABASE SOFTWARE
- **Aegis**
- **Ashton-Tate**
- **Borland**
- **Claris**
- **Fox Software**
- **MacBase**
- **Odessa**
- **Park ROW Incorporated**
- **Software Discoveries**

### BUSINESS SOFTWARE
- **Ashton-Tate**
- **Bravo**
- **Break Through Productions**
- **Claris**
- **MacProject II**

### WORD PROCESSORS AND OUTLINERS
- **Aegis**
- **Ashton-Tate**
- **Claris**
- **Microsoft**
- **WriTeNow 2.0 (word processor)**
- **WordPerfect**

### SPELLING CHECKERS
- **Aegis**
- **Ashton-Tate**
- **Claris**
- **Deneba**
- **Dream Maker**
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### GRAPHICS
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**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 power of the Mac for fun entertainment, education, and desktop presentations (Hyperware) $85.

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**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 mail merge. (Word processor) $109.

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**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.
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MacCourses ........................................... 32.
Simon & Schuster
Typing Tutor IV .................................... 35.

GAMES

On Cue (Icon 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. Let you work smoothly, quickly, and efficiently. (Utilities) $36.

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CMS TapeStack 60 Meg ......................... Call.
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MacStack 60 Meg ............................... 849.

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Disk Drive Interface Port .... Call.
MacSnap SCSI Interface Port ............... 129.
MacSnap 524 (512K to 1 meg) ........... 299.

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Wedge XL 30 Plus ............................ 829.
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Dayna Communications
DaynaFile single 360K (2 1/4") ......... 592.
Dove
MacSnap 2SE ........................................ 455.
MacSnap SCSI Interface Port ............... 129.
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TOPS 2.0
This versatile server software networked computers with different operating systems, and you can access it any time, from any application. Supports Macintosh, MS-DOS compatible and UNIX networks. (networking) $159.

EMAC 20D
From 895.00 - 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.

Centronics Software, Inc.
BlackJack Ace ................................. 27.
Crapsmaster or Roulette ................... 27.

Epyx
Sub Battle Simulator ......................... 24.

GREEN
Crystal Quest II ................................. 27.

Infocom
Leather Goddess of Phobos ............... 24.

Micro Sports
MSFL Pro League Football ............... 24.

Mindscapes
Balance of Power, Deja Vu ............... ea 30.

PBI
Strategic Conquest Plus .................... 46.

PCAI
Road Racer ........................................ Call.
Practical Computer
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Calculus ........................................ 60.
Davidson
Math Blaster ................................. 27.
Speed Reader II ......................... 39.

Great Wave
Kids Time ........................................ 26.
Learning Company
Reader Rabbit ................................. 33.

Mindscapes
Perfect Score S.A.T. ......................... 46.
Palantir
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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 Cowl" award. QuickKeys is right up there with sliced bread, the Great Pyramids of Cheops, and other wonders— Byte Magazine. (Utilities) $54.

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.

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WISI (With SCSI interface) .................................. 269.
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PL 30 Meg Turbo Drive ...................................... 819.
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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 PageTutor 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).

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 ⌘-1). 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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system all in one.

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for durability, Bernoulli Disk Cartridges
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built to survive the trip across town, or
across the world. Add to that the physical
security Bernoulli provides. With Bernoulli
removable Disk Cartridges, you can lock
your data in a safe or desk drawer, or take
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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 ⌘ keys while clicking the mouse to toggle between the Fit In Window and Actual Size views. Press the Shift, Option, and ⌘ 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—1/10 of an em space—place the cursor in the space, hold down the ⌘ key, and backspace to shorten the space. Hold down the ⌘ 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 Fantastic 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.

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 1 corresponds to the dialog box shown.

Spacing attributes

<table>
<thead>
<tr>
<th>Word space:</th>
<th>Letter space:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>Minimum</td>
</tr>
<tr>
<td>Desired</td>
<td>Desired</td>
</tr>
<tr>
<td>Maximum</td>
<td>Maximum</td>
</tr>
</tbody>
</table>

Hyphenation zone: 3 picas
Leading method: Proportional

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
"Can you believe it? Our team got picked for the hottest project of the year because they found out we do all our work on Sony diskettes."

The fast-moving, fast-thinking people in today's competitive corporate world are the people pushing for the highest standards. For example, Sony diskettes.

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Circle 388 on reader service card

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- helps you quickly track down solutions to any problem
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Circle 60 on reader service card

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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Check enclosed D Visa D MasterCard D Am Ex

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

How To/Insights

You can temporarly 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 document. 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 3C 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.

Have Rule Will Travel
Helvetcia en dashes (in some point sizes) can be repeated to create a solid line above or below a subhead or text. Unlike rules made with the line tool, a line created (continues)
This moment of peace is brought to you by Jasmine.
The image contains a page from a catalog or directory listing various computer programs and peripherals. It includes sections on Printers & Digitizers, Modems, Accounting Packages, Networking Software & Hardware, WriteNow 2.0 by T/Maker, Communications Software, Utility Software, and DataDesk Professional by Odesta. Each section lists various products with descriptions and prices. For example, under Modems, there is information about the Promodem 2400 with mail merge and increased PSI Mustang Flight Simulator, and under Accounting Packages, there's a description of the PSI Mustang Flight Simulator and related software offerings. The page is likely part of a larger catalog aimed at computer and software enthusiasts or professionals. Additional content such as software or peripheral specifications, product availability, and specific features are also mentioned, though the text is too dense to transcribe fully. The content is structured to provide a comprehensive overview of the available products, helping potential buyers make informed decisions.
Game Software

Access World Class Leader Board Golf 34.
Acolade Hard Ball 23.
4th & Inches 24.
Amiga Bridge 2.0 22.
Avalon Hill Mac Pro Football 30.
Baudville Award Maker Plus 29.
Broderbund Ancient Art of War or Ancient Art of War at Sea 27.
ShufflePuck Cafe or Ultima III 24.
Paster Maker Plus 29.
Bulletin Software Ferrari Grand Prix 32.
PSI Mustang Flight Simulator Special 32.
Centron Blackjack Ace Special 28.
Crapsmaster or Roulette Master Special 28.
Electronic Arts Ogre 20.
Chuck Yeager Flight Simulator or The Uninvited 30.
Defender of the Crown, Colony or The Uninvited 30.
Broderbund Ancient Art of War MSFL Pro League Football 24.
Baudville Award Maker Plus 29.
It's a Touchdown! 27.
Spartan Games A Touchdown 27.

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Scan-It!!! O.C.R. requires a MacPlus (or later) with 1 megabyte of RAM.

Languages

Borland Turbo Pascal 65.
Turbo Pascal Tutor 56.
Compuware Mac 68000 Dev. System 59.
Maxx Alice C 49.
Arcx MPW C or SDB 105.

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Single Sided 3½" Diskettes
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Sony 3½ SS/DD Disks (box of 10) 13.
Double Sided 3½" Diskettes
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Table: Desk Accessory Programs

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affinity Microsystms</td>
<td>$89</td>
</tr>
<tr>
<td>Tempo II</td>
<td>$32</td>
</tr>
<tr>
<td>AffInFile</td>
<td>$46</td>
</tr>
<tr>
<td>Beyond Inc. Menu Fonts 2</td>
<td>$379</td>
</tr>
<tr>
<td>Borland SideKick V2.0</td>
<td>$59</td>
</tr>
<tr>
<td>CE Software DiskTop 3.0</td>
<td>$28</td>
</tr>
<tr>
<td>Enware Software Comment 2.0</td>
<td>$45</td>
</tr>
<tr>
<td>Electronic Arts Disk Tools Plus</td>
<td>$31</td>
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<tr>
<td>Exodis Software Retriever</td>
<td>$59</td>
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<tr>
<td>Greene, Inc. HyperDialer</td>
<td>$26</td>
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<tr>
<td>QuickDex 14A</td>
<td>$32</td>
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<tr>
<td>Imagine Software</td>
<td>$28</td>
</tr>
<tr>
<td>Multi-User Appointment Diary with Smart Alarms</td>
<td>$85</td>
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<tr>
<td>Mainstay Think's Time</td>
<td>$28</td>
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<tr>
<td>Solutions, International Super Goo</td>
<td>$52</td>
</tr>
<tr>
<td>SmartScrap &amp; The Clipper 2.0</td>
<td>$52</td>
</tr>
<tr>
<td>Symmetry HyperDA (Req. 512K)</td>
<td>$38</td>
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Table: MacMoney by Survivor Software

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Price</th>
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<tbody>
<tr>
<td>MacMoney</td>
<td>$62</td>
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Table: MacSnap Internal Memory Expansions by Dove Computer Corporation

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Price</th>
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<tbody>
<tr>
<td>MacSnap 2SE</td>
<td>$475</td>
</tr>
<tr>
<td>MacSnap 524E</td>
<td>$265</td>
</tr>
<tr>
<td>MacSnap 524S</td>
<td>$409</td>
</tr>
<tr>
<td>MacSnap 548E</td>
<td>$585</td>
</tr>
<tr>
<td>MacSnap 548S</td>
<td>$649</td>
</tr>
<tr>
<td>MacSnap Plus 2SE</td>
<td>$475</td>
</tr>
</tbody>
</table>

Table: Graphics Software

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>3D Graphics Images with Impact</td>
<td>$59</td>
</tr>
<tr>
<td>ABA Software Draw It Again Sam 2.0</td>
<td>$89</td>
</tr>
<tr>
<td>GraphPaint II</td>
<td>$295</td>
</tr>
<tr>
<td>Adobe Systems</td>
<td>$82</td>
</tr>
<tr>
<td>Adobe Illustrator</td>
<td>$59</td>
</tr>
<tr>
<td>Adobe Fonts (Various vols)</td>
<td>$379</td>
</tr>
<tr>
<td>Adobe Freehand</td>
<td>$25</td>
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<tr>
<td>Alhys Corp. FONThastic Plus 2.0</td>
<td>$59</td>
</tr>
<tr>
<td>Fontographer 2.2</td>
<td>$29</td>
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<tr>
<td>Ashton Tate Full Paint</td>
<td>$29</td>
</tr>
<tr>
<td>Broderbund Print Shop</td>
<td>$36</td>
</tr>
<tr>
<td>Cassadyware Painter Fonts 2.0 (2-Disk Set)</td>
<td>$26</td>
</tr>
<tr>
<td>Funtur Laser Fonts Vol. 1-22 (set)</td>
<td>$45</td>
</tr>
<tr>
<td>CE Software Calendar Maker 3.0</td>
<td>$25</td>
</tr>
<tr>
<td>Claris MacPaint 2.0</td>
<td>$119</td>
</tr>
<tr>
<td>MacDraw II 2.0</td>
<td>$300</td>
</tr>
<tr>
<td>Cricket Software Cricket Draw</td>
<td>$169</td>
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<tr>
<td>Cricket Paint</td>
<td>$129</td>
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<td>Cricket Graph</td>
<td>$119</td>
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<tr>
<td>Cricket Presents</td>
<td>$289</td>
</tr>
<tr>
<td>Deneba Software Canvas 2A 2.0</td>
<td>$25</td>
</tr>
<tr>
<td>Canvas 2.0 (Includes Desk Accessory)</td>
<td>$169</td>
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<tr>
<td>DreamMaker MacGallery</td>
<td>$29</td>
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<td>Hypercard (Hypercard)</td>
<td>$29</td>
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<tr>
<td>Clipsware</td>
<td>$97</td>
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<tr>
<td>Duh-B-Click Software</td>
<td>$279</td>
</tr>
<tr>
<td>World Class Fonts: Various Vol. 1-4 (64 K)</td>
<td>$45</td>
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<tr>
<td>WetPaint: Various Vol. 1-16 (64)</td>
<td>$45</td>
</tr>
<tr>
<td>Electronic Arts Studio 8 (Mac)</td>
<td>$309</td>
</tr>
<tr>
<td>Exanu-Hosigami USA</td>
<td>$23</td>
</tr>
<tr>
<td>MacCalligraphy 2.0</td>
<td>$109</td>
</tr>
<tr>
<td>Japanese Clip Art</td>
<td>$279</td>
</tr>
<tr>
<td>Foundation Publishing Comic People</td>
<td>$23</td>
</tr>
<tr>
<td>Comic Strip Factory</td>
<td>$45</td>
</tr>
<tr>
<td>Grassholt Mini Cad 4.0</td>
<td>$15</td>
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<tr>
<td>Innovative Design Dreams</td>
<td>$315</td>
</tr>
<tr>
<td>MacDraft 1.2B</td>
<td>$149</td>
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<tr>
<td>LaserWriter Laserpoint Color II</td>
<td>$359</td>
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<tr>
<td>Letraset ImageStudio 1.5</td>
<td>$279</td>
</tr>
<tr>
<td>Macromind VideoWorks II</td>
<td>$118</td>
</tr>
<tr>
<td>Videoworks II Accelerator</td>
<td>$125</td>
</tr>
<tr>
<td>Microdrive II Driver for Hypercard</td>
<td>$60</td>
</tr>
<tr>
<td>MicroBliss Photon Paint</td>
<td>$179</td>
</tr>
<tr>
<td>Micro CAD/CAM MGMStation</td>
<td>$685</td>
</tr>
<tr>
<td>Micro Maps</td>
<td>$45</td>
</tr>
<tr>
<td>MacAtlas Paint 2.0 (MacPaint Format)</td>
<td>$45</td>
</tr>
<tr>
<td>MacAtlas Hyper Atlas</td>
<td>$64</td>
</tr>
<tr>
<td>MacAtlas Professional (FICT) MacDraw Version</td>
<td>$129</td>
</tr>
<tr>
<td>Microsoft Microsoft PowerPoint 2.0</td>
<td>$249</td>
</tr>
<tr>
<td>Olduvai Software</td>
<td>$109</td>
</tr>
<tr>
<td>Post-ART II (4-Disk Set) or ArtFonts</td>
<td>$99</td>
</tr>
<tr>
<td>Silicon Beach Software</td>
<td>$109</td>
</tr>
<tr>
<td>SuperPaint 2.0</td>
<td>$109</td>
</tr>
<tr>
<td>Digital Darkroom</td>
<td>$159</td>
</tr>
<tr>
<td>Super 3D</td>
<td>$159</td>
</tr>
<tr>
<td>Super-3D Enhanced (Mac II)</td>
<td>$249</td>
</tr>
<tr>
<td>Solutions International</td>
<td>$79</td>
</tr>
<tr>
<td>The Creator (Catalog Your Art)</td>
<td>$249</td>
</tr>
<tr>
<td>Springboard Certificate Maker</td>
<td>$24</td>
</tr>
<tr>
<td>Works of Art Assortment</td>
<td>$24</td>
</tr>
<tr>
<td>Holiday, or Education</td>
<td>$32</td>
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<tr>
<td>Springboard Publisher</td>
<td>$199</td>
</tr>
<tr>
<td>SuperMac Software Pixel Paint</td>
<td>$209</td>
</tr>
<tr>
<td>SuperPaint 2.0 (16MB)</td>
<td>$109</td>
</tr>
<tr>
<td>Syntype 2.0 (16MB) (Excluding DSK)</td>
<td>$109</td>
</tr>
<tr>
<td>Zedcor Desk Paint 2.0</td>
<td>$69</td>
</tr>
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</table>

Table: Disk Drives/Hard Disks/Upgrades

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacSnap 548E (128K to 2MB)</td>
<td>$599</td>
</tr>
<tr>
<td>MacSnap 548E (32K to 2MB)</td>
<td>$385</td>
</tr>
<tr>
<td>MacSnap 548S</td>
<td>$699</td>
</tr>
<tr>
<td>MacSnap Plus 2SE (MacPlus to 2MB)</td>
<td>$599</td>
</tr>
<tr>
<td>MacSnap Plus 2SE (MacPlus to 2MB Non Expandable)</td>
<td>$649</td>
</tr>
<tr>
<td>MacSnap 2SE</td>
<td>$475</td>
</tr>
<tr>
<td>MacSnap 724E (1024 Option)</td>
<td>$129</td>
</tr>
<tr>
<td>MacSnap Toolkit (Upright, opened &amp; ground set)</td>
<td>$159</td>
</tr>
<tr>
<td>Everex Emeac 20D (20MB Hard Disk)</td>
<td>$520</td>
</tr>
<tr>
<td>Emac 20 Deluxe</td>
<td>$585</td>
</tr>
<tr>
<td>Personal Computer Peripherals</td>
<td>$939</td>
</tr>
<tr>
<td>Beige or Platinum Color Option</td>
<td>$475</td>
</tr>
</tbody>
</table>

Table: C-A-T by Chang Laboratories

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>C-A-T</td>
<td>$220</td>
</tr>
<tr>
<td>C-A-T lets you organize and keep track of the Contacts, Activities, and Time that are crucial to the effective operation of your business. C-A-T features data sharing within work groups, twelve-changeable sorting categories, versatile custom report formatting, and import/export capabilities for a wide array of Macintosh programs. To make managers even more effective C-A-T offers task tracking, auto phone dialing, and versatile data security settings, all without user programming. C-A-T eliminates clerical drudgery with mailmerge, labeling, and calendar functions just a few clicks of the mouse away.</td>
<td></td>
</tr>
</tbody>
</table>
**Educational/Creative Software**

<table>
<thead>
<tr>
<th>Software</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barren’s Barron’s SAT</td>
<td>35</td>
</tr>
<tr>
<td>Bible Research The Word (KJV or NIV)</td>
<td>165</td>
</tr>
<tr>
<td>Boggs Productions Studio Session</td>
<td>49</td>
</tr>
<tr>
<td>Super Studio Session</td>
<td>79</td>
</tr>
<tr>
<td>Bright Star Technology</td>
<td>32</td>
</tr>
<tr>
<td>Alphabet Rocks</td>
<td>30</td>
</tr>
<tr>
<td>Broderbund Jam Session</td>
<td>50</td>
</tr>
<tr>
<td>Sensei Geometry, Calculus or Physics</td>
<td>60</td>
</tr>
<tr>
<td>Type!</td>
<td>21</td>
</tr>
<tr>
<td>Where in the World is Carmen SanDiego?</td>
<td>25</td>
</tr>
<tr>
<td>Code Mac Drum</td>
<td>35</td>
</tr>
<tr>
<td>Davidson &amp; Associates Speak Reader II</td>
<td>29</td>
</tr>
<tr>
<td>Match Blaster or Word Attack!</td>
<td>27</td>
</tr>
<tr>
<td>Electronic Arts Mavis Beacon Typing</td>
<td>36</td>
</tr>
<tr>
<td>Venture’s Business Simulator</td>
<td>47</td>
</tr>
<tr>
<td>Deluxe Music Construction Set V2.0</td>
<td>61</td>
</tr>
<tr>
<td>1st Byte/Electronic Arts</td>
<td>61</td>
</tr>
<tr>
<td>Kid Talk, Speaker Bee</td>
<td>32</td>
</tr>
<tr>
<td>First Shapes, or Math Talk</td>
<td>26</td>
</tr>
<tr>
<td>Great Wave Software Kids Time</td>
<td>33</td>
</tr>
<tr>
<td>Learning Company</td>
<td>33</td>
</tr>
<tr>
<td>Reader Rabbit</td>
<td>33</td>
</tr>
<tr>
<td>Mindscape Perfect Score SAT w/ The Perfect College</td>
<td>46</td>
</tr>
<tr>
<td>Nordic</td>
<td>46</td>
</tr>
<tr>
<td>MacKids Educational Programs (each)</td>
<td>28</td>
</tr>
<tr>
<td>Simon &amp; Schuster</td>
<td>28</td>
</tr>
<tr>
<td>Typing Tutor IV</td>
<td>35</td>
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</table>

**DataBase Management**

<table>
<thead>
<tr>
<th>Software</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access 4th Dimension</td>
<td>329</td>
</tr>
<tr>
<td>4D RunTime</td>
<td>245</td>
</tr>
<tr>
<td>Apple Computer HyperCard</td>
<td>44</td>
</tr>
<tr>
<td>Ashton Teate iBASE Mac 1.0</td>
<td>295</td>
</tr>
<tr>
<td>Bhyle Software Omni 3 Plus/Express</td>
<td>275</td>
</tr>
<tr>
<td>Borland Reflex Plus</td>
<td>165</td>
</tr>
<tr>
<td>Claris FileMaker II</td>
<td>24</td>
</tr>
<tr>
<td>Duscof, Inc. Applications &amp; Routlines for 4th Dimension Vol. I</td>
<td>66</td>
</tr>
<tr>
<td>Fox Software Fox Base Plus</td>
<td>214</td>
</tr>
<tr>
<td>Fox Base Unlimited</td>
<td>259</td>
</tr>
<tr>
<td>Idealform Hyper Book Maker</td>
<td>31</td>
</tr>
<tr>
<td>MediaLab Geofocal Point II</td>
<td>95</td>
</tr>
</tbody>
</table>

**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!

**Business Software**

<table>
<thead>
<tr>
<th>Software</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Technology Mind Write 2.0</td>
<td>95</td>
</tr>
<tr>
<td>Mind Write Express</td>
<td>149</td>
</tr>
<tr>
<td>Allan Bennett Software</td>
<td>149</td>
</tr>
<tr>
<td>ExpressWriter 2.0</td>
<td>79</td>
</tr>
<tr>
<td>Aldus Corporation</td>
<td>159</td>
</tr>
<tr>
<td>PageMaker 3.0</td>
<td>475</td>
</tr>
<tr>
<td>Ashton Tate</td>
<td>129</td>
</tr>
<tr>
<td>FullWrite Professional</td>
<td>295</td>
</tr>
<tr>
<td>Claris MacWrite 5.0</td>
<td>349</td>
</tr>
<tr>
<td>HyperCard</td>
<td>185</td>
</tr>
<tr>
<td>LetterReady, Set! Gol 4.5</td>
<td>278</td>
</tr>
<tr>
<td>Letra Studio</td>
<td>369</td>
</tr>
<tr>
<td>LetraFonts (Various Vol. 1-13 ea.)</td>
<td>69</td>
</tr>
<tr>
<td>MailChimp</td>
<td>185</td>
</tr>
</tbody>
</table>

**Selling & Grammar Checkers**

<table>
<thead>
<tr>
<th>Software</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argus Development</td>
<td>42</td>
</tr>
<tr>
<td>A.L.P. Systems</td>
<td>42</td>
</tr>
<tr>
<td>MacPro 3.0</td>
<td>115</td>
</tr>
<tr>
<td>Donah Software</td>
<td>79</td>
</tr>
<tr>
<td>Coach Merriam Webster's Thesaurus 2.0</td>
<td>36</td>
</tr>
<tr>
<td>Spelling Coach 3.0 (Words/Medical/Legal/Translation)</td>
<td>54</td>
</tr>
<tr>
<td>Spelling Coach 3.0 Professional</td>
<td>105</td>
</tr>
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</table>

**Electronic Arts Thunder! 1.23**

<table>
<thead>
<tr>
<th>Software</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lundeen &amp; Associates</td>
<td>30</td>
</tr>
<tr>
<td>Electronics Plus Spell 1.1</td>
<td>46</td>
</tr>
<tr>
<td>Microlytics, Inc.</td>
<td>46</td>
</tr>
<tr>
<td>Word Finder (Synonym Finder)</td>
<td>35</td>
</tr>
<tr>
<td>Sensible Software Sensible English</td>
<td>55</td>
</tr>
<tr>
<td>Working Software/MediaGenic</td>
<td>42</td>
</tr>
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</table>

**Signature Programs**

<table>
<thead>
<tr>
<th>Software</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Technology Mind Write 2.0</td>
<td>95</td>
</tr>
<tr>
<td>Mind Write Express</td>
<td>149</td>
</tr>
<tr>
<td>Allan Bennett Software</td>
<td>149</td>
</tr>
<tr>
<td>ExpressWriter 2.0</td>
<td>79</td>
</tr>
<tr>
<td>Aldus Corporation</td>
<td>159</td>
</tr>
<tr>
<td>PageMaker 3.0</td>
<td>475</td>
</tr>
<tr>
<td>Ashton Tate</td>
<td>129</td>
</tr>
<tr>
<td>FullWrite Professional</td>
<td>295</td>
</tr>
<tr>
<td>Claris MacWrite 5.0</td>
<td>349</td>
</tr>
<tr>
<td>HyperCard</td>
<td>185</td>
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<tr>
<td>LetterReady, Set! Gol 4.5</td>
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<tr>
<td>Letra Studio</td>
<td>369</td>
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<td>LetraFonts (Various Vol. 1-13 ea.)</td>
<td>69</td>
</tr>
<tr>
<td>MailChimp</td>
<td>185</td>
</tr>
</tbody>
</table>
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.

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.

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.
FileMaker II displays all the traits you look for in a great manager.

What do you look for in a great manager?

The ability to make your entire operation run smoother, faster, better is a must. You could use instant total recall. Plus the talent to manage complex tasks incredibly easy.

A real team player. With great presentation skills. And a proven performer with impeccable references. All for less than $75K, a window office and a company Porsche.

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

Perhaps reason enough to convince management the office and Porsche should be yours.
It's time we introduced you to the mastermind behind the PhoneNet System. Working quietly in the eye of an electronic storm, this nerve center insures that information travels reliably from agent to agent.

Code name: The StarController.

The PhoneNET StarController is an intelligent device that helps you build and manage AppleTalk networks. With its StarCommand software, the StarController will detect, isolate and diagnose problems on your network, reduce error rates, and monitor network activity.

So, should you accept the mission to build a better network, make it a success with the StarController. Your Farallon dealer has a complete dossier. Call (415) 849-2331, ext. 42 for the dealer nearest you.
As Apple's 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-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 Usbijiima

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.

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 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, 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)
At last, professional quality scanning within everyone's reach!

VisionScan™ from $595.00

Affordable line art and halftones without sacrificing your printer.
VisionScan™ delivers quality scans in seconds without tying up your ImageWriter™ printer.
Whether you're scanning photos, graphs, charts, or other original materials for newsletters, marketing reports, layouts or other applications, VisionScan™ produces affordable halftone images and extremely high quality line art.

Scan 3-D...and at no extra cost.
VisionScan can expand your view to 3-D. The roomy overhead scanner accepts objects up to one inch in height and gives you an added vantage point — a value many higher priced scanners can't begin to offer.

FREE DeskPaint™ Software.
The DeskPaint™ Software desk accessory inspires full graphic editing without desiring your desktop publishing program.
It crops, sizes, details, lightens, darkens and embellishes plain art into professional presentations.
Scan and edit text like the pro's with an optional O.C.R. software program, only $199.95.
With the revolutionary Read-it!™ software program by Olduvai Corporation, VisionScan enables your Macintosh™ to read whole pages of text, then store and manipulate them faster than ever before.

Why buy from Mirror?
• Buying direct saves money • Full 30 day "money back" guarantee
• Full 90-day warranty • An ongoing commitment to innovation

To order VisionScan™ and your free DeskPaint™ software package, call toll free: 1-800-654-5294

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2644 Patton Road
Roseville, MN 55113

VisionScan is a trademark of Mirror Technologies, Inc.
Macintosh and ImageWriter are trademarks of Apple Computer Company.
DeskPaint is a trademark of Zedcor Incorporated.
Read-it! is a trademark of Olduvai Corporation.
Prices subject to change without notice.
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.

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, 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 Macintosh 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 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 formation 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)
Sooner or later your Macintosh is going to crash. And unless your Mac's been backed up, it'll probably take your data with it. That's why you need the TG-4000 high performance tape backup system from Tallgrass. It features the tape format that Apple endorses, QIC-100. We invented it, and now it's the industry standard.

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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 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 Leuco’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, Neuronics’s Hyper-Brain, 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...
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Now the industry's top-rated PC-to-PC remote computing program lets you run a PC from any Macintosh® including the Mac II! And by "run," we mean more than emulation!

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Macworld News

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).


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.

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 Merg

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)
How To Build A Better Macintosh

Let's take a Macintosh II and build a formidable workstation. Whether it's for desktop publishing or computer aided engineering, the PCPC II high resolution color graphics system provides unrivaled power and performance for even the most demanding professionals. Choose 256 colors at one time from a palette of 16.7 million, or 256 shades of gray and create the most realistic images possible. With a resolution of 1024 x 768, you get the maximum in image detailing.

Next add the PCPC 144Mb internal hard disk—the perfect complement for any workstation. All your dazzling data is stored rapidly with megabytes to spare. And to protect your creations, there's the PCPC Tape Backup system, with our highly rated HFS Backup program. You can archive 2 gigabytes at speeds of up to 14 megabytes per minute—ideal when you have overwhelming amounts of data and no time to spare.

We can also help you build up your Mac Plus or SE with our MacBottom hard disks. Available in 21, 32, 45 and 70 Mb capacities, there's one to fit your every need. Plus, we offer an optional integral modem which ties you to the exciting world of telecommunications. All MacBottoms come with a two year warranty so your investment is protected.

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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. These 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, 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 317/841-0532. — 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 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)
The table
Apple would have designed,
had they gone into
the furniture business.

Any company with the vision to create a product as elegant and useful as the Macintosh would have hit it big in any industry.

Fortunately, Apple chose computers.

We, on the other hand, chose to make furniture. More specifically, the MacTable.

Like the Macintosh itself, the MacTable was created to put information at your fingertips, quickly and easily. We accomplish this by thinking of the workspace not as an inflexible monolith, but as a network of individual surfaces onto which you can place each of your Mac components, like your printer, modem, external drive, mouse, even manuals. Everything with plenty of elbow room, easily within reach, and there when you need it.

Next, each surface tilts to optimize your eye-to-screen and hand-to-component efficiency. Rest assured that as your comfort increases, so does your productivity.

Finally, there's the overall design — sleek, contemporary, and mindful of the future of your computing needs. Because MacTable's surface panels can be arranged, your workspace can accommodate any model of Macintosh, from the Plus to the Mac II...to who knows what.

Surprisingly enough, all of this Mac-like versatility and European beechwood framing is more than affordable: only $289 for MacTable and $139 for the optional roll-away cabinet (doubles as a Laserwriter stand); $269 for the matching, ergonomically balanced chair; lateral file cabinet $239; bookshelves $119; and two-door cabinet $159.

MacTable. It's the workspace that organizes the tools that organize your life. And it's available by calling (800) 722-6263 which, by the way, is not Apple's phone number.

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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 801/531-0205; 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 Presentations, Microsoft's PowerPoint, Letraset's ReadySetShow, and a new version of Symantec's MORE are already shipping. Others are due out soon, including 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) introduced 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 LaserWriter.
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Writer II NTX 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 J. O'Connor

New Paint, New Color

Professional color paint software that approaches the capabilities of dedicated color systems such as the $200,000 QuanticPaintbox is now available for the Mac II. SuperMac's PixelPaint 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 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

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.

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, resized 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 lite 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 plusses. 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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Have you outgrown your hard drive?

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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.

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

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 Magañá. “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
Start the day right

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

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"Yesterday morning my seven year old son decided to spend some of his long-saved allowance on a computer game. Having enjoyed dealing with your company for the past several years, I phoned in his order. All day long I listened to his periodic refrain of, "When will my game get here, Mom?" Probably around lunch time tomorrow," was my usual reply. With a son who spent most of yesterday figuring and refiguring the number of hours and minutes left until noon today, I fully expected to hear more of the same this morning. Imagine my surprise and my son's delight when your package arrived at 9:02 today, as he was finishing his breakfast. Thanks MacConnection, you looked good—and you made this mother look great!"

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Manufacturer’s standard limited warranty period is listed after each company name. Some products in their line may have other warranty periods.

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### Bright Star Technology

Talking Tiles—Interactive computer tutor lets you learn phonics & reading without learning phonics rules or memorizing tedious drills. Preschoolers to adults.

$79.
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-

---

**Figure 1**

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

David L. Peltz is a *Macworld* contributing editor and the president of CADventures, a consultancy specializing in microcomputer graphics applications. He has been involved in the computer graphics industry since 1966.
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.
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.

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:

Revolution (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 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.

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**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.

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 4
By combining a square and a rectangle, Suitev 3D's facility for connecting cross sections created this solid.
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.)

One feature useful to architects and planners is SpaceEdit's ability to simulate a heliodontic 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
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 minutes, or hours. On the positive side, a hatching 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

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<th>Mac3D</th>
<th>SpaceShit</th>
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**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.

**MacArchitron** 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 3DGE Macromind and a few other Mac developers have already announced their intentions 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 InCAD—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 modeler/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. Availability 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 MacArchitrion; 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.

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 MacArchitrion 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 MacArchitrion produces outline-only views (see illustration on page 109).

On the other hand, MacArchitrion, 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. MacArchitrion 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.”
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.
We 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
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 antiproductivity 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-limed 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.

**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 novellete included in the documentation. I’ll give you the basics: You play the part of Vervel, one of seven characters involved in a paranormally intertwined roundelay 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 Vervel 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 Vetroel, 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.

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.

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.
AWARD

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.
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](image)

**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](image)

**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](image)

**World Class Leader Board**

Taking a second shot at the second hole at 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](image)

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

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 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 reformating 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 back-up, security, and print spooling software, and its formatting program is good, but the cable supplied with it should be a bit longer.

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.

The MicahDrive XT20 is a quiet drive with a good price per megabyte. It includes partitioning software.
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 (.06 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 “Macworld 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. Suble 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

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,
## 20MB Hard Disk Features Compared

<table>
<thead>
<tr>
<th>Drive</th>
<th>Manufacturer</th>
<th>SCSI Connectors</th>
<th>Cable Length</th>
<th>Terminator</th>
<th>SCSI ID Set</th>
<th>Kilobytes</th>
<th>Price</th>
<th>Cost per Megabyte</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD20SC</td>
<td>Apple Computer</td>
<td>25/50</td>
<td>22 in.</td>
<td>external</td>
<td>push button</td>
<td>19,171</td>
<td>$1099</td>
<td>$57.33</td>
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<td>SD20</td>
<td>CMS Enhancements</td>
<td>25/25</td>
<td>36 in.</td>
<td>internal</td>
<td>DIP switch</td>
<td>20,472</td>
<td>$560</td>
<td>$27.35</td>
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<tr>
<td>ST225N</td>
<td>Crate Technology</td>
<td>25/25</td>
<td>72 in.</td>
<td>internal</td>
<td>jumpers</td>
<td>20,472</td>
<td>$545</td>
<td>$27.35</td>
</tr>
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<td>EMAC 20DL</td>
<td>Everex</td>
<td>25/50</td>
<td>24 in.</td>
<td>external</td>
<td>push button</td>
<td>20,165</td>
<td>$1095</td>
<td>$54.30</td>
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<tr>
<td>HyperDrive FX/20</td>
<td>GCC Technology</td>
<td>25/50</td>
<td>20 in.</td>
<td>external</td>
<td>software</td>
<td>20,465</td>
<td>$999</td>
<td>$48.82</td>
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<td>MagicDrive 20</td>
<td>MacProducts USA</td>
<td>25/25</td>
<td>72 in.</td>
<td>internal</td>
<td>software</td>
<td>20,623</td>
<td>$599</td>
<td>$29.05</td>
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<tr>
<td>MicahDrive XT20</td>
<td>Micah Storage Systems</td>
<td>25/50</td>
<td>30 in.</td>
<td>internal</td>
<td>rotary switch</td>
<td>20,519</td>
<td>$649</td>
<td>$31.63</td>
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<tr>
<td>MacBottom HD21</td>
<td>PCPC</td>
<td>25</td>
<td>22 in.</td>
<td>internal</td>
<td>push button</td>
<td>19,858</td>
<td>$1195</td>
<td>$60.18</td>
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<tr>
<td>Hard 20 Plus</td>
<td>Relax Technology</td>
<td>25/25</td>
<td>72 in.</td>
<td>internal</td>
<td>software</td>
<td>20,525</td>
<td>$895</td>
<td>$43.61</td>
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<td>MiniMate 20</td>
<td>Relax Technology</td>
<td>25/25</td>
<td>72 in.</td>
<td>internal</td>
<td>software</td>
<td>20,623</td>
<td>$895</td>
<td>$43.40</td>
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<td>Rodime 20+</td>
<td>Rodime</td>
<td>25/50</td>
<td>22 in.</td>
<td>internal</td>
<td>rotary switch</td>
<td>19,869</td>
<td>$1195</td>
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<td>SupraDrive 20</td>
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<td>20,163</td>
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<td>Photon 20</td>
<td>Warp Nine Engineering</td>
<td>25/50</td>
<td>36 in.</td>
<td>internal</td>
<td>push button</td>
<td>21,780</td>
<td>$499</td>
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<td>Warranty</td>
<td>Dimensions (H × W × D in inches)</td>
<td>Features</td>
<td>Foibles</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>90 days</td>
<td>3¾ × 9¾ × 10½</td>
<td>Fits under Mac Plus or SE.</td>
<td>Loud.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year</td>
<td>3¼ × 10 × 10¼</td>
<td>Fits under Mac Plus or SE. Quiet.</td>
<td>You need manual to set SCSI address.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 years</td>
<td>3¾ × 10 × 10½</td>
<td>Fits under Mac Plus or SE.</td>
<td>Won't boot on Mac Plus until an INIT is removed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year</td>
<td>3¼ × 11 × 12¾</td>
<td>Fits under Mac Plus or SE.</td>
<td>You need manual to set SCSI address.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year</td>
<td>8¼ × 3¼ × 12½</td>
<td>Includes security software, backup software, and printer spooler.</td>
<td>Formatting software gives some bogus error messages.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year</td>
<td>2¾ × 10¼ × 11</td>
<td>Fits under Mac Plus or SE. Quiet.</td>
<td>Setting SCSI address with jumpers is awkward.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90 days</td>
<td>3 × 9¼ × 10½</td>
<td>Fits under Mac Plus or SE. Quiet.</td>
<td>Fits under Mac, but has significantly larger footprint.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 years</td>
<td>2¼ × 9¼ × 9¼</td>
<td>Fits under Mac Plus or SE. Quiet. Includes partitioning software.</td>
<td>Doesn't take advantage of faster transfers on SE and Mac II.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year</td>
<td>2¾ × 10¼ × 13</td>
<td>Fits under Mac Plus or SE.</td>
<td>Formatting software gives some bogus error messages.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>120 days</td>
<td>8 × 3¾ × 10½</td>
<td>Front-panel on/off switch.</td>
<td>Supplied cable is too short.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year</td>
<td>3 × 9¾ × 9¼</td>
<td>Fits under Mac Plus or SE.</td>
<td>Fits under Mac, but has significantly larger footprint.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90 days</td>
<td>3¾ × 5¾ × 11½</td>
<td>Fits under Mac Plus or SE.</td>
<td>Formatting program lacks features.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year</td>
<td>4 × 10 × 11</td>
<td>Fits under Mac Plus or SE. Quiet. Includes 10MB of HyperCard stacks.</td>
<td>Utilities not supplied on floppy disk.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Attached SCSI cable.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
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 "reality 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.

but noise levels vary over a considerable range. The CMS SD20, the Crate Technology ST225N, the MagicDrive 20 from Micah Products 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 attractive. 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 Crate Technology ST225N, and the MagicDrive 20 from Micah Products USA. 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 Micah Products 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 sought 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 cheerful 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 multiheued 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 primeval 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 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 bookkeeping—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.

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.
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 ultraviolet 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 Maccessories Tilt/Swivel, I realized I was out of tape and ribbon. Good timing, because this adjustable Mac 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, autocallers, 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 emulation. 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 autocallers 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

<table>
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<tr>
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<th>MacTell</th>
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<tr>
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1 VT102 emulation.  
2 Service files.  
3 Connection files.

Noting "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-
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.

Acknowledge draws a distinct line between its programmers and its users. Users employ Connections, miniprograms written in Acknowledge’s Telecommunications Access Language (TAL). Connections are similar to scripts in that they can perform functions, such as logging on or getting E-mail. Connections differ from standard

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

To write a Connection you must enter Acknowledge’s TAL programming environment (see “Writing to Connect”). A Record feature allows you to capture keystrokes and remote responses while online and translate them into TAL code, a process that eases the programming burden somewhat. But adding menus, dialog boxes, and references to other Acknowledge modules—service files, lookup tables, and modem files—requires serious programming. Debugging tools are included in TAL’s development environment.

**inTalk**

Like Acknowledge’s TAL, the Communications Command Language (CCL) in Palantir’s inTalk is a programming language. Although you can create Mac-style dialog boxes in CCL, the overall language is less flexible than Red Ryder’s language, Microphone II’s language, or TAL. In addition,
you on to MCI Mail, then execute the script by clicking a button labeled MCI Logon (see "Buttons for Mail"). There are four layers of buttons, and each layer contains up 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.
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.

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 (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 Textronix graphics terminal emulations, not available in other programs. The Textronix 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, Knowledge 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-
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 reformating down the road.

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.

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 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.
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.

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.

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.

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.
**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.

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.

**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.

**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.

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, 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,

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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 recal 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

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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.

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 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

See Where to Buy for contact information.
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 999% 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 in 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."
Reviews

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-

programming 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 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 (INTs 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

Database Benchmarks

<table>
<thead>
<tr>
<th>Operation</th>
<th>Double Helix II</th>
<th>4th Dimension</th>
<th>FoxBase+/Mac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Import data (index one field)</td>
<td>2009</td>
<td>10,009</td>
<td>67</td>
</tr>
<tr>
<td>Find exact</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Find (starts with ...)</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Find (containing ...)</td>
<td>566</td>
<td>300</td>
<td>116</td>
</tr>
<tr>
<td>Sort numeric (indexed)</td>
<td>14</td>
<td>45</td>
<td>2-3</td>
</tr>
<tr>
<td>Index numeric</td>
<td>8983</td>
<td>2008</td>
<td>18</td>
</tr>
</tbody>
</table>

All timings are in seconds.
“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.”
write applications for you). I called technical support on several occasions and always received prompt and courteous help. Odessa also offers introductory and advanced courses on Double Helix II as well as a registered developer's program. Runtime, multuser, 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 F. 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 checkbox buttons; allow editing of icons and creation of new sounds. Cons: Move 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 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 XPNCs in the stack.

**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--
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Reviews

SoftQuad Author/Editor 1.1


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-disc 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, spell checking, 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 come close to those of FullWrite’s Find-and-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.

With entity files, 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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programs 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 mainstream publishing systems or don’t do team writing, stick with the more common word processors.—Jeff Walden

See Where to Buy for contact information.

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


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.

(continues)
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” for a tack-sharp display! The OCLI™ anti-glare coating eliminates reflections and improves contrast 14 times over bare screens.

Get the facts

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Reviews

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 note 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 thirteenth.

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


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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Circle 173 on reader service card
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.

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 Setter

See Where to Buy for contact information.
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10. It's easy to find. For a Turbo Mouse dealer near you, just call 1-800-535-4242, or 212-475-5200. Circle 192 on reader service card.
Reviews

LCD Projection Pads

**Mac-Screen Overhead.** Pros: Blue-tone projected image is large and easy on the eye; 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; but projector can cause image fading. Company: Ask LCD. List price: $1490, including adapter and 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 Datashow 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 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 Datashow 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 projector. 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 Datashow. There was a clear consensus (continues)
When it comes to electronic mail, InBox is TOPS.
<table>
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### Grappler 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:** IBM, two 500K 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 Grappler LQ interface—can be a productive if imperfect union. If your printing volume is low, the Grappler 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 Grappler LQ joins a short list of earlier products designed to bridge the gap between the Mac and non-Apple printers, such as the Grappler C/Mac/GS interface for 9-pin dot matrix printers and GDT Softworks's excellent utility for daisy wheel machines, Mac Daisy Link. The Grappler 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 Grappler 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 Grappler 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 Grappler creates razor-sharp text by condensing 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 Grappler 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 Grappler 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 Grappler can't be faulted for print quality, it does have its share of drawbacks (continues)
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Reviews

slow performance even when compared around the bit longer. To an extent, you can work LaserWriter would have finished the same advantage of a printer spooler option wisely in—
to the sluggish ImageWriter LQ. A three—
work 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 fonts 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’re 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


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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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 formatting. 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 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, Levec, 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

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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 Buderi

See Where to Buy for contact information.
We've been asked why Cricket Software would introduce a black and white paint program when the whole world is making so much noise about color. Frankly, we feel it's obvious: There are more than 1.5 million* monochrome Macintosh® users—Apple® hasn't abandoned them and neither have we. Plus, we felt there was still a lot of room for improvement over the current best selling paint program.

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Reviews

CompuServe Navigator 2.1

Terminal program. Pros: Gives CompuServe a Macintosh interface; saves time and money online; 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 online 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 online 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 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 (continues)

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.
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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 equivalent keys 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 AppleCD SC CD ROM (compact disk 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

(continues)
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Circle 297 on reader service card
I reached LOT's helpful customer service that found our 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, the 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 problem. 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.—Britta 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 multiline 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 Lisp, including packages, structures, and hash tables.

**Company:** Coral Software. **List price:** $175. **Requires:** 1MB.

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.

(continues)
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MORE AWARDS
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MORE FEATURES
- Now displays each font in its own typeface in the font menus
- Downloadable printer fonts and screen fonts can be shared on a network
- Resolves font number conflicts
- Merges PostScript font style variations into one family
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The new SUITCASE II is really packed. Now you can have up to 99 suitcase files full of fonts and DAs, or files containing FKEYs and alert sounds, that you can access at any time—and you don't have to install them in your System file. Plus you can see in the menu what a font will look like before you use it. By merging PostScript fonts into one family, SUITCASE II unclutters your font menus. And by compressing fonts and sounds, SUITCASE II saves you precious space on your hard disk. So, whether you're a new Mac user or a dyed-in-the-wool Mac enthusiast, you need SUITCASE II.

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.
Full workstation LISP machines offer the same types of features. Breaks in Xerox's Interlis-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 spreadsheet-like window in which the cell formulas can be arbitrary LISP expressions. The documentation is a fine reference and provides a good introduction 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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Strap yourself in for the
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Road Racer's detailed graphics
and digitized sounds simulate driving
conditions in 5 environments ranging
from high-speed desert flats to twist­
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you'll actually find yourself trying
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the turns.
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mouse, and use your keyboard for
brakes and shifting.
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driving. Road Racer is high perfor­
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Watch out! ... SMASH! ...
A heat-seeking missile
has just slammed
into your ship.
The year is 2059. Raiders have
stolen five controlling crystals that
maintain the defense and supply net­
work for the moon's 26 cities. With
key commodities cut off, the cities
are doomed.
Your mission is to recover the
fiendishly hidden crystals while trans­
porting vitally needed goods between
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for a total of 108 holes, all in vivid full
screen color on the Macintosh II.
MacGolf Classic gives you a
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view of each hole with close up options.
You have complete control of your
position, ball placement, ball speed
and direction, and selection of all 14
clubs. Spectacular digitized graphics
and sounds add to the excitement.
MacGolf Classic is so close
to the real thing it will improve your
golf game. Every challenge should
be this spectacular.
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. 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, pre-invoice 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.
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Circle 185 on reader service card
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.

**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.

**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.

**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
In 1968, in a small garage outside Bakersfield, California, Marshall Manufacturing was formed. Mitch Marshall perceived a growing market demand for electronic components, particularly for computers. He began production with a small staff of 12. Today, with plants throughout North America and Europe, Marshall Manufacturing Inc. is a leader in providing hardware for the computer industry. As sales continue to grow, we will reach.

Our History

<table>
<thead>
<tr>
<th>Year</th>
<th>Sales</th>
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<td>1968</td>
<td>1,596</td>
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<tr>
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<td>1,904</td>
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<tr>
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<td>2,150</td>
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Mitch Marshall, President & Founder

M.M. Inc., a rapidly expanding company, is comprised of extremely talented and dynamic people. Over the next 3 years, sales are projected to triple due to our accurate forecasts concerning our customers’ needs (see chart below). To maintain this present level of growth, we rely on you — our new employees, to provide us with the insight, knowledge and constant challenges of our business.

—Mitch Marshall

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M.M. Inc., a rapidly expanding company, is comprised of extremely talented and dynamic people. Over the next 3 years, sales are projected to triple due to our accurate forecasts concerning our customers’ needs (see chart below). To maintain this present level of growth, we rely on you — our new employees, to provide us with the insight, knowledge and constant challenges of our business.

—Mitch Marshall

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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 software 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 offices. 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 Kostur

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 pAnywhere 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 pAnywhere. PCMacTerm runs on the Mac, while pAnywhere 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 pAnywhere. That connection can be made via a modem, AppleTalk, or a direct cable. pAnywhere 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 pAnywhere sits in

(continues)
Thousands of people just like you have put their heads together to form one of the world's most advanced data processors — CompuServe's Mac Forums. And they'd like you to join them.

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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 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 simultaneously, 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 Alt to “press” function key Fl, 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 it 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

See Where to Buy for contact information.
SCION, a pioneer in high resolution graphics since 1978, introduces the SCION Image Capture Board for the Macintosh® II computer. Now you can grab video images as quick as click-click.

If you find time is putting the squeeze on your Desk Top Publishing efforts look at these features:

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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 Cordland 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 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 ⌘ 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. E.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, so 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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Houdini would have been impressed with our new executive workstation.

Decide whether you want a beautiful executive desk or a technological workstation. Press the concealed button-up lifts your computer. Finished? Push the button again and down it descends, desktop flush.

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The Manifesto is a registered trademark of Sunrise Technologies. The Manifesto design patent-pending. Macintosh is a registered trademark of Apple Computer, Inc. IBM is a trademark of International Business Machines. Dealer inquiries are most welcome. Allow 2-4 weeks for delivery.
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 mentioned 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 outline 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.
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.

In Version 2.0, SuperPaint gives you more graphics power than the costly "professional" drawing programs, yet it's easier to use. Draw spontaneously with the freehand Bezier tool, for example. You don't have to get it perfect the first time—the Bezier path is completely editable, so you can progressively refine your work. Or use AutoTrace™ to instantly convert any bitmapped image to an object-oriented line drawing.

Then, with a mouse click, you can further refine your graphic with the most flexible and sophisticated painting tools available on the Mac, including a slick new airbrush that works just like the real thing. Plug-in paint tools can be custom-programmed and will show up in the tool palette.

We've added nearly all the other features you wanted, too. You can set any document size for printing multiple pages, work in landscape view, or use SuperBits™ to edit bitmaps of any size and resolution—you can even edit a full page at 300 dpi. Plus you can preview your image in color before printing.

More power, more flexibility, and easier to use. That's SuperPaint 2.0—setting the standard for Macintosh graphics... again.

Suggested retail price: $199. Upgrade from 1.0 or 1.1: $50.

System requirements:
Macintosh Plus, SE or Macintosh II;
System 6.0 or later

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A new and advanced paint, editing and special effects program.

For the serious artist, with capabilities and speed beyond any other Macintosh paint software.

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Create and save your own set of colors — one at a time with color picker, or a range of colors using RGB and/or HLS tables. Blend any range of colors from 2 to 256. Change palettes to change the color scheme of any illustration.
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- 2 Layers with Paint and Edit features on both.
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- New “thermometer” displays colors on the palette.
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Take any two images, on two layers . . . incrust an image from one onto the other — in any position — or onto any other illustration — in any position — or back onto the full original.

**Spherization**

Take any image, or text . . . define the area . . . and create a 3-D sphere of the entire image, or text.

**Custom Color Management**

Customize color palettes by changing RGB and/or HLS wave forms — or use the standard Macintosh color picker.

Graphist Paint II is a new hi-end paint program with all of the standard painting tools, file formats and 16 Macintosh standard modes . . . PLUS you can:

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- Pixel by pixel editing.

Graphist Paint II is packed with so many new features you’ll want to get your hands on it right away. For full information and the name of the Graphist Paint dealer nearest to you call: 1-800-234-0230.

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Dealers circle 115 on reader service card

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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


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.


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.


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, 214/458-0058.

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)
You've known us as AppleCrate. We are now Crate Technology. So, just say Crate!

We offer a great line of external disk drives now known as MacCrate ranging from 20MB to our performance driven 80MB model all using Seagate quality disk drives.

We have expanded our product line to include InnerCrate: our solution for your Mac SE and Mac II internal disk drive needs. InnerCrates range from 30MB to our high performance 300MB model.

Introducing TapeCrate, our high speed quality backup system. TapeCrate's high speed data transfer rate, protects 60MB of your valuable information in just 12 minutes. TapeCrate comes with a 60MB data cartridge and is ready for "Plug and Play" operation.

MacCrate, InnerCrate and TapeCrate are registered trademarks of Crate Technology, Inc.
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Prices will remain in effect until December 31, 1988.

California 800-323-9994    Nationwide 800-543-5808
Call for same day orders or technical support.
New Products


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; performs theft-detection report; performs 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.


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)
It's So Easy.
To create brilliant visuals.

Word sure gets around. Once people started getting their hands on PixelPaint™, enthusiastic users started burning up the wires. They keep telling us PixelPaint opens up a whole new world of visualizing for them.

We feel we should respond.

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.
STAX! is dedicated to creating great HyperCard® products that help you get more out of your Mac. We’re more than just stacks because we design our products with your needs in mind. For example, all our products have extensive on-line help, annotated scripts and no copy-protection. We don’t process credit card orders and checks until we ship your product. And upgrades will cost only $10 per disk. We’re dedicated to providing you with high-quality, reasonably priced solutions. So whether you’re a new Macker or a long-time hacker, STAX! has products to help you work smarter. And, all three products are available NOW!

**STAX! The Macintosh Bible:**
- S•T•A•X! Edition
- S•T•A•X! Sound Effects Studio
- Incredible easy-to-use interface
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- Incredible easy-to-use interface
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- Handy reference card
- Three 800K disks
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To order by credit card, call 1-800-MAC-STAX! in Texas, call 512-467-4563. All products have an unconditional 30-day money-back guarantee. Minimum system configuration for all products: Macintosh with one megabyte of RAM, two 800K disk drives and a copy of HyperCard. Hard disk recommended. HyperCard and Macintosh are registered trademarks of Apple Computer, Inc.

### New Products


- **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.

- **Insight Expert Inventory** Addition to the Insight Expert Accounting Series. Offers inventory-control system for small and medium-size businesses, enabling them to manage stock inventories on a perpetual basis. Integrates with the Insight Expert Accounts Receivable and General Ledger modules. 1MB min. memory. $695. Layered, 617/242-7700.


- **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.

### 1989 MACINTOSH ART CALENDAR

**KEEPS YOU ON TRACK**

Macworld’s 1989 Macintosh® art calendar brings you twelve winning entries from the 1989 Macintosh Masters art contest. You’ll enjoy full-color reproductions of these Macintosh masterpieces and a brief description of how each was created, in a wall calendar that allows space for daily personal notes.

Send a check or money order for $12.95, payable to Macworld Calendar, 144 Townsend Street, San Francisco, CA 94107.
I'm always working under deadline. But with the help of my Mac and Tempo II, I get a lot more work done in a lot less time.

I just record any repetitive work once with Tempo II, then I can play it all back as a single command. And that's a macro!

**Zap, you're Zapfed**

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 Tempo II macro simply sets it up for me—uneven columns, different page size, none of my usual defaults. One keystroke.

**1 keystroke = 375 steps**

Some jobs are the same thing every week. Like updating a sales map. Tempo II grabs a text file of numbers and pastes each one into its spot on the map. Altogether, that's more than 375 steps. But for me it's one keystroke.

Now that's productivity!

**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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**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, joystick 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.

**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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**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. GTPS, 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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**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.

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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.

Springboard Publisher  Desktop publishing package designed for DTP nonexperts. Integrates page-layout control, word processing, and a set of built-in graphics tools. IMB 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. IMB 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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New Products

lettered printing), maintains original tabs and columns, recognizes fine details such as hyphens. Has built-in scanner driver software. 1MB min. memory. $1495. CTA, 212/759-6201.

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, 212/936-6738.

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. Leisser 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. P.P.T. 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 as an overhead projector, 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.

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.

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.


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.

Sniffer  Network protocol analyzer that supports all layers of AppleTalk protocol model. Designed to aid in 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.

SilverView

Nutmeg Kodak Datashow

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The Big Picture Z21


ACCESSORIES


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(continues)

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To have your product considered for inclusion in New Products, send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number to New Products Editor, Macworld, 501 Second St., San Francisco, CA 94107. We reserve the right to edit press releases.
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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 Option-Shift-S for the stack script, Option-Shift-B for the background script, or Option-Shift-C for the card script.) However, HyperCard has no built-in shortcuts for accessing the Stack Info, Bkgnd 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 Bkgnd Info, or C and then Return for Card Info.

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).

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)

Info Shortcuts

To install keyboard shortcuts for HyperCard's Stack Info, Bkgnd 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.
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.

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**Freedom to choose.** NetWare for Macintosh lets you connect Macs with a
work made to satisfy Macintosh user.

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Disk Life

What is the shelf life of a floppy disk, and how long might the disk remain usable?

Ken Jago
Earville, Australia

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

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 Buonassissi 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

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Ken Jago
Earville, 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
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 (Alsoft, 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 3.0 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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☐ Option One $65
Conference sessions* and exhibits.
Pre-register by December 16. $75 at the door.

☐ Option Two $20
Admission to exhibits only.
Pre-register by December 16.

Please send my badge and further information to:

Please check one: ☐ Home Address  ☐ Company Address

Last Name ____________________________  First Name ____________________________

Mailing Address ____________________________

City, State, Zip ____________________________

Telephone ____________________________

If mailing to company address:

Title ____________________________  Company ____________________________

☐ Check enclosed (make payable to MACWORLD Exposition)  Amount: $ __________

☐ MasterCard  ☐ Visa  ☐ American Express  Amount: $ __________

Account Number ____________________________  Expiration Date __________

(Include all numbers)

Cardholder Signature ____________________________

(Signature necessary to be valid.)

If cardholder is other than registrant, please print name below:

Last Name ____________________________  First Name ____________________________

Cash only at the door. After December 16, you must register at the show.

Please check the appropriate categories:

Your industry or profession

a. ☐ Manufacturer (noncomputer)  o. ☐ Engineer
b. ☐ Manufacturer (computer industry)  p. ☐ Doctor/lawyer/dentist/CPA
c. ☐ Distributor/dealer/retailer/service  q. ☐ Educator
d. ☐ Finance/insurance/real estate  r. ☐ Consultant
e. ☐ Professional (law/medicine)  s. ☐ Marketing
d. ☐ Communications/publishing  t. ☐ Sales
f. ☐ Education  u. ☐ Other (specify)
g. ☐ Government  Size of your organization (number of employees national/international)
h. ☐ Consultant  v. ☐ Under 50
i. ☐ Other (specify)  w. ☐ 50-99
j. ☐ Other (specify)  x. ☐ 100-499
k. ☐ CEO/president/vice president  y. ☐ 500-999
l. ☐ Comptroller  z. ☐ 1,000-5,000
m. ☐ DP/MIS manager  aa. ☐ Over 5,000
n. ☐ Owner/Partner

Which personal computer(s) do you own/or use?

bb. ☐ Macintosh  ee. ☐ Macintosh II
cc. ☐ Macintosh Plus  ff. ☐ Apple II+
dd. ☐ Macintosh SE  gg. ☐ Apple IIe
ee. ☐ Macintosh II  hh. ☐ Apple IIic
ff. ☐ Apple II  ii. ☐ Apple III
gg. ☐ Apple II GS  jj. ☐ Apple II GS
hh. ☐ None  kk. ☐ None
ii. ☐ Other (specify)  ll. ☐ Other (specify)

Where will you be staying while at MACWORLD Expo/San Francisco?

mm. ☐ Home  oo. ☐ Hotel (specify)
nn. ☐ With friends  pp. ☐ Other (specify)
oo. ☐ Other (specify)

*All conference sessions are on a first-come, first-served basis with no guaranteed seating.
There are Two Ways to Play the Game at MACWORLD Expo/San Francisco, January 20-22.

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TO PRE-REGISTER ADDITIONAL PEOPLE, COPY THIS FORM AND FILL OUT COMPLETELY FOR EACH ATTENDEE.

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*All conference sessions are on a first-come, first-served basis with no guaranteed seating.
How To/Quick Tips

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.

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, armoured man at the right corner of the room has been replaced by a beautifully decorated Christmas tree (see "Holiday Decorations").

Carlos Merino
Daily City, California

Page Numbers in Linked Documents
Tip: Word 3.0 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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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.
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But no matter which Microtech drive you choose, you’re assured of the most thoroughly tested, best-backed drives in the business. So years from now, you’ll still know you made the best decision possible.

<table>
<thead>
<tr>
<th>SIZE (MB)</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nova 30</td>
<td>$479.00</td>
<td>$569.00</td>
</tr>
<tr>
<td>Nova 40</td>
<td>$599.00</td>
<td>$679.00</td>
</tr>
<tr>
<td>Nova 80</td>
<td>$949.00</td>
<td>$1039.00</td>
</tr>
<tr>
<td>Nova 120</td>
<td>$1229.00*</td>
<td>$1279.00</td>
</tr>
</tbody>
</table>

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Circle 243 on reader service card
How To/Quick Tips

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-


Color World
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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240 December 1988
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*8MB kits for Mac II only. Prices and availability subject to change without notice.

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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.

<table>
<thead>
<tr>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Description</td>
<td>Item</td>
<td>Horizontal</td>
<td>Vertical</td>
<td>Width</td>
<td>Height</td>
<td>Text</td>
</tr>
<tr>
<td>2</td>
<td>Trans. No. field name</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>101</td>
<td>Trans. No.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Trans. No. entry field</td>
<td>7</td>
<td>1</td>
<td>20</td>
<td>80</td>
<td>Amount</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Amount field name</td>
<td>5</td>
<td>100</td>
<td>1</td>
<td>80</td>
<td>Amount</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Amount entry field</td>
<td>8</td>
<td>100</td>
<td>20</td>
<td>80</td>
<td>Date</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Date field name</td>
<td>5</td>
<td>200</td>
<td>1</td>
<td>80</td>
<td>Date</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Date entry field</td>
<td>8</td>
<td>200</td>
<td>20</td>
<td>80</td>
<td>8/26/88</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>To/From field name</td>
<td>5</td>
<td>1</td>
<td>45</td>
<td>280</td>
<td>To/From</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>To/From entry field</td>
<td>6</td>
<td>1</td>
<td>65</td>
<td>Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Type group</td>
<td>11</td>
<td>100</td>
<td>Type</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Debit button</td>
<td>12</td>
<td>Debit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Credit button</td>
<td>12</td>
<td>Credit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Account group</td>
<td>11</td>
<td>100</td>
<td>Account</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Acct. A button</td>
<td>12</td>
<td>Acct. A</td>
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<td></td>
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</tr>
<tr>
<td>16</td>
<td>OK</td>
<td>1</td>
<td>210</td>
<td>OK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Cancel</td>
<td>2</td>
<td>210</td>
<td>Cancel</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Initialize &amp; Display Checks Dialog Box</td>
<td>Option-Command-d</td>
</tr>
<tr>
<td>2</td>
<td>ECHO(FALSE)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>=SET.VALUE(J4,INDEX(&quot;Checks!Database.ROWS&quot;,&quot;Checks!Database&quot;)1+1)</td>
<td>Set Trans. No. field default</td>
</tr>
<tr>
<td>4</td>
<td>=SET.VALUE(J5,&quot;&quot;)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>=SET.VALUE(J6,TEXT(NOW(),&quot;m/d/yy&quot;))</td>
<td>Set Date field default</td>
</tr>
<tr>
<td>6</td>
<td>=SET.VALUE(J7,&quot;&quot;)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>=SET.VALUE(J8,&quot;)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>=SET.VALUE(J9,&quot;&quot;)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>=DIALOG.BOX(J1:J10,J1) Bl D isolav dialao box</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>=RETURN()</td>
<td></td>
</tr>
</tbody>
</table>

**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 SET.VALUE 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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-Sarah

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- Real

ACCOUNTING

<table>
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<td>Simply Accounting</td>
<td>209.00</td>
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</table>

“Most people these days have done their homework, and pretty well know which program they want. Now, we’ve made it even easier to buy software. Call us with the program you need. Once you’ve used it awhile, you may find something you weren’t aware of, that you don’t like. No problem... just send it back. We'll treat it as a trial purchase, and refund the difference between what you paid to buy the software, and what it would cost if you had taken it on trial. (10-day minimum, and we provide six free days for shipping).”

- Mike

BUSINESS

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COMMUNICATIONS & NETWORKING

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<tr>
<td>TOPS (Mac)</td>
<td>119.00</td>
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“We get software back every day, and people tell us, ‘Boy, am I glad I had a chance to try this out first’. These are customers who really thought they wanted a certain program, but later found it wouldn’t fit their particular application. And, they’ll often take a competing program on a trial purchase. Then, when they decide to keep it, they’re sure they’ve got the right one.”

- John

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DESK ACCESSORIES & UTILITIES

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GRAPHICS

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<td>Video Works II</td>
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<th>Monitor Type</th>
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<tr>
<td>NEC Multisync II</td>
<td>$544.39*</td>
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<td>Mitsubishi Diamond Scan</td>
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<td>NEC Multisync XL</td>
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<td>Princeton Ultrasound</td>
<td>$479.74*</td>
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<td>Sigma Laserview SE 15&quot;</td>
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<td>Sigma Laserview SE 19&quot;</td>
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## PRINTERS

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<th>Printer Type</th>
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<td>HPF 3M RAM Image Writer II</td>
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<td>Panasonic 1091 w/ Grappler</td>
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<td>Orange Micro Grappler LQ</td>
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<td>Apple Local Talk Connector Kit</td>
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## COMPUTERS

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<th>Computer Type</th>
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<td>Apple Mac SE</td>
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<td>IBM PC/AT</td>
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<td>IBM PS/2</td>
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## SOFTWARE

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<td>Adobe Illustrator</td>
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<td>Aldus PageMaker 3.0</td>
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<td>ABA &quot;Draw it Again Sam&quot;</td>
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<td>ACIUS 4th Dimension</td>
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## DISKETTES

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<th>Diskette Type</th>
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<tr>
<td>3.5&quot; DS/DD Diskettes</td>
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<td>PNIAM EM65 65MB Hard Drive</td>
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<td>RODIME 201 Ext. Plus Hard Drive</td>
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<td>3.5&quot; DS/DD Diskettes</td>
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<td>3.5&quot; Diskettes DD/HD Diskette 2MB (Box of 10)</td>
<td>$38.95*</td>
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The number one choice in word-processing programs for the Macintosh. Write Now 2.0 now features mail merge, 100,000-word dictionary, cursory key support, direct import and export of text, MacWrite, and RFT (Word, Write, and Works option) files, window menu, decimal tabs, hide pictures option, multifinder and network capability...and more!

## DISKETTES

<table>
<thead>
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<tr>
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<td>ORCHID Colorvue SE</td>
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<td>TnE* 9600 Baud External Modem</td>
<td>$449.00</td>
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## DISKETTES

<table>
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<tr>
<th>Diskette Type</th>
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<tr>
<td>3.5&quot; DS/DD Diskettes</td>
<td>$12.62*</td>
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<tr>
<td>3.5&quot; Diskettes DD/HD Diskette 2MB (Box of 10)</td>
<td>$38.95*</td>
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<td>3.5&quot; Diskettes DD/HD Diskette 2MB (Box of 10)</td>
<td>$38.95*</td>
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### This Month’s Specials

**Internal Hard Drives**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>Conner</td>
<td>1 Year Warranty</td>
<td>$989.</td>
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<tr>
<td></td>
<td>100 Meg Internal 19ms*</td>
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<tr>
<td>Miniscribe</td>
<td>1 Year Warranty</td>
<td>$2,295.</td>
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<tr>
<td></td>
<td>(Mac II Only)</td>
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<td></td>
<td>340 Meg Internal 10ms*</td>
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<tr>
<td>Quantum</td>
<td>2 Year Warranty</td>
<td>$625.</td>
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<td></td>
<td>40 Meg Internal 12ms*</td>
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<td></td>
<td>80 Meg Internal 12ms*</td>
<td>$989.</td>
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*Effective Access Time*

---

### Hard Disk Drives

#### CMS Enhancements

- **1 Year Warranty**
  - MacStack Series
    - CMS MacStack 20 65ms: $539.
    - CMS MacStack 30 83ms: $599.
    - CMS MacStack 45 100ms: $749.
    - CMS MacStack 140 28ms: $1,299.

#### SE Internals

- **CMS Pro SE 30 38ms**: $475.
- **CMS Pro SE 45 32ms**: $659.
- **Mac II Internals**
  - CMS Pro 60 I/II 40ms: $659.
  - CMS Pro 102 I/II 28ms: $1,059.
  - CMS Pro 140 I/II 28ms: $1,199.

#### Tape Backup

- CMS 60 Meg Tape: $699.

#### Giga Cell Systems-NuData

- **1 Year Warranty**
  - All Giga Cells come with disk optimization/backup/partitioning software...a $200 value!!

#### Slim Line Series

- Data Cell 20 65ms: $499.
- Data Cell 60 40ms: $779.

#### SE Internals

- Data Cell 45 SE 28ms: $849.

#### Mac II Internals

- Data Cell 60 I/II 40ms: $699.

#### Everex

- **1 Year Warranty**
  - Everex 200D 65ms: $539.
  - Everex 20 Deluxe 65ms: $549.
  - Everex 400 28ms: $819.
  - Everex 40 Deluxe 28ms: $899.

#### Irwin Magnetics

- Irwin 40 Meg Tape: $899.
- Irwin 60 Meg Tape: $1,099.

#### MicroNet

- **1 Year Warranty**
  - MicroStack Series
    - MicroStack 30 28ms: $579.
    - MicroStack 62 40ms: $739.
    - MicroStack 91 I/II 18ms: $1,139.

---

### Hardware Accessories

#### Anchor

- **5 Year Warranty**
  - (Includes Cable & Software!)
  - 2400 Baud Modem: $149.

#### General Computer

- Personal LaserWriter: $1,499.
- Business LaserWriter: $3,149.

#### Radius

- Radius 16+ Accelerator: $849.
- Radius 25 Accelerator: $1,399.
- Radius Full Page Display +, SE: $1,349.
- Radius Full Page Display II: $1,425.
- Radius Two Page Display SE, II: $1,949.
- Radius Color Monitor: Call

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### Memory

#### Dove (Limited Supply)

- MacSnap 2SE: $399.
- MacSnap 548S: $499.
- MacSnap Plus 2: $399.

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Circle 264 on reader service card
### SOFTWARE

<table>
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<tr>
<th>Software</th>
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<td>Adobe Illustrator '88</td>
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<td>FullPaint</td>
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<td>Disk Fitter</td>
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<td>BASYS 7, BASYS 3</td>
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<td>DPMi Clockwork</td>
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<td>EDSYS</td>
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<td>EOD Data</td>
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<td>AXcolors</td>
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<td>IMAGE SOFTWARE</td>
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<td>MS Word 3.0</td>
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### HARDWARE

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<td>Diamond Surge Suppressors</td>
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<td>Ruby Surge Suppressors</td>
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<td>CUTTING EDGE</td>
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<td>Wedge XL 45</td>
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<td>DATADISK</td>
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<td>HyperDisk</td>
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<td>DOVE COMPUTER CORP.</td>
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<td>MAC 1 - 101</td>
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<tr>
<td>MAC 2</td>
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<td>MAC 3</td>
<td>1029</td>
</tr>
<tr>
<td>MAC 4</td>
<td>759</td>
</tr>
</tbody>
</table>

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SD 80 Megabyte ............$1249

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45 Megabyte SE rear ........$689
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80 Megabyte SE rear ........$1199
100 Megabyte SE rear .......$1489
60 Megabyte Mac II ..........$699
80 Megabyte Mac II ..........$1145
150 Megabyte Mac II ..........$1879
300 Megabyte Mac II ..........$2799

Tape Back-up

CMS 60 Megabyte External
TS-60..................................$729

Everex
External 20D .....................$509
20 Deluxe External ..........$575
40/60 DTL External ............$1795
20 ID Internal Mac II ........$445
91 ID Internal Mac II ..........$1395

Cutting Edge
800K External Drive ..........$175
Wedge XL30 ......................$625
Wedge XL45 ......................$625
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Moniter Monitor
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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.

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.

(continues)

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.

Jim Heid is a Macworld contributing editor who focuses each month on a different aspect of Mac fundamentals.

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.)
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 1stAid Kit, Symantec Corporation's Symantec Utilities for Macintosh, and Central Point Software's Copy II can resurrect deleted files, reconstruct damaged ones, and perform other magnetic miracles. 1stAid 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 FindFile desk accessory, included with the Mac.) William & McIas's DiskFinder and Ideaform's DiskQuick 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 half a 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 *bead 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 bead 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 dusty old files and applications to floppies to free up disk space.
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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 airflow, 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 airflow 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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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 their security, reliability, and convenience their cartridges provide.

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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 5-1/4-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 firework 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 interleave, 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)

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**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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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, reform 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 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. Electrocution 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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Updates

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**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 Doublegrove, 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.

"A hard disk for my Mac®? I've got my Preference."
**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 Jaszeof, which lets you determine how much memory a record occupies. Language Systems News Corporation, 441 Carlisle Dr., Herndon, VA 20170; 703/478-0181. Free; $3-15 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 Spellwell 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 anti aliasing 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 Macbug 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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- Business...
- Business Mgmt...
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save on 2-3/4"
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<table>
<thead>
<tr>
<th>Size</th>
<th>Across</th>
<th>Qty</th>
<th>Price</th>
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<td>2-1/2 x 15/16</td>
<td>1</td>
<td>5,000</td>
<td>$2.18</td>
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</table>

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<thead>
<tr>
<th>Model</th>
<th>Price</th>
<th>Description</th>
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<tbody>
<tr>
<td>Macintosh Plus</td>
<td>$CALL</td>
<td>Apple 13&quot; Color monitor</td>
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<tr>
<td>Macintosh SE 2dr</td>
<td>$CALL</td>
<td>Mac II 8 bit video card</td>
</tr>
<tr>
<td>Macintosh SE 30mb internal</td>
<td>$2695</td>
<td>Apple ImageWriter II</td>
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<td>Macintosh SE 45mb internal</td>
<td>$2895</td>
<td>Apple ImageWriter LO</td>
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<tr>
<td>Macintosh II 40mb internal</td>
<td>$3995</td>
<td>Laser printers</td>
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<tr>
<td>Macintosh II 60mb internal</td>
<td>$4150</td>
<td>Big screen monitors</td>
</tr>
<tr>
<td>Apple keyboard for SE or II</td>
<td>$100</td>
<td>CMS hard drives</td>
</tr>
<tr>
<td>Apple extended keyboard</td>
<td>$185</td>
<td>SIMM chips in stack</td>
</tr>
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</table>

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<table>
<thead>
<tr>
<th>Capacity</th>
<th>Full Height</th>
<th>Full Height</th>
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<tr>
<td>90 Meg</td>
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<td>190 Meg</td>
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<td>300 Meg</td>
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<td>345 Meg</td>
<td>0.44 s</td>
<td>0.33 s</td>
</tr>
</tbody>
</table>

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788 HyperDrive FX/20. GCC Technology, 580 Winter St., Waltham, MA 02154; 617/890-0880, 800/634-9737.
789 HyperTools #1 and HyperTools #2. Softrworks, Inc., P.O. Box 2285, Huntington, CT 06484; 203/326-1116.

* 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.
792 Inspiration. Ceres Software, Inc., 9148 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.

Circle 405 on reader service card
Screen stars with The Visible Edge.

What gives Princeton's new generation of screen stars the Visible Edge is a screen image of incomparable clarity and resolution. Where brilliant colors and infinite shades of gray, with striking contrast and dimension, are commonplace.

The versatility of the Princeton family of monitors gives the new generation (and present generation) of computers, the greatest autosynchronous horizontal/vertical scan range combination available (ULTRASYNC and MAX-15). The clarity of .28mm dot pitch (ULTRASYNC and PSC-28), 1024x750 display resolution (MAX-15). And the entire spectrum of color, with the ease and comfort that can only accompany an ergonomically designed monitor.

Experience a world of unlimited vision. And the technology that's made our high level of quality, service, value and performance, second nature. Experience the Visible Edge. And see what we do best. For more information call (609) 683-1660 Ext. 110.
Save on Macintosh Systems...

Macintosh Plus Entry System

Complete System Includes:
- Macintosh Plus Computer w/1 Megabyte of Memory
- 1 Internal 800K Drive
- Keyboard & Mouse
- Cutting Edge 800K External Drive
- Apple ImageWriter II w/Cable
- HyperCard Software
- Diskettes-Box of 10
- Computer Paper-Pkg of 500
- Mouse Pad

Sugg. list $8270 CDA $2075
Specify package #8910

Macintosh SE Super System

Complete System Includes:
- Macintosh SE Computer w/2 Internal 800K Drives
- 1 Megabyte of Memory
- Keyboard and Mouse
- ImageWriter II Printer
- ImageWriter Cable
- HyperCard Software
- Diskettes-Box of 10
- Computer Paper-Pkg of 500
- Dust Cover for Macintosh SE
- Mouse Pad

Sugg. list $9380 CDA $3199
Specify package #8907

Macintosh SE/20 Super System

Complete System Includes:
- Macintosh SE Computer w/built-in 20 Meg Hard Drive
- 1 Internal 800K Drive
- 1 Megabyte of Memory
- Keyboard and Mouse
- ImageWriter II Printer
- ImageWriter Cable
- HyperCard Software
- Diskettes-Box of 10
- Computer Paper-Pkg of 500
- Dust Cover for Macintosh SE
- Mouse Pad

Sugg. list $4469 CDA $3699
Specify package #8908

Mac SE Performance Systems w/CMS Drives

Complete System Includes:
- Macintosh SE Computer w/2 800K Internal Drives
- 1 Megabyte of Memory
- CMS Internal Hard Drive
- Extended Keyboard and Mouse
- ImageWriter II Printer
- ImageWriter Cable
- HyperCard Software
- Diskettes-Box of 10
- Dust Cover for Mac SE
- Dust Cover for ImageWriter II
- Computer Paper-Case of1200

Pkg #8901 CMS 30 (38ms) $3799
Pkg #8902 CMS 45 (38ms) $3899
Pkg #8903 CMS 65 (32ms) $4199
Pkg #8904 CMS 80 (19ms) $4295
Pkg #8905 CMS 100 (25ms) $4699

Apple Hardware

Macintosh Plus $1399
Macintosh SE-Keyboard $8295
Macintosh SE/20-Keybd $3249
Macintosh II w/Ext. Keybd $4149
Mac II/40 w/Ext. Keybd $5149
Mac IIf/80 w/Ext. Keybd. $7899

Monitors

Apple
- Mac II Monochr. Monitor $329
- Mac II RGB Monitor $739
- Sony CDP1303 RGB $675
- E-Machines T16 $2779
- E-Machines C20 $4295
- Monitern Viking 2400 $1999

Printers

(Prices include required cable)

- Apple ImageWriter II $849
- ImageWriter II Feeder $189
- ImageWriter II Ribbon $5
- Apple ImageWriter LQ $1099
- Apple LaserWriter LQ $239
- Apple LaserWriter LSC $2299
- Apple LaserWriter IINT $3995
- Apple LaserWriter IINTX $6995
- LaserWriter Toner Cartridg $109
- General Computer Laser
- Plus $1699
- Qume Crip Ten $3795
- QMS9810

HP DeskJet Printer Package

Laser Quality under $1000!
Orange Micro's Grappler LS provides full compatibility and laser quality to the Hewlett Packard DeskJet printer. Features include 300 DPI, draft speed under 30 sec/page, spooling, software 3 and popular fonts.

Package Includes:
- Hewlett Packard DeskJet Printer
- Orange Micro Grappler LS Interface
- Grappler Spooler

Sugg. list $1125 CDA $999
Addl. font pack (8 fonts) $79

More Raster Ops

- 19" Color Trinitron complete with color 108 video card (768 x 1024 res.) $4999
- 19" Color Trinitron $2299
- 19" Color Trinitron $3225
- Tilt/Swivel for Trinitron $259
- Color 108 Board $1149
- Color 124 Board $3429

Sigma Designs

- LaserView SE $1799
- LaserView II $1799
- PageView SE $1575
- SilverView (Grey Scale) $1949

IBM in Your Macintosh

- Apple 5,25 Drive $832
- AST Mac SE (Mac SE) $479
- AST Mac 286 (Mac II) $1099
- Dayna File MS-DOS Drives Call

Software

We stock over 900 titles for the Apple Macintosh, Call for Prices.

Scanners

- Apple Flatbed Scanner $1599
- AST Research
  - TurboScan-Feeder $1299
  - TurboScan-Flatbed $1459
- Thunderware
  - ThunderScan 4.0 $199
- Mac II Power Accessory $42
- Sharp Color Scanner $6395

Surge Protectors

Electronic Protection Devices
- EC-1 (6 Outlet) $29
- EC-2 (6 Outlet On/Off) $45

Kensington

- System Saver SE $59
- MasterPiece Mac II $115

Accessories

- ADB Cable 7 ft. - Extra Long $25
- Anti-Glare Filter $33
- Super-Base $34
- Mac II Monitor Extension $35
- Targus Carry Case (SE/Plus) $89

Modems

- 2400 Baud modem can be shared by any user on an AppleTalk network. Or call in from a remote location and communicate with any computer or device on your network. $449

Shiva Netmodem V2400

Apple
- AppleFax Modem $595

Practical Peripherals

- 1200A Modem (1200 Baud) $815
- 2400A Modem (2400 Baud) $1189
- 2400A Modem With Cable & Microphone Communications Software $239

Input Devices

- Abaton ProPoint $119
- Asher Track Ball $79
- Apple Extended Keyboard $199
- Cutting Edge ADB Keyboard $138
- DataDesk 101 Keyboard w/2 Masterkeys Software $159
- Data Desk 101 Keyboard w/Masterkeys Software $159
- Kensington Turbo Mouse-Plus $109
- Summa Mac Tablet $379
- MCS A-/Mouse ABB $85
- Kurta IS ADB Tablet $259

Music

- Apple MIDI Interface $82
- Bose Roommate II Speakers $225
- Passport MIDI Interface $89
- Passport MIDI Transporter $319

---

Or, call, and our System Sales Division will help design

---
Custom Built to Meet Your Needs

Macintosh II 140 Meg Super System

Complete System Includes:
- Macintosh II CPU w/800K Floppy Drive
- 1 Megabyte of Memory System 6.0 Operating System
- HyperCard Software
- Apple Extended Keyboard
- Rodime 140 Meg. Internal Hard Drive (29 ms)
- Apple Video Display Card
- Apple High-Res RGB Color Monitor
- Apple ImageWriter II Printer
- ImageWriter II Printer Cable
- Pkg. of Computer Paper
- Mouse Pad
- Dust Cover for Computer & Keyboard
- Dust Cover for ImageWriter II
- Diskettes-Box of 10

Specify package #8906

Macintosh II/40 Complete Graphic System

The Macintosh II answers the demands for larger screens, higher performance, more memory, expandability and color. Ideal for graphics and desktop publishing, the Mac II systems come complete and ready to run. When more storage is needed choose package #X8876 with the 80 meg. hard drive.

Complete system includes:
- Macintosh II Computer w/40 Megabyte Hard Drive
- 1 Megabyte of Memory
- Extended Keyboard
- Apple ImageWriter II Printer
- ImageWriter II Printer Cable
- Pkg. of Computer Paper
- Mouse Pad
- Dust Cover for Mac II & Monitor
- Dust Cover for Extended Keyboard
- Apple 140 Megabyte Hard Drive

Specify package #X8874

Write for CDA's Free Catalog

Complete line of Hardware, Software and Accessories

30-Day Trial Period

At CDA we believe in customer satisfaction. If you're not 100% satisfied or are unsure of your purchase, you can take advantage of our 30-day trial period. Simply return within 30 days of receipt (software and some internal components excluded) for a quick, courteous refund (freight excluded).

Service and Support

CDA offers a full 90-day warranty. After your 30-day Trial Period, we offer free repair services for an additional 60 days. We provide trained service technicians and a speedy turn-around time for your convenience, and welcome you to continue your service and maintenance with us in our excellent in-house service center. Our friendly customer service assistants will be happy to help you Mon.-Fri. 9am-4pm EST at (201) 892-9007.

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Foreign Orders All foreign orders ship via DHL. Please call or fax for rates and additional information (201) 832-9740. (Sales representatives speaking Spanish, German, Italian & Japanese available.)

Payment Visa, MC, Amex, Discover, Optima accepted at no additional charge. Cashier Checks and Money Orders shipped promptly personal checks are held 10 days for clearing.

NO CODs Leasing now available to qualified businesses. All Prices Subject to Change.

Apple, AppleTalk & LaserWriter are registered trademarks, and ImageWriter, HyperCard, & Macintosh are trademarks of Apple Computer Inc.

IBM is a registered trademark of International Business Machines.
Where to Buy

794 Know Your World. Soft Horizon, P.O. Box 2115, Harker Heights, TX 76543; 817/699-0493.

796 MacAmber Screen Enhancer. Sideways Solutions, 1516 Oak St., #309, Alameda, CA 94501; 415/865-5357.
798 MacCarols. Park Row Software, 4640 Jewell St., #101, San Diego, CA 92109; 619/581-6778.
  * Mac Chimney. BMUG, 1442A Walnut St., Berkeley, CA 94709; 415/849-9114.
802 MacInvoice. Synex, 692 Tenth St., Brooklyn, NY 11215; 718/499-6293, 800/447-9639.
  * Mac/LPR. Lasergraphics, 17671 Cowan Ave., Irvine, CA 92714; 714/660-9497.
807 Mac3D. Challenger Software Corp., 18530 Kedzie Ave., Homewood, IL 60430; 312/957-3475.
809 Mathematica. Wolfram Research, Inc., P.O. Box 6059, Champaign, IL 61821-9902; 217/398-0700, 800/441-6284.
810 MicroPhone II. Software Ventures Corp., 2907 Claremont Ave., #220, Berkeley, CA 94705; 415/644-3232.

MacMoney
THE HOME AND SMALL BUSINESS FINANCIAL MANAGEMENT PACKAGE
STRIKES AGAIN

MacMoney is a winner! This time our users voted—in Macworld’s 1988 “World Class Macintosh” contest. You gave us first place in not one, but two, categories. We placed first in the Financial/Investment category and tied for first in the “Accounting” category.

We were thrilled by this show of support from our users. We want you to know that your enthusiasm has given us new energy and commitment to our goal of providing you with powerful software and world-class support at unbeatable prices. Please phone or write for further information.

Thanks for the vote of confidence!

*We’ll send you a bibliography of our reviews and more information about MacMoney. Just call or write. Address written requests to “Reviews,” Survivor Software Ltd., Suite 450, 11222 La Cienega Blvd., Inglewood, CA 90304. Phone (213) 410-9527. List price $19.95. Hardware: 512KE Macintosh, Macintosh XL, Plus, SE & II. Printer recommended: ImageWriter or LaserWriter (or equivalents). MacMoney is a trademark of Survivor Software Ltd.; any other trademarks are for reference only.

Circle 112 on reader service card

306 December 1988
Style is a Matter of Choice.

Introducing QuarkStyle, a new solution for improving the quality of your business communications. Now your documents can have a professionally designed appearance without the effort or time that goes into design and layout. When it comes to document design, it's simply a matter of choice.

QuarkStyle solves design and layout problems, so you don't have to. Eight leading designers have developed a broad range of pre-formatted templates that address typical business and professional needs. Correspondence, newsletters, overhead presentations, reports, books, and many other categories are included in the first edition of QuarkStyle.

Using QuarkStyle is as simple as selecting a template and replacing the copy and image areas with your own. You can use QuarkStyle's powerful word processor to create and edit copy. Or your graphics and text can be imported in a variety of popular formats. In either case your page design will remain intact. And to make choosing a design easy, QuarkStyle features a template preview function so you can see your choices quickly.

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Quark and QuarkStyle are trademarks of Quark, Inc.
Where to Buy

Reader Service

• Microsoft PowerPoint. Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717; 206/882-8080, 800/426-9400.

811 MiniCad. Diehl Graphics, 8370 Court Ave., #202, Ellicott City, MD 21043; 301/461-9488.


813 ModelShop. Paracom, 123 Townsend St., #310, San Francisco, CA 94107; 415/543-3848.


815 Mouse Pad Imprinting. Computer Expressions, 3833 Chestnut St., Philadelphia, PA 19104; 800/443-8278.


817 'Ncryptor. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301; 818/991-6540.


819 On Cue. ICOM Simulations, Inc., 648 S. Wheeling Rd., Wheeling, IL 60090; 312/520-4440.

820 Orbital Mech. Studio Zero, 6212 Samuell Blvd., #153, Dallas, TX 75228; 800/752-9222.


822 PageTutor. Personal Training Systems, P.O. Box 54240, San Jose, CA 95154; 408/559-8635.

823 PCMater. 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 Pegasis Expert. IGC Technology Corp., 305 Lennon Ln., Walnut Creek, CA 94598; 415/945-7200.

826 Pegasis 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; 714/652-7500.


828 Pinball Construction Set. Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94401; 415/571-7171.


829 Police Quest. Sierra Software, P.O. Box 485, Coarsegold, CA 93614; 209/685-4468.

830 Practica Musica. Ars Nova Software, Box 40629, Santa Barbara, CA 93140; 805/564-2518.

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Create PostScript fonts and logos using FONTOGRAPHER

Professional desktop publishing combines both type and graphics in a document suitable for high resolution printing. Fontographer® provides quick, accurate tools to create professional type and graphics characters. Typefaces can be designed with precise widths and kerning pairs to the highest typographical standards. Existing fonts can be customized with your logo or special symbols on any key. Fontographer generates fonts that are accessible from any Macintosh™ application. And they print with full PostScript® resolution up to 2540 dots per inch. All type and graphics in this ad were created in Fontographer. Use desktop publishing to its fullest potential—with Fontographer.

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Tired of using the same old typefaces in your documents? Now create your own fonts, display faces, foreign language fonts and unique graphics. Have them accessible from any Macintosh application at the touch of a keystroke. Modify and customize existing fonts with all those special characters you've always wanted. Create the proper sizes, widths and kerning pairs for printers like the Image Writer™ II or LQ and LaserWriter™ II SC. Use FONTastic™ Plus—the best bitmap font editor available on a microcomputer.

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720 Avenue F, Suite 109E - Plano, TX 75074
(214) 424-8888 Ext. 5

Circle 35 on reader service card
Simply Accounting is simply magnificent

InfoWorld, March 14, 1988...
"Simply Accounting lists for $349, which gets you all six accounting functions. Other popular entry-level accounting systems for the Mac include Plains & Simple, priced at $395, and Back to Basics at $199.

Of course, these competitors provide only three accounting functions, compared to the six functions of Simply Accounting. You can get these other accounting functions with higher level systems from Great Plains and Layered Inc., but they hit your wallet for $600 or so a module.

Not every company will want to automate the additional functions of inventory, job costing, and payroll. But if you do, Simply Accounting delivers the goods in a cost-effective package.

Simply Accounting is one of the top choices for small businesses who want to start Macaccounting."

<table>
<thead>
<tr>
<th>General Ledger</th>
</tr>
</thead>
<tbody>
<tr>
<td>• entire fiscal year available for reports</td>
</tr>
<tr>
<td>• user definable chart of accounts</td>
</tr>
<tr>
<td>• prior period posting</td>
</tr>
<tr>
<td>• produces full audit trail</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Payables/Receivables</th>
</tr>
</thead>
<tbody>
<tr>
<td>• uses open invoice method</td>
</tr>
<tr>
<td>• prints checks, invoices and statements</td>
</tr>
<tr>
<td>• user defined aging periods</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Payroll</th>
</tr>
</thead>
<tbody>
<tr>
<td>• uses built-in payroll formulas; no user-maintained tables</td>
</tr>
<tr>
<td>• automatic federal and state deductions</td>
</tr>
<tr>
<td>• accumulates OTD, YTD, W-2, 940 and 941 information</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>• fully integrated with payables and receivables</td>
</tr>
<tr>
<td>• uses average weighted cost method</td>
</tr>
<tr>
<td>• handles adjustments and transfers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Jobcost</th>
</tr>
</thead>
<tbody>
<tr>
<td>• distributes revenue or expense to projects or profit centers</td>
</tr>
<tr>
<td>• paycheck distribution includes the company's portion of FICA, SUTA and Disability Insurance</td>
</tr>
</tbody>
</table>

Requirements

• Apple® Macintosh™ computer with one megabyte of memory, 1 BOOK disk drive and 128K ROM

Standard Features

• Six fully integrated functions
• Reports can be displayed, printed or exported
• Exclusive Comfort Guarantee assures every version reflects the latest tax formulas and program features
• Not copy protected

Available through most Apple® dealers. Suggested selling price of $349. Dealers may sell for less. Compatible with Bedford authorized DataPrint forms.

Supports AppleShare™ and MultiFinder™.

Bedford Software Corporation
15311 N.E. 90th Street
Redmond, WA 98052
(206) 883-0074

Circle 10 on reader service card
Where to Buy

**ProColor.** Matrix Instruments, Inc., 1 Ramland Rd., Orangeburg, NY 10962; 914/365-0190, 800/852-8533.

**Pro3D.** Enabling Technologies, Inc., 600 S. Dearborn St., #1304, Chicago, IL 60605; 312/427-0386.


**Reach for the Stars.** Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404; 415/571-7171.

**Red Ryder.** FreeSoft Co., 150 Hickory Dr., Beaver Falls, PA 15010; 412/846-2700.

**RenderMan.** Pixar, 3240 Kerner Blvd., San Rafael, CA 94901; 415/258-8100.

**Sculpt-Animate 4D.** Byte by Byte Corp., 9442 Hwy. 360 N, #150, Austin, TX 78759; 512/343-4357.

**SD20.** CMS Enhancements, Inc., 1372 Valencia Ave., Tustin, CA 92680; 714/259-9555.

**SE Silencer.** Mobius Instruments, 6020 Adeline St., Oakland, CA 94608; 415/654-0556.

* Sea Life. A.A.H. Computer Graphics Productions, P.O. Box 610607, San Jose, CA 95161; 408/980-7363.


**Shufflepuck Cafe.** Broderbund Software, Inc., 17 Paul Dr., San Rafael, CA 94903-2101; 415/492-3200.

**SmartCom II.** Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348; 404/441-1617.

**Super 30.** Silicon Beach Software, Inc., P.O. Box 261430, San Diego, CA 92126; 619/695-6956.

**Swivel 3D.** Paracom, 123 Townsend St., #310, San Francisco, CA 94107; 415/543-3848.

---

**We tear up the competition on both price and quality**

Hardware House, Inc., introduces **MAX**, a new series of 40 and 80mb hard drives for the MAC SE and MAC II, utilizing state-of-the-art 3½" mechanisms from QUANTUM.

**MAX** is the fastest drive available with an effective access time of 12 ms. Track-to-track averages 6 ms and the interleave is 1:1.

**MAX** is easily installed, portable, shock protected to 60g, and weighs less than 2 pounds.

**MAX** is complete with cables, driver and utility software, and full instructions.

**MAX** is dependable, with a 30-day money-back guarantee and a 2-year warranty. Mean time between failure is 50,000 hours.

Hardware House, Inc. offers **MAX** at factory-direct prices.

**$647.00** for 40mb  **$977.00** for 80mb

Circle 387 on reader service card

---

310 December 1988
Where to Buy

849 TelStar. Spectrum Holobyte, 2061 Challenger Dr., Alameda, CA 94501; 415/522-3584.
850 Tetris. Spectrum Holobyte, 2061 Challenger Dr., Alameda, CA 94501; 415/522-3584.
852 Totem II. Bering Industries, 240 Hacienda Ave., Campbell, CA 95008; 408/379-4300, 800/237-4641.
* T-Shirt Factory. I/O Design, Inc., P.O. Box 156, Exton, PA 19341; 800/241-2122.
857 VersaCAD/Macintosh Edition. VersaCAD Corp., 2124 Main St., Huntington Beach, CA 92648; 714/960-7720.
859 World Class Leader Board. Access Software, 545 W. 500 S, #130, Bountiful, UT 84010; 801/298-9077.

Public domain software and shareware are available through online information services; user groups (call 800/538-9695 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).

24 BIT IMAGE CAPTURE

ColorFreeze24

14250 N.W. Science Park Drive • Portland, Oregon 97229 • (503) 626-2291 • Telex 4949559

Circle 68 on reader service card
## Macworld Best-Sellers

### Business Software

<table>
<thead>
<tr>
<th>Months on chart</th>
<th>Last month</th>
<th>This month</th>
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<td>33</td>
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</table>

1. **Microsoft Works** Microsoft
2. **Microsoft Word** Microsoft
3. **Microsoft Excel** Microsoft
4. **PageMaker** Aldus
5. **WordPerfect for the Macintosh** WordPerfect
6. **MacWrite** Claris
7. **Adobe Illustrator** Adobe Systems
8. **QuarkXpress** Quark
9. **SuperPaint** Silicon Beach Software
10. **MacDraw** Claris

### Hard Disks*

<table>
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<td>3</td>
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<tr>
<td>13</td>
<td>1</td>
<td>4</td>
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</tbody>
</table>

1. **MacStack SD 30**
2. **EMAC 20 External** Everex
3. **FX20** General Computer
4. **FX40** General Computer
5. **Macintosh Internal 20SC** Apple Computer

### Education Software

<table>
<thead>
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<td>4</td>
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<tr>
<td>9</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

1. **MathBlaster** Davidson & Associates
2. **Reader Rabbit** The Learning Company
3. **KidsTime** Great Wave Software
4. **Typing Tutor IV** Simon & Schuster Computer Software
5. **MacEdge II** Think Educational Software

### Add-in Boards

<table>
<thead>
<tr>
<th>Months on chart</th>
<th>Last month</th>
<th>This month</th>
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<tbody>
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1. **Radius Accelerator** Radius
2. **Apple 2MB Memory Expansion Kit** Apple Computer
3. **Apple 1MB Memory Expansion Kit** Apple Computer
4. **Macintosh II Video Card** Apple Computer
5. **Radius Interface Display** Radius

### Entertainment Software

<table>
<thead>
<tr>
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<th>Last month</th>
<th>This month</th>
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1. **Beyond Dark Castle** Silicon Beach Software
2. **MacGolf** PCAI
3. **Falcon** Spectrum Holobyte
4. **Dark Castle** Silicon Beach Software
5. **Crystal Quest** Casady & Greene, Inc.

### Networking/Data Communications

<table>
<thead>
<tr>
<th>Months on chart</th>
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1. **TOPS** TOPS
2. **AppleShare** Apple Computer
3. **LocalTalk (formerly AppleTalk)** Apple Computer
4. **PhoneNet** Farallon Computing
5. **MacServe** Infosphere

### Product Watch

Editors' choice: other recent or forthcoming products of particular interest.

1. **FileMaker 4.0** Claris database software
2. **OmniPage** Caere OCR software
3. **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.*
The WriteNow difference: 
Ease, Performance, and...

<table>
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<th>Feature</th>
<th>WriteNow 2.0</th>
<th>MacWrite 5.0</th>
<th>MS Write</th>
<th>MS Word 3.01</th>
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<td>50</td>
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<td>No</td>
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<td>9.5 sec</td>
<td>9.7 sec</td>
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<td>Happy Users</td>
<td>Yes</td>
<td>?</td>
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</table>

...Happy Users!

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All timing tests performed by an independent testing organization on a 12-page document using a Macintosh II and a 20 megabyte hard disk.

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