Now the person making the presentation can make the presentation.

The old adage, "If you want something done right, do it yourself" couldn't be more true than when you're making a presentation. Or, right now, more possible.

In fact, all you will really need is Microsoft PowerPoint software and an Apple Macintosh to run it. It's the easiest, most cost-efficient way to assemble a professional-looking presentation from conception to completion, and right from your own desktop.

PowerPoint gives you the power to create your own picture-perfect overhead transparencies, flipcharts, 35mm color slides, speaker notes, and audience handouts. In such record-breaking time that there'll be nothing for you to do the night before the big day but sleep.

Its built-in word processor (complete with spelling checker) and drawing tools allow you to mix text and graphics in countless ways. You can use different typefaces, logos, special effects like shaded backgrounds, dropshadows, diagrams and color-coordinated palettes. Or you can copy charts, tables, and illustrations from other programs, like Microsoft Excel, with a simple cut and paste.

Once you design an overall "look" for your presentation, PowerPoint allows you to standardize that format automatically. So you can use it slide after slide.

And you can make global changes easily with the Slide Master, which instantly executes your revisions throughout.

At any point along the way, the Slide Sorter feature lets you view slides one by one or scan your entire presentation at a glance, or simply rearrange the order with a point and click.

Then, whenever you're ready, you can print out all your presentation materials—from attention-getting overheads to handy speaker notes—without ever leaving your desk.

If 35mm slides are in order, simply send your presentation to the nearest Genigraphics center, the leading presentation graphics service bureau, and your slides will be on their way in 24 hours.

Lastly, last-minute changes need no longer cause traditional last-minute panic. Because a PowerPoint presentation is as easy to change as it is to create.

If you'd like a live PowerPoint demonstration, call (800) 541-1261, Dept. P54 for the location of your nearest Microsoft dealer.

And remember, the best part of doing a presentation all by yourself comes afterward. When you get all the credit.

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New World Expeditions — March 14, 1491

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Ashton-Tate Loses dBase?
Federal courts have dismissed Ashton-Tate's longstanding suit against Fox Software. A-T accused Fox of infringing on A-T's copyright with FoxBase, which duplicates the dBase programming language. The presiding judge wrote that the dBase language derives from a public domain language developed at the Jet Propulsion Laboratory; that Ashton-Tate's copyrights are invalid; and that Ashton-Tate's "repeated failure to disclose . . . material information (to the U.S. Copyright Office) was done knowingly and with an intent to deceive." A-T said it intends to appeal to demand a jury trial.

IDS and Jasmine Offer 2½-inch Hard Drive
If you've always wanted to clip 20MB onto your belt, a 2½-inch portable hard drive from IDS and Jasmine Technologies may be just the thing. The drive is code-named the Plug-In because it connects directly to the Mac's SCSI port without a cable. The drive draws its small power requirement from the Mac through the SCSI connector. About the size of a portable cassette player, the Plug-In uses a 2½-inch drive mechanism from Conner Peripherals, and it really does come with a belt clip. IDS and Jasmine, divisions of Chess, expect to ship the new drive in late February or early March. By the third quarter the companies hope to offer 40MB and 80MB versions. The price had not been set at press time. For more information, call Jasmine at 408/752-2900.

Aapps Seized by Creditor
With assets seized by its sole secured creditor, Aapps Corporation, developers of DigVideo, has all but closed its doors. Aapps caused a stir of excitement a year and a half ago when it debuted MicroTV, an add-in board that displays a television picture in a Mac II window. Since then other vendors—including RasterOps, E-Machines, and Radius—have introduced products with similar capabilities. Aapps is still providing product support, and according to Aapps, there is some interest in buying the technology and continuing the products. However, the future of the company is in limbo as the creditor decides what to do. For more information, contact Aapps at 408/735-8550.

Multimedia: A Standard Is Born?
Over a series of Chinese dinners in San Francisco, executives from multimedia businesses have hammered out a rough standard for controlling multimedia devices like VCRs and laser disc players. Spearheaded by MacroMind president Marc Canter, the informal Chinatown Group wants Sony, JVC, and other big hardware companies to adopt the standard, dubbed MacroMedia. Canter's office refused to give details.

Adobe Licenses Storm Technology's Compression Software
Storm Technology announced that Adobe has licensed Storm's PicturePress JPEG-compatible image-compression software. Adobe is expected to modify the compression technology from PicturePress and incorporate it into PostScript Level II, adding to JPEG's status as a growing de facto standard.

Quark: Something for Free
Quark has released the Freebies package of XTensions for QuarkXPress 3.0. The two XTensions, which are free, add 9 new features and 15 user-definable defaults. FeaturesPlus adds capabilities including creation of fractions and prices, removal of manual kerning in a selection, and a keyboard command to kern only the word spaces in selected text, as well as a much-needed grabber hand. NetworkConnection lets QuarkXPress users pass graphics and formatted text over a network from one QuarkXPress layout into another (it can also send messages). Quark has also released version 2.0 of Zapper, the QuarkXPress bug-fix utility. For more information, call Quark at 303/934-2211.

Cork Computer Claims Iici Clone
Start-up Cork Computer says it expects to ship on March 25 a $2999 clone of the Mac Iici that requires only a 128K ROM from a monochrome Macintosh. The Macintosh ROM plugs into the main logic board of the Cork System 30 and works with color ROM chips developed by Cork that the company says provide the functions of 32-bit QuickDraw without infringing on Apple's copyright. The $2999 price includes the system box with a 25MHz 68030 microprocessor, a 68882 math coprocessor, 3 NuBus slots, 4MB of RAM, a floppy disk drive, a SCSI port, and built-in 8-bit color support for an optional monitor. The Cork System 30 also has a DSP chip and software that provide the functions of a 9600-bps modem, voice mail, and sound manipulation. For more information, contact Cork Computer at 512/343-1305.

(continues)
Object Logo Lives
Apple acquired Coral Software in 1989, quickly republishing Coral’s Allegro Common Lisp and leaving the object-oriented programming system Object Logo to languish. Paradigm Software is taking over Object Logo and adding new documentation, support for the new Macs, 32-bit color, and hierarchical menus. Object Logo version 2.5 will list for $149. For more information, contact Paradigm at 617/542-4245.

Big Storage
Single-user document archiving and storage is here. For $495, Blueridge Technologies’ single-user Optix Desktop Imaging System provides the same features as Blueridge’s $100,000-plus multituser turnkey systems. Optix can scan batches of documents as large as E-size and save them in TIFF; later, you can index them using pop-up menus, radio buttons, and other standard Mac tools in a data entry window that you design. Optix has image-manipulation tools for rotating or unskewing documents and for comparing images, and security features to prevent alteration of scanned images. For more information, contact Blueridge Technologies at 703/675-3015.

Data Delivery
Three utilities take file-sharing between applications beyond the realm of text files and PICT images. DBMS/Copy Mac can translate files in either direction between Microsoft Excel, Microsoft Works, Foxbase+/Mac; Oracle; seven statistical packages; and Macintosh-, DOS-, and UNIX-format text files. Type of variable, numeric accuracy, and null values are retained where appropriate. DBMS/Copy Mac lists for $95. DBMS/Copy Mac With PC Access Lite lists for $185 and adds bidirectional translation for Mac applications and 26 DOS spreadsheets and databases. DBMS/Copy Mac With PC Access lists for $290 and adds support for DOS statistics, time series, graphics, and other applications. For more information, contact Conceptual Software at 715/667-4222.

Tax to the Future
The millennium may be close at hand, but paying taxes is still a certainty. SoftView’s 1990 version of MacInTax “interviews” you to make sure you fill out the correct forms, and there are now 14 state supplements available. MacInTax lists for $99; 1989 users can renew for $50. For more information, call SoftView at 805/385-5000.

Radius Adapts the Pivot for Built-In Video
Radius has introduced a version of its Pivot tilting monitor that can work with the Macintosh Ils and Ilci. Since both systems use Apple’s on-board 8-bit video chip, the Radius Pivot For Built-In Video does not require a display adapter board. The new Pivot has a suggested list price of $1295, which is $395 less than the existing Pivot including display adapter. Radius says that it changed the timing in the display and wrote a driver called Soft Pivot, which incorporates a pixel-rotation engine. Soft Pivot intercepts QuickDraw calls and rotates the bitmap 90 degrees before it goes to the Pivot’s screen. For more information, contact Radius at 408/434-1010.

Farallon Takes Over PC AppleTalk
Farallon Computing and Apple Computer have signed a long-term licensing agreement that enables Farallon to develop and market current AppleTalk products for IBM PCs and compatibles. Included in the license are the LocalTalk PC Card, Apple’s add-in LocalTalk board for PCs, and Apple’s AppleShare client software for MS-DOS, AppleShare PC. Those products will be renamed, sold, and supported by Farallon. Farallon plans to use the licensed technology to develop AppleTalk products for MS-DOS and Windows 3.0. For more information, contact Farallon at 415/596-9100.

Strata Paints the Town
Strata is branching out from 3-D modeling for the Mac. StrataVision Paint is capable of 64-bit color, though the Mac does not support 64-bit color and Apple has not announced 64-bit-color plans. StrataVision Paint has a few 3-D primitives (objects are not compatible with StrataVision 3d); ink- and watercolor-like tools; and a Light Table for backlighting and tracing or painting on translucent overlays. The program can create shaders such as bump maps for use in StrataVision 3d, and it supports masking, several levels of antialiasing, and separations. The program lists for $695. For more information, contact Strata at 801/628-5218.

First Impressions
With 24-bit color becoming standard and 64-bit color a-threatening), file sizes are getting downright preposterous. Impressit is a software-only utility that compresses color images by as much as 95 percent. Radius claims that its JPEG-compatible Impressit can compress a 24-bit 640-by-480-pixel file in six seconds on a Mac Ilx. Users can select from 25 quality levels, see the results in a preview window, and incorporate a decompression engine into a file (somewhat like AutoUnstuffit). Impressit should list for less than $200. For more information, contact Radius at 408/434-1010.

Minding Your Ps
Neon Software is developing network-analysis software for LocalTalk networks. Network managers can tell NetMinder LocalTalk to filter and record packets based on source and destination address, packet protocol, and such triggers as network events. NetMinder LocalTalk also provides tools to search and analyze captured packets. It lists for $395. Neon also publishes NetMinder Ethernet for $495. For more information, contact Neon Software at 415/283-9771.
Even before the Macintosh Classic & its new companions came along to wow the reviewers with heroic price/performance ratios, UltraPaint was keeping them plenty busy.

"As advertised, Deneba's UltraPaint...really does set new Macintosh graphics standards", wrote Ernest Mau of CompuServe.

"...many more B&W paint features than SuperPaint, almost all of PixelPaint's color tools, a superset of MacDraw II's object-oriented features, and the gray-scale prowess of Digital Darkroom. All this comes in a single program for less than half the price....", wrote David Pogue in MacWorld.

Perhaps Chris Prior of MacUser UK summed it up best when he wrote that "UltraPaint...could prove to be the ideal software package for those looking for a powerful, all-around draw and paint program."

And it's true. UltraPaint really does offer you the same sophisticated graphics processing power of several leading programs combined — all in one inexpensive, easy-to-use package.

Open it up on one of Apple's new low-cost machines and we're talking a match made in heaven.

Particularly if you've always pictured heaven as a place where you get big muscles without having to pay the price.

WE'LL PAY YOU $25 FOR BEING SMART.

Purchase UltraPaint and a Macintosh Classic, LC, or IIsi between October 15, 1990 and May 31, 1991, and receive a $25.00 rebate direct from Deneba. Simply send a copy of your qualifying Mac registration card, your original UltraPaint registration card, and dated proof of purchase for both to our main address. We'll send a check for $25 US by return mail!

See below for further details.
Now you can let your imagination run wild. At a very conservative price. Because Tektronix introduces the first color printer that is PostScript-compatible for less than $5000.

The Phaser II SX is great for individuals or small groups. It works with Windows 3.0 or Macintosh QuickDraw and is software-based PostScript-compatible. It also delivers brilliant 300 dpi thermal-wax color as only Tektronix printers can.

For bigger businesses, we offer the new Phaser II PX. This printer is hardware-based PostScript-compatible with HP-GL and is licensed by Pantone, Inc.* It also works with Macs, PCs, and UNIX workstations. All at once.

Now, say you buy an SX, your business grows, and you end up wishing you'd gotten the PX. No
need to worry because all Tektronix printers are upgradable so you'll never outgrow them.

And in case you didn't notice, this entire ad was created by one of our printers. That includes the brilliant graphics you see above and the crisp type you're reading now. Because we have so much faith in our color printers, we let them do their own ads. No one else can make a statement this bold.

Printout for printout, ad for ad, you won't find a better color printer. Call 1-800-835-6100, Dept. 13C for more information. The rest is up to you.

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“Features that make your extended workgroup easy to manage: A mail log tells you the status of all your mail—who’s read it, who hasn’t. Sort mail and file it in personal mail folders so you can track conversations or projects. Retrieve messages or even ‘unsend’ them.”
“...And features that make it easy to work. The QuickMail Menu™ is always there so you can send a quick message, attach your open document or up to 90 seconds of voice mail, set up an impromptu online conference, post a notice to your whole directory or a pre-set group, or send mail for delayed delivery all without leaving your application.”

“No wonder it’s the world’s most popular.”
“QuickMail is working for over a quarter million users in 60 countries. It got the highest E-mail rating for PC or Mac from InfoWorld, who states, ‘CE Software’s QuickMail reigns supreme as far as features go.’ MacWeek says, ‘CE Software is far ahead... offering links to more than a million E-mail users.’ From MacUser, ‘QuickMail is the one you should pick.’ Get the message?”

“Go to a dealer and try it.”

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Get it together.
How Does Apple Deal with Success?

IN FISCAL 1991 APPLE COMPUTER WILL SHIP OVER 1 MILLION MACINTOSHES

BY JERRY BORRELL

Somewhere in the steamy heat of an Asian morning, a cargo plane sits on a corner of a vast, white concrete runway, its cargo doors propped open for the pallet-loads of Macintosh Classics being loaded into its belly.

Q: Just how many Classics does it take to fill a 747?
A: That's the wrong question. The right question is how long does it take for a cargo ship—same container of Classic Macs to reach Cupertino. The answer? Three months.

Apple doesn't have that kind of time on its hands. Initial projections for sales of the Mac Classic were about 450,000 for the 1991 fiscal year. By the end of the first fiscal quarter of 1991, Apple had already sold or taken orders for close to half that number, somewhere around 220,000. The LC, with sales projected at similar numbers (over 400,000) for the fiscal year, may be the same kind of runaway hit—if Apple is able to begin shipping it in quantity as planned in February.

Meanwhile, the SE/30 is strictly on back order at dealers in the United States, while sales of the ci and fx continue to fare well. Apple is seemingly on the way toward solving what critics say is one of its most severe problems: shrinking or flat growth in the personal computer market.

Naturally, Apple has received the kind of press attention about the entire state of affairs that makes employees question just how the company catches so many breaks. A Wall Street Journal headline on one article screamed "Demand Turns New Macintosh into Rare Apple." The theme of the article was that someone in product planning at Apple had screwed up again. It included lots of words and phrases like missing, widespread shortage, frustrated dealers, critical, long-term survival, dealers bowing, spending huge sums on ads...You get the picture. A San Jose Mercury News article headlined "Demand for Apple's Mac Classic exceeds supply" mentioned that "dealers are really mad."

Apple employees had to be wondering why the headline didn't read "At last, Mac is runaway success" but instead focused on the negative side of the wide acceptance for the company's latest product offerings. That happens to Apple a lot these days, bad press generated by even its most promising successes.

What's Going On?

The established product line—SE/30, ci, and fx—continue to sell well, but the demand for the new machines has brought a new company (in terms of its sales) in just a few months. For its first quarter, Apple's product mix (the type of CPUs that it sells) is 80 percent different from that of the previous quarter. Demand for the Classic and LC is also hot in Europe, and keyboards and mice are in short supply. Dealers there complain that they cannot sell the few machines they have because they are not complete systems—a problem being alleviated by increasing the number of contract suppliers to Apple.

Then there is the issue of how the market decides what a particular machine is going to be used for. While Apple initially hoped to sell the Classic to businesses and tried to position the machine as a small-business computer, it is clear that the majority of Classic sales are to those of us who want a Mac at home but can't afford to drop $4000 on a color machine. So Apple continues to sell to its traditional customer base—home users. I hope that in this go-around Apple realizes that home computing is an important part of its business, and that many, if not most, home users also use their machines for business.

How the Company Is Catching Up

Needless to say, this success has the company in a furious pace of planning and activities. One answer to the overwhelming demand is a dramatic expansion of Apple's manufacturing capability. Over the past year Apple has doubled the physical space given over to its manufacturing processes. Both the Cork, Ireland, and the Singapore manufacturing facilities have built huge additions to their already impressively large plants.

Initially the Classic was to be produced in Singapore, the LC in Cork, and the ci in Fremont, California. Then demand picked up and three shifts (round-the-clock) in Singapore were planned to catch up on the demand for Classics. Then Apple realized that there were no longer going to be delays, so it introduced air freighting. Now the Classic is being produced both in Asia and in Europe, at Apple's Cork facility. And (continues)
Our valued customers think so. The experts agree. Let them tell you why.

"worked flawlessly" "Just a quick note to let you know how sturdy your hard drives are. I am a Navy A-6 pilot. Just thought you’d like to know that your drive logged about 5 hours of flight time and 5 carrier landings and has worked flawlessly since. Not bad eh?"
Lt. Carl Oesterle, Navy A-6 pilot

"La Cie drives are the most reliable and convenient disks I’ve ever had." James J Haf, Lansing, MI

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"performance champ" "Of all the high-capacity drives, the price performance champ is the very affordable La Cie." MacUser, Dec. 1990

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"support was exceptionally good" "I now know why my friends suggested I buy La Cie, their backup and support was exceptionally good. Not only did La Cie provide intelligent articulate instruction and advice but they even called back to learn of my progress." Richard Woudenbergh, Ridgwood, NJ

"Perhaps you can take satisfaction in knowing that your dedicated users are appreciative of the quality you put into your product and the service with which you back it up." Dr. David J. Hibler, Lincoln NB

"service star" "Service star La Cie has toll free support and guaranteed turnaround time for repairs. La Cie comes out on top in service and support." Macworld, June 1990
David Kennedy
Langley, B.C. Canada

"fast, quiet, small and light"  "I love your Tsunami drive! It's fast, quiet, small and light and I can't emphasize how wonderful it is to turn the termination on and off. Of course, it doesn't hurt that you bundle Silverlining with it—the universal formatter with no competition that I know."
Johnathan Braun, Palo Alto, CA

"La Cie offers the leading combination of software and performance."  *Macworld, March 1990*

MacUser Labs show that La Cie drives best in raw speed, real-world performance, temperature and noise tests.  *MacUser, February 1990*

"performed beautifully"  "My productivity has increased at least three-fold. My La Cie drive has performed beautifully. It is really fast, quiet and the documentation is very clear. When I had a question and called, I got a friendly, helpful person who really took the time to explain what I needed to know. This sounds like a testimonial. Yep, I guess it is."  *Craig Turner, Chapel Hill, NC*

"I love these drives. The size is perfect, the response time is great, these are the best drives money can buy. I have searched and compared price, quality and performance with other products. La Cie is the best."  *Edwin E. Rivera-Juan, Hato-rey, PR*

"king of consumer choice"  "If you are value conscious you'll be hard pressed to beat La Cie."  *Macworld, November 1990*

"La Cie's longer warranties truly represent a good deal. The king of consumer choice."  *Macworld September 1990*

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*Circle 199 on reader service card*
the internal manufacturing structure has changed somewhat as well, at least in Cork. Flexible manufacturing has given way to speedier dedicated manufacturing capabilities—what Apple calls the cookie-cutter approach—so that the company can pump up the numbers of machines produced. Sören Olsson puts it succinctly: "We’re not talking about just going to a third shift in Singapore anymore. We’re talking about new manufacturing plants." And indeed, Apple has announced its intent to build another manufacturing plant in southern Europe in the near future.

More to Come
The changes in the volume of sales are reflected in engineering as well, where three new subdivisions of engineers look after products: high-volume (the Classic), high-performance (such as the f1x), and new products. And by this summer the company will have introduced a raft of additional products—a new version of its existing portable, a low-cost (that is, under $1000) printer, and a new CPU design center, the so-called Tower machine. Innovation in product design has taken a decided leap forward in Cupertino. More machines are emerging from the prototype projects that Apple’s horde of engineers have long produced.

An interesting question for Apple is how its dealers are going to handle this success and the sheer number of products. The permutations of computers, peripherals, and configurations are already confusing. It’s clear that Apple will have to perform some substantive overhaul of its dealer channel. And by that I don’t mean simply reducing the number of dealers (again) based upon how many Macs they sell (a policy that has reduced the number of dealers in the smaller or regional markets that Apple already serves so poorly).

An indication of the confusion, or perhaps of the number of opportunities that Apple has created, is the few add-on products that have been announced for the Classic, LC, and si. Only recently have manufacturers been able to create new add-on products for the Classic and si.

Growth May Hit 20 Percent
Apple’s revenues could grow to nearly $7.5 billion this year. Significant growth that should be returned to product engineering and development. Or, Apple could get greedy and figure out ways to export its operating system to other machines, thus creating an IBM-like clone scenario, and lose control of its own destiny. The company could continue to keep its executives in splendid isolation far from the market. Or all the success could allow Apple to focus on the near-term issues of new computers and not on the long-term viability of the Mac Operating System or of third-party software and hardware developers that sell the bulk of Apple’s computers.
When it comes to selecting the right scanner, be forewarned. It's a jungle out there. You may not get the quality you were promised.

The La Cie Silverscanner has evolved beyond all that. Just look at this comparison between the Microtek 300ZS and the La Cie Silverscanner. Each image was scanned at standard settings with no corrections. This ad was then created and separated using Adobe Photoshop, QuarkXPress and a Linotronic 330.

As you can see, Silverscanner is a more advanced species of scanner which adapts better to a changing environment. Silverscanner provides superior color, gray scale and line art over any other similar species of scanner. And as a bonus, Adobe Photoshop Limited Edition, Aldus PrePrint, Silverscan plug-in and Silverlining are included FREE with every Silverscanner purchase.


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Professional CAD System for the Macintosh

When we introduced this product we had to ask ourselves, "What should DesignCAD cost?" To help with our decision we hired accountants. We consulted with industry "movers and shakers". We purchased the finest spreadsheets available. Many people said, "The software should sell for $3,000.00 or more." Others said, "It's good, darn good—sell it for at least $2,000.00." Opinions varied. Finally we said, in the Great American Tradition, "Aw... What the Heck! Let's see the competition beat this $699.00.

DesignCAD has disproved a common misconception about computer software: you don't always have to spend a lot of money to get high-power quality software. DesignCAD for the Mac has features of CAD systems costing thousands of dollars! Yet, DesignCAD is priced at least 50% to 80% BELOW comparable CAD packages... AND DESIGNCAD IS BETTER!

Excellent Software Compatibility!
Along with extensive hardware support, you get software compatibility! DesignCAD comes with (at no extra charge, of course!) file transfer utilities to let you read and write files in other formats such as IGES, DXF, HPGL, XY or XYZ coordinates, ASCII text files, EPS, Postscript and PICT or PICT2. NOW THAT'S COMPATIBILITY!

DesignCAD offers fully integrated 3D geometry!
Need 3D capability? Great! Look at how DesignCAD fully integrates its very powerful 3D mathematical foundation with excellent 2D drafting attributes, which are in a league all of their own, offering first-rate ease of learning and use.

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Tests prove that DesignCAD's user-friendly interface allows you to quickly produce complicated drawings in a fraction of the time required from the competition. Flexibility and power found within DesignCAD means you save time and money! DesignCAD is truly the CAD system that ANYONE can use!

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The list goes on and on!

For a closer look, contact your local Apple Authorized Dealer or call us: 918/825-4848
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Call or write for FREE BROCHURE
LETTERS

Curley, Larry, and Mac

The three stooges are alive, and going by the names of Classic, LC, and IIsi. In 1986 Apple had the right machine at the wrong price, but now, four years and a little cosmetic work on the Plus later, they give us the wrong machine at the right price. (After all, it does have a 7-year-old CPU.) The best thing the introduction of the LC will accomplish is to stimulate the market for used Mac IIs. (The wisdom of providing slots but requiring adapters to use them still escapes me.) Actually the IIsi, being the easiest to fix, is not so bad. A simple spacer to expand the case back to full-height will solve most of its problems. It offers value with the least compromise and fewest gimmicks. Best of all, it's the only one of the three that's not obsolete right out of the box.

Paul Looney
Los Angeles, California

Unfounded ELF Scare?

In your Commentary (December 1990) you have become an unwitting contributor to an unfounded fear of ELF electromagnetic fields. At worst, this scare is equivalent to the “cold fusion” euphoria of two years ago, and at best it represents irresponsible science and journalism. My assessment is based on calculations of field strengths and currents using standard electromagnetic theory and known electrical properties of cells. I refer the technically trained reader to a convincing presentation of these calculations and results by Robert K. Adair in Physics and Society, volume 19, number 4, October 1990, published by the American Physical Society.

Harmon W. Hubbard
Los Angeles, California

VDT Victim?

I may be one of the “early” victims of VDT radiation. I was a fanatical computer hacker in the 1980s, and all that I know or have done for the last 10 years is with computers. In 1986 I had a malignant cancer removed from my eyelid, near the tear duct. My doctor suggests it was caused by exposure to the sun, but I am a fair-skinned redhead and take precautions in the sun. I suspect the cause could be linked with overexposure to VDT screens. Three cheers for your efforts to let others know of possible hazards.

Carol Barnaly
British Columbia, Canada

Misfortune 500

Increasingly, Macworld seems to be talking to a different Mac world—either the very elite or those in big business. As a home user, it concerns me that each issue appears to be catering less to the individual user's needs and more to corporations or multiuser setups. Not all of your readers have TL's or connected to multigigabyte drives, newspaper-size color monitors, flatbed scanners, MIDI synchronizers, state-of-the-art video systems, and a coffee machine. Do my 5MB cx, ImageWriter LQ, 40MB drive and 2400-baud modem make me the sole candidate for the misfortune 500?

Dale Mullen
Nova Scotia, Canada

We make a concerted effort to meet the needs of home users too. "Is Your Mac Obsolete?" February 1990, which covered upgrade strategies, is only one example of features geared toward the more basic systems. Our regular How To columns, Insights, Quick Tips, and Getting Started, also provide information useful for the beginner to advanced user, and the New Products column covers products in every price range.—Ed.

(continues)

Corrections

MacBulletin (December 1990) incorrectly stated that Ariel Corporation is the only digital signal processing board based on the Motorola DSP56001 chip, intended for use with the Mac II. Digidesign also ships 56001-based DSP boards.

In our September 1990 article, "Best Buys in Low-Capacity Drives," the per-
Until now this age-old annual problem had two solutions. You'd either pay someone lots of money to do your taxes. Or suffer through doing your taxes yourself, and end up wishing you'd paid someone to do them.

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TurboTax? The tax preparation software designed for your Macintosh, that's like having someone to help you, and hold your hand while you prepare your own taxes.

While it knows all the tricks of an accountant, it incorporates the care that only you can have for your hard-earned money.

It guides you through preparing a tax return step by step. More than 60 commonly used forms, schedules and worksheets are included.

If you run into tough tax terminology, TurboTax will use a hypertext format to translate it into easy English.

It lets you try various tax scenarios to maximize your refund. Declare a stock loss, for example. Depreciate income property. Or try a different W4 deduction for next year's return.

TurboTax guides you in categorizing and filing more than 90 types of expenses and income. Then proofs your return in over 250 areas to help ensure no mistakes in logic, calculation, or any missed savings opportunities slip through.

It'll even help you sleep at night.
Tables showing the percentage of the returns audited for the amounts you're claiming can be used as a safety check. So there's little worry that anything on your return might flag the IRS.

All the number crunching is done in under 5 seconds. Then, when you're finished, you can print out and mail in your return right off your computer.

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But we didn't just double the raw output speed, we made it easier to use. We included direct scan support, so you can fax art and photos straight from the scanner with excellent resolution. We also made the software easier to use—it's as simple as printing to any printer. And we made the InterFax work in background (with or without Multifinder), so you can get back to work while your Mac faxes. You can even schedule when faxes are sent to take advantage of lower phone rates.

As an added plus, the new InterFax also works as a 2400-bps Hayes-compatible data modem with MNP 5 error correction. All these features together made *MacUser* name the InterFax 24/96 the best communication product of 1989.

If you want to get from here to wherever with twice the horsepower, call Abaton at 1-800-444-5321 (In Canada, 1-800-663-5161) or fax a note and your business card to (415) 683-2956. The new InterFax 24/96 will make your ideas easier to publish. Anywhere.

Introducing the Interfax 24/96
CPUs Apple is going to turn the screw again. Apple does not care about loyalty and makes it impossible for the small business or the home computer user to keep up with growing technology.

Timm Gearhart
Thomston, Georgia

A Matter of Bits
The 68020 is a full 32-bit data address device. Lon Poole refers to it as a 16-bit data device ("The Macintosh Family Evolves," December 1990). Better retract this unless you know of a new variation of the 68020.

Ray Houghton
Portland, Oregon

The 68020 CPU does process data 32 bits at a time once the data is in the CPU. However, the CPU must access memory twice for each 32 bits because the LC’s 68020 has a 16-bit data path for moving data between the CPU and memory.—Ed.

Privacy and Prodigy
Thank you for Steven Levy’s iconoclast column in your January 1991 issue. It’s nice to see something in print regarding Prodigy’s contempt for its subscribers’ privacy and free speech. The online community cannot allow the dangerous precedent that Prodigy has set to stand.

Dave Walker
Ecorse, Michigan

Wake Up and Smell the Carbide
In your News story (November 1990) you printed a photo of a Union Carbide plant captioned “A syzygy using Union Carbide plant in Bound Brook, New Jersey. Union Carbide declined to respond.—Ed.

Spelling Checker Shenanigans
A spelling check on a recent document I was working on questioned my use of the word ‘childcare.’ The editors of Microsoft’s dictionary, however, were able to offer only one alternative: ‘kidnapper.’

Dave Grupper
Brooklyn, New York

Letters should be mailed to Letters, Macworld, 501 Second St., San Francisco, CA 94107, or sent electronically to CompuServe (70370,702) or MCI Mail (284-8078). Please include a return address. We regret that, due to the high volume of mail received, 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.
Four Ways to Recognize a More Productive Mac User

The most obvious sign is the PTS package — usually on top of software manuals that no longer have to be read.

A cassette player is a sure giveaway — because it's the only accessory you need.

A PTS disk near the Mac — working with the real program brings real results.

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<td>Flight Simulator 1.0</td>
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<td>Flash 1.1</td>
<td>$127</td>
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<tr>
<td>QuickMail 2.2.3 (10 users)</td>
<td>$315</td>
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Dear MacConnection,

My family ordered my birthday present from MacConnection. It arrived the day after my birthday. The package was not nearly as large as it could have been. The catalog inside was not as glossy. The gift arrived intact despite the minimal, entirely-recyclable packing material. In short, the entire bundle was gorgeous. I recommend ordering from MacConnection for all these reasons. The item was priced less than the competition's, but I would have suggested MacConnection even if it had been a little more. Incidentally, I didn't get my present until the day after my birthday because it wasn't ordered until my birthday.

Bill Ware
Cleburne, TX

"It arrived the day after my birthday."
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- **3M** ... 60 day MBG
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Circle 177 on reader service card
by Cathy Abes

The tools and the talent behind Macworld’s graphics and the techniques that make them possible

Artist: Until recently an illustrator for the San Francisco Chronicle, Ron Chan says he likes to completely plan out his illustrations before he starts rendering them. “I need to be organized,” he says, “working on one section of the illustration at a time, building up from the bottom.” He has experimented with different techniques for creating graduations, several of which he used in this illustration.

Tools: Mac IIcx with 4MB of RAM and an internal 80MB hard drive; Microtek color scanner; Illustrator 3.0.

How It Was Done: For our feature on building a toolbox of Mac utilities (“Tools of the Trade”), Chan began his illustration by drawing a rough pencil sketch, which he scanned into Illustrator 3.0. After he blocked out all the shapes, he selected process (CMYK) colors for the various parts of the drawing by entering the correct percentages of cyan, magenta, yellow, and black for each. Once he had fine-tuned all the shapes and colors, he began creating gradients for several different parts of the drawing.

The first area Chan focused on was the face. Since it was made up of numerous curved paths, he decided to break them down into smaller paths so they would be easier for the Mac to process and print. To create the shadow that covers the left side of the face, he selected all the points along the outside edge of the shadow shape except the two endpoints (because Illustrator always tacks on the segment that follows each selected end point). After copying that area, he selected Paste in Front (-F) from the Edit menu to place

(continues)

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Circle 313 on reader service card
Search and Destroy

WHAT HAPPENED WHEN THE SECRET SERVICE VISITED STEVE JACKSON GAMES

BY STEVEN LEVY

Twenty-seven hundred 'A' Metcalfe Road is located in the city of Austin, State of Texas, County of Travis. Said address is a two story square building measuring approximately 50 feet on a side located on the south side of Metcalfe Street. The bottom story is multi-colored brick face and the upper story is white wood frame construction.

This is how the warrant authorizing the United States Secret Service to search the premises of Steve Jackson Games, Inc., describes the location of a raid conducted on March 1, 1990. Special agent Timothy Foley, who flew in from Chicago for the event, and several of his colleagues apparently had no trouble finding the target. They were there early, before the first employees arrived at the (non-computer) role-playing game company. By the time the astonished workers showed up, including proprietor Steve Jackson, the Secret Service agents, wearing shiny windbreakers and armed with handguns, were already at work, ripping drawers and closets open, collecting computer equipment for confiscation, and barring access to Jackson and his workers.

Thus began an episode that is startling in and of itself, but is also potentially significant in the issues it raises concerning law enforcement— and abuse—in the age of computers. But first back to 2700 "A" Metcalfe Road.

Trashing the Duke

“They said they had a warrant,” recalls Jackson, an affable bearded fellow in his thirties. The warrant authorized the agents to search his offices and remove items relating to certain alleged crimes. But the paper they flashed did not explain why Steve Jackson’s company was suspected of harboring information relating to a crime, nor even what that crime might be. Generally, communication between searchers and searchees was minimal, according to Jackson, as demonstrated by the agents’ insistence on forcibly breaking open closets and drawers when the nearby keybearers were perfectly willing to unlatch the locks to prevent damage.

After several hours, the U.S. government ended its visitation. Among the remains were greasy Whataburger wrappers from the agents’ breakfast and a Dukakis for President sticker one Secret Service agent apparently pulled off a wall and shredded. Not among the remains were three computer systems, several hard drives, a number of floppy disks, a laser printer, a pocket calculator, and stacks of paper files. The confiscated computers had held all the information for the game Jackson was preparing for release, as well as a working bulletin board system that focused on discussions of science fiction and gaming.

Naturally, Steve Jackson tried to get his hardware and his files back. Because without that data, he was unable to publish a game that was crucial to the financial health of his company—advance orders had already been taken. As it turns out, this game, called GURPS Cyberpunk, had a plot that involved a computer break-in. And when Jackson went to the local branch of the Secret Service to attempt to re-
claim his property, he was told that the game was, in the opinion of the agents, a handbook for computer crime. At that point, Jackson thought he knew the reason for the search: the employee designing the product, Loyd Blankenship, had faced a Secret Service raid on March 1 and equipment had been confiscated from his home. But surely this was a misunderstanding:

GURPS Cyberpunk involved a science-fiction scenario occurring in the future, and the computer described and the details of its operating system were products of a game designer's imagination.

Nonetheless, Jackson was not able to retrieve his data or equipment then. The best he could do was make an appointment with the Secret Service to make copies of a very few files, with an agent painstakingly hunt-and-pecking the commands at the keyboard, muttering comments, Jackson claims, like "modems should be outlawed." When Jackson's lawyer asked to see a copy of the warrant, the attorney was informed that the information was sealed. It was not until the Electronic Frontier Foundation, a Massachusetts-based nonprofit devoted to protecting civil rights in the computer age, became involved in the case and announced its intent to sue to get the document released that the search warrant was unsealed.

**The Real Reason**

Once the search warrant was released, Steve Jackson learned that his game had nothing to do with the search. The warrant consisted of a description of the location, a general list of material and equipment to be examined, and an affidavit by Secret Service agent Tim Foley that presented the justification for the search.

The real motive behind the raid was to gather evidence relating to Loyd Blankenship. This young man, according to Foley, was a member of the so-called Legion of Doom, an informal group of cyberpunk hackers who were under scrutiny for allegedly messing with the Bell South telephone system. Blankenship, whose online handle was The Mentor, had a bulletin board of his own and like several other BBS operators across the country had posted an electronic newsletter called *Phrack*. This information was provided to Foley by Henry (Hank) Kluepfel, a Bellcore security expert who logged on to Blankenship's bulletin board, checked the user list, and discovered people known to Kluepfel as hackers. As Foley defines the term, "computer hackers are individuals involved with the unauthorized access of computer systems by various means."

According to Foley's affidavit, *Phrack* was published by a college student named Craig Niedoř. In issue 24 of *Phrack*, Niedoř included a document allegedly stolen from Bell South by a Legion of Doom member Robert Rigg(s). (Riggs has since pled guilty.)

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Circle 287 on reader service card
guilty to the theft.) It concerned the 911 emergency phone system and was, Foley claims, a “highly proprietary” document worth at least $79,000. By republishing the document, Blankenship allegedly violated the law against transporting stolen property worth more than $5000.

The second alleged crime cited was also discovered as a result of Hank Kluepfel’s daring undercover work. Supposedly, another hacker involved in running the BBS had begun a new service to crack UNIX passwords. This would be a violation of federal law. Foley claimed that Blankenship was involved in this scheme because Blankenship responded to a question about a certain “transfer protocol,” presumably to be used to crack passwords and rummage through people’s data.

The Affidavit Decrypted

Sounds frightening. But upon further examination, the charges in the Secret Service affidavit evaporate as cleanly as a deleted data file. First, consider the case against the electronic newsletter Phrack. Putting aside the question of whether simply republishing a stolen document is a crime (remember, the Supreme Court affirmed that the New York Times was within its rights to print the Pentagon Papers), there is a question of the worth of the 911 document. Indeed, when government attorney William Cook brought Phrack publisher Craig Niedorf to trial he got a very nasty surprise. Niedorf’s defense team had discovered that the information in the “highly proprietary” paper could easily be found in public libraries and ordered for $13 by calling an 800 number run by the phone company itself. (At that point Cook discreetly dropped the charges against Niedorf.)

As for the password-decryption scheme supposedly uncovered by the Bellcore security expert Henry Kluepfel, it’s enlightening to examine the actual comments posted. True, a hacker calling himself Erik Bloodaxe (spare me) discussed such a plan, but it was clearly in the realm of speculation. He even finished his comment by saying, “What do you people think? Bad idea? Good idea? Hell . . . it is just another attempt by me to piss everyone off.” This disclaimer was not included in Foley’s affidavit.

And Loyd Blankenship’s role in this imaginary scheme is even more evanescent. In the course of the online discussion, someone mentioned the word kermit. Another user asked what that was, and Blankenship, in his only comment in that particular thread, mentioned, correctly, that it’s simply a transfer protocol to move files from one computer to another. There’s nothing illegal or sinister about it. So the link to Blankenship in this affidavit was entirely bogus.

So much for the reasons for searching Blankenship. What about Steve Jackson? There were never any allegations against him. The search of his company was conducted only be—
(continues)
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cause Blankenship worked there. As a result, the company could not continue with a key product, and Jackson, fighting to keep his company going, had to lay off 8 of his 17 employees.

"The layoffs were entirely because of the raid," says Jackson. "When we couldn’t ship the product, we had no money. It almost killed our company." It wasn’t until six months after the search that any of Jackson’s equipment was returned. Of the three computers confiscated, one was fine, one didn’t work until after a $200 repair job, and the third was inoperable.

Even though Jackson has now published GURPS Cyberpunk, and the game is doing well, the company has not yet recovered. "I know we’ve lost more than $125,000 because of the raid," says Jackson. "But I can’t put a cash value on firing eight employees.” He has rehired one worker and plans to add another, that means there are still six people without jobs, courtesy of the United States Secret Service.

The Issues
The Jackson case may not be over. The Electronic Frontier Foundation has retained counsel for Jackson. The foundation has not yet decided if Jackson’s experience would make a good test case in a civil action to determine the limits of the government in computer-related searches.

But even if this case never reaches trial, Jackson’s attorney, Sharon Beckman, believes that Steve Jackson has been unfairly treated. “This isn’t the way things should happen,” she says of the search. Some of the issues have nothing to do with the computer age. For instance, the lack of a nexus—a piece of evidence linking Steve Jackson Games to the investigation of Blankenship—is ample grounds for questioning a search, regardless of any computer connection. But more to the point, the entire Jackson case illustrates the lack of established precedent in dealing with crime that may involve electronic data.

Beckman points out that one of the confiscated computers was devoted to running a BBS that was actually connected at the time. Since an electronic bulletin board is a sort of publication (however new), pre-
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sumably it is entitled to protection under the First Amendment. A related First Amendment question comes from the fact that Steve Jackson Games is essentially a publisher. Its ability to publish was ended simply because the government thought that one of its employees might be storing incriminating evidence on the company computer system. Does this mean that if a hacker worked for *Macworld*, or the *New York Times*, investigators could use those circumstances to confiscate all the computer systems, effectively shutting down operations?

There are other issues as well. Certainly law enforcement officials should be able to legally search computer files when there is sufficient evidence, fairly presented, to get a search warrant. But how sweeping should the search be? "Does a search mean that every piece of digital media that the subject has should be searched?" asks Marc Rotenberg, of the Computer Professionals for Social Responsibility (CPSR). "The main point of searches of digital spaces should be the concept of minimization, trying to get the least intrusion possible." In an ideally designed search, law enforcement officers might well examine hard drives electronically, seeking key words to identify relevant documents while maintaining the privacy of the remaining files.

Gail Thackeray, an Arizona prosecutor known for her antihacker efforts in what have been called the Sun Devil raids, says that properly planned digital searches can minimize inconvenience to searchees, particularly those involved as witnesses rather than as the subjects of investigation. But she does note that sometimes it's not so easy to determine immediately what might or might not be relevant. And sometimes investigators looking through confiscated data files can stumble on other materials that might trigger further action. "What if we take 10 disks away from someone we suspect of breaking into computers and taking data, and we discover 15 expensive software programs that look like pirate copies. What do we do? Give back stolen property?"

Thackeray says that though it is unlikely, and current law limits this option to federal authorities, it is possible that a prosecutor might try the "Al Capone trick." (As mob scholars and movie fans know, Capone was nailed not for murder but for tax evasion.) So if a prosecutor can't pin a break-in on a hacker, he might decide to try him for a pirated copy of SimEarth. Or, as Marc Rotenberg notes, "If you extend the 'plain view' doctrine [which means that anything visible to investigators during a search is fair game] to digital media, there's a problem—*everything* is there. What if you wrote a memo to yourself saying you haven't paid the IRS?"

The Worst Case

 Somehow I feel that common sense, spurred by the efforts of organizations like the CPSR and the EFF, will ultimately prevail. Eventually law enforcement officers will understand computers better and learn to search electronic files effectively. If not, judges will force them to.

But what I do not understand is the passion with which certain law enforcement officers pursue groups like the Legion of Doom, who strike me as relatively benign lawbreakers on the overall scale of skulduggery. The murder rate is soaring, the national debt is burdened by savings and loan fraud, and here is the Secret Service, led by government attorneys, expending its limited resources to chase Erik Bloodaxe and The Mentor. In their defense, prosecutors like Gail Thackeray claim that the harm caused by young cyber-criminals is not only considerable, but growing. And though none of the Legion of Doom have been convicted of actually damaging anyone's files, there is a clear potential for harm. As computer users, we have much to fear from the dark-side hacker. A bad-case scenario? Someone's privacy could be violated when a hacker reads computer files without permission. Our files could be compromised or made unavailable. The very worst case? An entire business could be brought to a halt.

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Ethics, E-Mail, and the Law

WHEN LEGAL AIN'T NECESSARILY RIGHT

BY DEBORAH BRANSCUM

Just over a year ago, Epson America fired Alana Shoars from her job as electronic-mail administrator. Epson says she was fired for just cause, but won't elaborate. Shoars says she was fired for questioning why her supervisor was reading employee E-mail without the knowledge of the employees involved.

The suits Shoars has filed against Epson raise several unresolved legal and ethical questions about electronic communications. Some 10 million people in the United States use E-mail systems, and users tend to assume that electronic messages are as private as letters sent through the postal service—but that's not the case.

The Suit against Epson
Alana Shoars says she found out the hard way as Epson's E-mail administrator. The company “told me to market the E-mail system and make sure everyone knew it was private, safe, and secure.” But according to Shoars, E-mail between the Hewlett-Packard 3000 system and the MCI Mail service was being monitored by her supervisor. “I could keep my mouth shut and ignore it, or I could try to stop it and lose my job,” said Shoars, who now works for Warner Brothers. “I made my choice. I had given everyone in the company my word that the E-mail was safe and secure.”

Epson has a very different perspective. Shoars “was terminated for just cause,” says Scot Edwards, Epson's director of corporate communications. "Her termination had nothing to do with electronic mail or the right to privacy."

Epson denies allegations that the company was monitoring electronic mail and denies any wrongdoing. “The E-mail system is part of the computer system that also carries other non-E-mail company data,” says Edwards. “And because there are individuals charged with maintaining and administering the system, we do not guarantee the privacy of electronic data on our system. But our policy clearly is not to routinely or indiscriminately read electronic mail.”

But attorney Noel Shipman, who represents Shoars, maintains that Epson was reading and printing out E-mail and in so doing violated a California law that makes it a crime for a person or company to eavesdrop or record confidential communication without the consent of both the sender and receiver. (Colorado and Florida have similar legislation, according to Shipman, who says federal law is weaker because it requires consent from only one party to monitor mail.)

The expectation of privacy is a key issue, according to Shipman. At the time Alana Shoars was fired Epson (like many companies) had no official policy regarding access to E-mail. “Privacy is a constitutional right in California,” says Shipman. “There are all sorts of very easy ways to invade your privacy. But the law says you have a right to your privacy. And you have a right to communicate without unknown parties reading your mail. And the fact that you're doing it at work doesn't change that.”

Since Shoars filed wrongful-termination and class-action suits (continue)
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against the company, Epson has notified employees that it cannot guarantee the privacy of any data. To head off lawsuits, some other companies are doing the same. But that may not resolve all the legal issues. Michael Blum, a specialist in electronic communications issues, raises some interesting questions. "In the absence of an employee having reasonable expectations of privacy in the system, should that employee be punished for using cryptographic software himself? And if employees are encrypting information, to what degree should employers have the keys?"

The legal issues won't be resolved anytime soon, which leaves companies to grapple with the practical and ethical considerations of handling electronic mail. Executives routinely give assistants passwords to E-mail accounts so that important messages don't get ignored when they travel or call in sick. And that seems entirely reasonable to me. But reading individual messages for any other reason is the kind of ham-handed action that can destroy whatever trust exists between supervisors and their employees. Moreover, companies don't need to read mail or eavesdrop on telephone conversations to protect their resources. Managers often monitor phone bills to check for inappropriate usage, and the same technique works for electronic mail. As Blum told InfoWorld, "You can look at the address, the header, the location from which it is being sent, and how large a file it is in order to determine if the company's resources are being abused." Finally, it's inefficient. E-mail is often less expensive than phone calls or faxes, but once the expectation of privacy is lost, employee usage may drop dramatically.

Whatever official policy a company adopts on electronic mail, there are plenty of ways for a network administrator (or a savvy tech type) to intercept messages—not necessarily to eavesdrop, but to anticipate or solve network problems. "Any product that captures [data] packets directly off the network wire in raw form will bypass most network security," says Eric Forste of Neon Software, which makes a network administration tool for Ethernet networks. There are several similar programs for Ethernet networks, and such products are expected to move to LocalTalk networks soon. Using these tools, virtually anything on a network can be captured and read.

"There's a small universe of people who know how to intercept electronic mail and an even smaller subset who want to," says Mike Godwin of the Electronic Frontier Foundation. Maybe so, but can managers really feel comfortable knowing that their confidential memos can be captured? "The only protection you have is encryption," says Forste. Some companies, such as cc:mail, already offer encryption as part of their Macintosh E-mail products. Others, such as Microsoft and CE Software, are working to add that feature so that messages will be

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So fast that it waits for me, I don't wait for it...
automatically encrypted once they are composed and decrypted at the receiving end.

Until mail encryption becomes universal, Alana Shoars has some advice. The first suggestion: get the company policy on E-mail in writing. The second “goes back to an old rule: my grandfather taught me. Don’t put anything in writing that you would be ashamed to see on the front page.”

The Prodigy Puzzle
The privacy of electronic mail on information services is protected by the Electronic Communications Act of 1986, but revised message guidelines and a new membership agreement by Prodigy suggest that privacy is not the only issue when it comes to electronic communications.

As readers of The Iconoclast (January 1991) may recall, after the Prodigy information service announced a new fee structure for electronic mail last year, all hell broke loose. A group of protesters organized to oppose the price hike and sent out thousands of messages to other members and advertisers to win support for their cause. Prodigy responded by abruptly disconnecting about a dozen people because of complaints the company says it received. The service also instituted new guidelines for private mail and revised the membership agreement.

Prodigy’s messaging guidelines place limits on communications to advertisers, the use of messaging software with the service, and so-called chain letters. According to the guidelines, “Members may use messaging to contact merchants and advertisers only to purchase goods and services [and] communicate about specific orders placed online. Automated message-distribution programs . . . may not be used with the Prodigy software. Chain letters (a mailing with a request to recipients to continue distribution to others) are not permitted.”

Prodigy wants to make it clear that it is not an E-mail service. “This was costing us an enormous amount of money, thousands of dollars,” says Geoffrey Moore, the director of market programs and communications at Prodigy. “What we didn’t anticipate and what we can’t ignore is having a tiny minority send out huge amounts of mail. Even if they pay for it, if the volume is unlimited we have to make more capital investments—add more modems, ports, mainframes. The revenue we get doesn’t come anywhere near covering those capital expenses.”

I called Moore because I was troubled by what Henry Niman had told me about his experience with Prodigy. Niman, a cancer researcher in Pittsburgh, Pennsylvania, was involved in the Prodigy E-mail protest and sent out hundreds of messages about the price hike and related developments. Niman says that his account, like those of several other protesters, was terminated without warning for “harassing” other members, a charge he denies. (continues)
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<tr>
<td>Resolution (dpi)</td>
<td>80</td>
<td>72</td>
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<tr>
<td>Vertical refresh</td>
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<tr>
<td>Popup menus</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Enlarged menu bar</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Enlarged cursor</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Screen saver</td>
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<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Screen copy</td>
<td>Yes</td>
<td>No</td>
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</tr>
<tr>
<td>Full year warranty</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
<td>VideoPaint</td>
<td>No</td>
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<td>No</td>
</tr>
<tr>
<td>DeskPaint v1.5</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Tilt and swivel</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Works with Plus. SE. Classic</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Dealer markup</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

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We have a color interface for every Mac II and the SE/30. And monochrome systems for the Mac Plus, Classic, SE, SE/30 and all Mac IIs. Whether your application requires color or monochrome, we have the solution!

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<table>
<thead>
<tr>
<th>PixelView I</th>
<th>PixelView II</th>
<th>ProView 8</th>
<th>ProView 24</th>
</tr>
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<tbody>
<tr>
<td>Display type</td>
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<td>8-bit color</td>
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<td>Viewing area (sq. in.)</td>
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<td>No</td>
</tr>
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</table>
Niman lost access to electronic banking and, like the other protesters, he lost access to the messages in his mailbox. In his case, that was particularly critical because one of the messages involved a patient's medical treatment.

Prodigy's membership agreement says that either side can terminate without warning. Prodigy will not discuss individual members, but Moore said, "I don't think we specifically went to them and said if you don't stop what you're doing, we're going to disconnect you." The company has offered to allow the protesters back onto the service if they sign the revised guidelines. But Moore didn't sound contrite about shutting people out of their mailboxes. "We're not talking about a bunch of people who've done nothing and one day a malicious company cut them off," he said. "We're talking about many people who've done outrageous acts for which many people have complained. . . . We do give them warnings. But if someone is sending 50,000 messages a day, then we don't give them much warning. I don't think you appreciate how much this is costing us."

I appreciate the fact that E-Mail has been more expensive than Prodigy expected, which is why the company changed the pricing structure. But this issue is about more than dollars and cents. Dissent may be outrageous, but it's not a crime. No warning, electronic or otherwise, was sent to the protesters in the many weeks they were sending out mail—they were simply booted off the service abruptly.

Unfair Treatment
Prodigy makes me cranky because I don't think people deserve such (continues)
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WE DIDN'T THINK IT COULD HAPPEN TO US.

But why take a chance? Sure, we'd heard about virus protection. But it was hard to believe our innocent little Mac could be a breeding ground for computer disease and disaster. Until we started sharing more data disks. And spending more time online. Suddenly it really made sense to protect ourselves.

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The last thing we wanted was some complex paranoid program that kept interrupting us while it went on search and destroy missions. We wanted a program we could load and pretty much forget about.

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So when it comes to virus protection, take our advice.

Don't get scared.

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"faster and easier to use..."

—MacWEEK, July 10, 1990

"...has replaced SAM as my preventer and checker of choice."

—MacUser, September 1990 (5 Mice)

SERVICE HERO

Manhattan-based consultant (and Macworld contributing editor) David Pogue writes of a satisfying experience with Texas Instruments. He suggested that one client buy a Texas Instruments microLaser printer. After a few days, the printer stopped working. Pogue called the service number and discovered that there was a TI repair place only a few blocks away. But the client had lost the receipt.

"The TI guy asked where we bought it. We told him MacAvenue. He told us to hold on. Within five minutes, he was back to us. He had traced the most recent shipments of microLasers from the TI plant to MacAvenue. It had been manufactured only a month before, and thus was certainly within its warranty.

"The final good straw: over the phone, we deduced that the problem was with the controller board. No need to haul in the whole 35-pound printer, he said."

treatment unless they are being investigated for a criminal act. And I don’t approve of limits on private communications to advertisers—what if I have a customer service complaint?

Niman and others complained to Prodigy about the lack of notice and other aspects of their membership terminations. Perhaps in response, the company has expanded its membership agreement to make it clear it has no responsibilities to speak of toward its members. “Prodigy may terminate any Membership without notice for violation of this Agreement or for other conduct that Prodigy believes, at its sole discretion, is detrimental to other Members or to the business interests of Prodigy, its Merchants or information providers,” reads the agreement. Prodigy has no responsi- (continues)
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  - Orders placed by 9 pm EST (6 pm PST) weekdays for 'in stock' items will ship that day for overnight delivery (baring system failure, traffic, etc.).
  - APO/FPO/PG boxes shipped 1st class U.S. mail.

**Defective software will be replaced immediately, and hardware will be replaced or repaired at our discretion.**
- Most products carry a 30-60 day money-back guarantee (call 1-800-248-0300 for return authorization number.
- Due to the advanced printing of this advertisement, our prices may change. We are committed to offering these prices and product availability so call for most current prices.
- Customer Service: 1-800-248-9948, Weekdays: 10am-9pm EST, 7 am-6 pm PST.
- MacZone 18005 NE 68th st., Suite A110, Redmond, WA 98052 USA
- Outside USA: Canada
  - Fax: (206) 381-3421
# Business & Presentation

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## Utilities

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### Key Features

- **Microsoft Excel 2.2**: Excel 2.2 delivers a host of improvements and new features. It recalculates up to 40% faster and the new Search and Replace function makes global changes. Charting is improved—just double-click anywhere on a chart to see the dialog box for all the chart formatting contexts.

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<th>Price</th>
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### Over 1600 products in stock
Survivor Software
MacMoney
MacMoney – an award winning personal and small business basic accounting program. More than just check writing, it tracks multiple bank accounts, credit cards, and cash accounts, as well as assets and liabilities. Prints reports, graphs and checks and it's easy to use. Complete double entry accounting without having to understand accounting terms. Includes simple loan and retirement planning:
MacMoney ........ $58

Meca Software, Inc.
Managing Your Money
Andrew Tobias' Managing Your Money is personal financial software that includes powerful financial 'chapters' that provide everything from basic budget and checkbook management to life insurance and tax planning, even complex portfolio management. These integrated chapters allow transactions made in one part of the program to be automatically recorded in the other chapters.
Managing Your Money ........ $230

Reality Technologies
Wealth Builder
Calculate your net worth by using templates to easily create a personal profile, balance sheet and budget summary. If you use Quicken, Andrew Tobias' Managing Your Money or Mac Money you can import data directly. Also establish realistic financial goals, objectives and then take action!
Wealth Builder ...................... $144

Chipssoft
TurboTax
TurboTax Personal/1040 takes the hard work out of preparing your federal taxes. When finished, it prints out your completed tax form and all supplemental schedules. TurboTax warns you of questionable deductions and tells you what the IRS regards as normal.
TurboTax ... $54

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Excite your imagination with monitors for every Macintosh

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15" Full Page Monitor
You can now eliminate all the scrolling, squinting, and squinting of small screen Macintosh computing. Word processing, financial analysis and graphics have never looked as good as they do on this full screen viewing area. The monitor can display an entire 8 1/2 x 11 inches of screen with a flicker-free refresh rate of 75 Hertz and a high resolution of 640 by 870 pixels.

15" Monitor .......... $579

E-Machine T-16
Color Display
Spread out with almost twice the display area of the standard 13" color monitor. View your work exactly as it will be printed at actual size. Save almost one half the cost of a 19" color monitor. Get the sharpest, cleanest color display at any price. The T16 has excellent colors, linearity, and sharpness, and it sells for a lot less than its larger cousins. The T16 is an excellent choice for CAD/CAM or color graphics. Retail $2295.

T16 Color Monitor .......... $2275

Sigma
L-View
Multi-Mode Monitor
An ergonomic monitor design offers user-oriented details like a tilt/swivel base and paper white phosphor. L-View's Low-Emission design meets guidelines for electromagnetic field emissions established by the Swedish National Board for Measurement and Testing. L-View includes video card, 19" monitor, control panel software, and user's guide.

Multi-Mode Monitor .................. $1475

MegaGraphics
Rival
B & W Monitor
The critically acclaimed MegaGraphics Rival is now available for all Macintosh models. It gives you the most crisp, most clear, and brightest image in the business, with true 'What You See Is What You Get.' Because the 19" screen displays two facing pages, it is ideal for use in desktop publishing, layout and word processing. The wide expanse of workspace is an enormous benefit when using CAD and spread sheet applications.

Rival 2001 ................. $1199

VIDEO BOARDS & MONITORS

Micron - 8 Bit Color Cards
Resolution 640 x 480
Mac II or SE/30 ........ $345
Resolution 1024 x 768
Mac II or SE/30 ........ 585
RasterOps
ClearView GS Gray Scale
System Mac II & SE/30 .... 1692
Color Boards
256 (II, IIx, IIX, IIc) ........ 290
264 (SE/30 - 13) .......... 525
364 (Mac II - 13) ......... 435
364 (Mac II - 13) ........ 955
RasterOps
Multi Media
364 w/AudioMedia ......... 1299
364 w/ Director ....... 1299
Sigma Designs
L-View Multi-Mode
SE/30 or II ........ 1475
Page View
SE, SE/30 or Mac II .... 850
Silver View for Mac II .... 1950
Color Max 24 .......... 4550
Sony - Color Multiscan
14" 1304 H6 Color ....... 825

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Classic ............... $649
Plus ............... $679

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Applied Engineering 1.44 Mb Drive

Applied Engineering's SuperDrive-compatible 1.44 Mb high density drive looks, feels, runs, reads, writes, stacks and even smells like Apple's but it costs hundreds less. Access files almost instantly and copy disks without continually swapping disks. This drive incorporates the same high quality Sony Mechanism Apple uses and features auto eject MS-DOS compatibility and exclusive two-way read/write indicator light. Also available in 80K.

1.44 Mb Drive .................. $225
80K Drive ...................... $195

EMAC Impact Drive

The EMAC Impact hard drives pack all the power and convenience of a full-sized drive into a compact chassis. Now all your files and applications can be stored in one easily accessible location. Impact drives come in three capacities and are built with precision-engineered drive mechanisms for whisper-quiet, high-speed operation.

105 mb Drive ................... $805

PLI Infinity 40 Turbo Removable Hard Drive

The Infinity 40 Turbo uses PLI's turbocharged drive software to attain a 20ms access time, and with the TurboCache disk accelerator software and TurboBoost, you can achieve near zero effective average access times. This removable 45MB drive gives you infinite storage potential with removable cartridges. Each one holds 44MB and costs only slightly more per megabyte than floppy disks.

40 Turbo Removable .............. $750

Quantum External

40MB .......................... 428.
80MB .......................... 598.
160MB ......................... 679.
320MB ......................... 768.
720MB .......................... 928.

Quantum Internal

40MB .......................... 349.
80MB .......................... 569.
160MB ......................... 599.
320MB ......................... 768.
720MB ......................... 889.

Emac - Impact

20MB External .................. 385.
40MB External .................. 520.
80MB External .................. 750.
170MB External ................. 1305.

Microtech

Seagate Mechanisms
20MB External .................. 309.
40MB External .................. 420.
80MB External .................. 560.
100MB External .................. 715.

PLI

Turbo
20MB External .................. 1725.
300MB External .................. 1975.
600MB External .................. 2850.
SyQuest Removable
Infinity Twin ..................... 1475.
Carrying Case .................. 60.

Rodime

Impact Mechanism
45MB Removable .................. 659.

Rodime Plus
20MB External .................. 328.
45MB External .................. 499.

Rodime Cobra Mechanism
45MB External .................. 670.
45MB Internal .................. 535.
70MB External .................. 870.
70MB Internal .................. 735.
100MB External .................. 975.
100MB Internal .................. 870.
210MB External .................. 1345.
330MB External .................. 2125.

Syquest

44MB Cartridge .................. 74.

CD ROM Drive

DaymaFiX 360K 5.25” ........... 475.
DaymaFiX Dual Drives: 360K/1.44MB 5.25” .... 725.
360K/1.44MB 8.5”/4. ISO 748.
DOS Moutner .................. 53.

Toshiba Mechanism
Porta Drive CD ROM ............. 648.

NEC

CD-ROM-35 Battery Pack ..... 58.

PLI

CD ROM Drive .................. 675.
600MB Optical Drive .......... 379.
600MB Optical Cartridge .. 235.

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After Hours Software

TouchBASE

TouchBASE is a database to keep track of personal and business contacts. It is always handy because it’s a desk accessory. TouchBASE can print envelopes, labels, address books, fax cover sheets, and reports. It’s even a multi-user product so you can share your database on a network or use it all by yourself.

TouchBASE ............ $85

Quark XPress 3.0

Quark XPress 3.0 boasts a more intuitive user interface, many new features, plus redesigned and reorganized documentation. New measurement and page padding provide the user with interactive on-screen access. A library stores frequently used items, and a pasteboard provides a work area next to each page. Color trapping ensures precise color printing.

Quark XPress 3.0 ........ $508

Gold Disk

Animation Works

Animation Works is a 1 to 8 bit, easy-to-use, path-based animation program. Objects are created in the CEL editor, then animated over static or scrolling backgrounds in the Movie Editor. Also available is the ability to add sounds, color cycling, multi-frame palettes, and looping control.

Animation Works ........... $64

EDUCATION

Addison Wesley

Carlina

Voyager 1.2 ............. 86.

Goldstein & Blair

Bible, What Do I Do Now? 
& Software Combo ........ 39.

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Kid'sMath or Kids Time ... 28.

Hyperglog

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Pronunciation Tutor .... 54.

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Arthur: Quest for Excalibur, 28.

Quarterstaff ............. 19.

Leather Goddess of Phobos 19.

Incline Design

Bomber (with headphones). .31.

Dorian's Dilemma ........ 31.

Lucasfilm

Pipe Dream .......................... 16.

Indiana Jones: The Last Crusade . . . 33.

Microsoft

Flight Simulator 1.02 .... 31.

Mindscape

Global Dilema-Guns & Butter .... 33.

Loopz .......................... 26.

Balance of Power 1990 .... 29.

Truck 'n' Treasure .... 26.

Uninvited ................. 26.

Mysterium Tremendum

Moriarty's Revenge ........ 31.

New World Computing, Inc.

Might and Magic II ........ 38.

Strategic Simulations, Inc.

AD&D: Pool of Radiance .... 32.

Postcard International

Christmas Cards ............. 26.

with Secrets ............. 37.

Secrets ................. 14.

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Wordstar ............ 29.

Faces...Tris III ............. 20.

Visit! .......................... 32.

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Gold of the Americas .... 27.

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Armor Alley .......... 33.

Harpoon ................. 49.

Visionary Software

Synchronicity .......... 38.

XOR Corporation

Mac-Sci .................. 37.

MacGold Classic ....... 51.

NFL Challenge ........... 53.

We offer a complete selection of entertainment products.
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Entertainment

Acolade

Way of the Stones ........ 23.

Strategic ......... 35.

Jack Nicklaus' Greatest 18 . . 35.

Activision

Cosmic Osmo .......... 39.

Manhole .......... 27.

Shanghai ........... 18.

Addison Wesley

The Hobbit .... 22.

Braderbund

SimEarth .................. 41.

Ancient Art of War .... 25.

Ancient Art of Sea . . . 26.

Shufflepack Cafe .... 22.

SimCity 1.1 .......... 28.

SimCity Color .......... 46.

The Playroom .... 26.

Casady & Greene

Crystal Quest 2.2 .... 28.

w/Critter Editor ....... 39.

Mission Starlight .... 28.


Cinamaware

3 in Three .............. 31.

Electronic Arts


Weaver Baseball .... 33.

Starflight .......... 39.

THE MAC ZONE
Established 1986

One source for all your needs

Gold Disk

Animation Works

Animation Works is a 1 to 8 bit, easy-to-use, path-based animation program. Objects are created in the CEL editor, then animated over static or scrolling backgrounds in the Movie Editor. Also available is the ability to add sounds, color cycling, multi-frame palettes, and looping control.

Animation Works ........... $64

After Hours Software

TouchBASE

TouchBASE is a database to keep track of personal and business contacts. It is always handy because it’s a desk accessory. TouchBASE can print envelopes, labels, address books, fax cover sheets, and reports. It’s even a multi-user product so you can share your database on a network or use it all by yourself.

TouchBASE ............ $85

The Mac Zone

Published by

TouchBASE

TouchBASE is a database to keep track of personal and business contacts. It is always handy because it’s a desk accessory. TouchBASE can print envelopes, labels, address books, fax cover sheets, and reports. It’s even a multi-user product so you can share your database on a network or use it all by yourself.

TouchBASE ............ $85

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Conspicuous Consumer

bility for continued access to banking or brokerage services if you lose your account. And Prodigy has no responsibility for maintaining or delivering private electronic messages to a member who is suspended or terminated.

Are these rules fair? I don't think so, but as a private company Prodigy and other companies can set their own terms of service. At least for now. This country is headed toward a debate about computers, privacy, and electronic communications that may shape the law, and thus the industry, for many years to come.

That debate should be revved up at an upcoming conference sponsored by Computer Professionals for Social Responsibility. The First Conference on Computers, Freedom & Privacy is scheduled for March 25 to 28 in Burlingame, California. (Contact CPSR for more details at 415/322-3778.)

One of the sure topics is legislation. Prodigy is working hard to convince the world that it's a publisher, like Macworld and other magazines, and so has the right to edit or prohibit postings on its bulletin boards. But legislators might decide that the interactive communications aspect of Prodigy makes it more like a common carrier (such as the phone company) and that Prodigy should be treated accordingly. That would mean some form of public access—bad news for Prodigy officials, but good news for Prodigy members who want greater freedom of expression.

I don't know what the future holds for Epson, Prodigy, or electronic communications. But I do know that there's a very real electronic community created whenever people have access to computers and modems. For many users at home and at work, E-mail isn't just a service, it's a lifeline.

(Research assistance by Carolyn Bickford.)

Send nominees for sainthood to Service Heroes, Macworld, 501 Second St., San Francisco, CA 94107 or via AppleLink (Macworld1) or America Online (Branscum). Conversely, drop Conspicuous Consumer a line if a company is ignoring you.

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Making Music

YOU, TOO, CAN HAVE A MUSIC STUDIO IN YOUR OWN HOME

BY BRUCE F. WEBSTER

Music on the Macintosh has come a long way since the early days. It isn't that the original Mac did such a bad job—it just offered its share of obstacles—but systems such as the Amiga and the Atari ST were better known for their support of sound, music, and MIDI-based programs.

Things have changed, indeed. While the Atari ST remains popular within the music industry (perhaps the only place in the United States it does), the Macintosh is mounting a strong challenge to its primacy, thanks mostly to third-party developers who have pushed hard to develop bleeding-edge music software and hardware for the Mac. These products, developed initially for professionals and serious hobbyists, also open up new opportunities for students, at-home composers, and even those diving into the still-tenebrous waters of multimedia.

Even Apple, which for years has treated sound like a poor relation (why put a stereo sound chip in a machine if you're only going to provide monaural output?), is getting its act together. A massive rewrite of the Sound Manager, scheduled for System 7.0 but included in System 6.0.7, fixes many bugs, provides consistent functionality across platforms, and adds new capabilities in digitizing and compressing sound. The Macintosh IIx and Mac LC both come with sound-input ports (and a microphone). And Apple's MIDI Manager INIT and Patch Bay DA provide a universal mechanism for allowing MIDI-based software and hardware to talk to each other.

Prelude

Before delving further into this subject, some concepts and terminology should be discussed. Sampling or digitizing is a method of getting sound from the outside world (analog) into the Macintosh (digital). The sound comes in via a microphone or audio cable(s) from a stereo sound system. To convert the sound from an electromagnetic wave to a set of discrete digital values, an analog-to-digital (A-to-D) converter is used. The quality of the digitizing depends on two key factors: the sampling rate (how many times per second the wave is sampled) and the sample resolution (the number of bits used to represent the sampled value). The faster the sampling rate and the larger the sample resolution, the higher the quality of the digitized sound. Low-end sampling is usually around 8kHz (8000 samples per second), monaural (single channel), and uses 8 bits per sample; one minute of sound digitized at this quality would take up just under 470K of space. By contrast, compact discs use two channels of 44.1kHz and 16-bit sampling; one minute of digitized sound at this quality takes up 10 megabytes.

The MIDI (Musical Instrument Digital Interface) standard really is just that: a standard specification on both physical and logical levels for exchanging musical information between (continues)
People buy the Macintosh computer because it's friendly, easy to use, understandable, and uncomplicated. Doesn't it make sense that Macintosh training should be the same?

The Macintosh training problem started back a few years ago. First Apple said we didn’t need it. Later, when it became obvious that we did need training, Apple decided to leave it up to dealers and outside training companies. The dealers didn’t want to be bothered with training so in stepped the IBM training companies with their Mac version seminars and their $695 price tags. Most Mac owners choked on these courses. They were slow, tedious, expensive, and extremely ineffective. Mac owners didn’t like the training courses for the same reason they didn’t like the IBM computers. Too hard, too complicated, too time consuming.

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In 1986 MacAcademy pioneered a new Macintosh learning system. MacAcademy was formed by a group of business partners who were running several educational businesses on the Macintosh computer. Each specialized in one Macintosh program. They used that program every day for actual business purposes. They mastered each technique, experienced each program strength, each crash and bomb, learned shortcuts, and used the program to run actual businesses. No theory, no demos, but instead actual end-user experience.

In January of 1986 the four business partners combined their Macintosh knowledge, their business background, and their teaching skills into a brand new Macintosh training program called MacAcademy. Since that time they have trained over 50,000 Macintosh owners and 20,000 companies. Over 97% of all graduates have given MacAcademy training the rating of excellent.

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various devices, such as keyboards, synthesizers, sequencers, and computers. The information moved about is not actually audio; it is instructions on how to create audio, including when to turn notes on and off, setting timing, selecting instruments, and so on. MIDI hardware is based on serial transmission, but with special cables and a fixed baud rate; a MIDI interface for the Mac typically consists of a separate box hooked up to one or both serial ports (modem and printer) on the Mac. (A good primer on MIDI is *MIDI for Musicians* [Amsco Publications, 1986] by Craig Anderton.)

There are two basic types of sound in electronic instruments: synthesized and sampled. Synthesized sounds are usually generated by pushing data through special-purpose hardware, such as a digital signal processor (DSP). Sampled sounds come from digitized recordings of actual instruments (or people or phenomena), which are then played back. Synthesized sounds are easier to generate; sampled sounds are more true-to-life.

MIDI devices are described in terms of *instruments*; a device might have just one instrument, or it might have several, or it could even have hundreds. Devices are typically (though not always) *polyphonic*, that is, able to play multiple notes simultaneously as a chord. MIDI devices are also often *multitimbral*, able to play multiple instruments simultaneously. Each active instrument is typically assigned to one of 16 MIDI *channels* and responds only to MIDI instructions associated with that channel, ignoring all others.

A *sequencer* is a MIDI device (real or virtual) that records sequences of MIDI instructions, then plays them back. A given sequence is usually assigned to a specific MIDI channel; several sequences can be played simultaneously, allowing multiple instruments or devices to be driven by the sequencer.

**Theme**

How does one go about using all this technology with the Macintosh? A good start is a MIDI-producing instrument of some sort, such as a keyboard or synthesizer. At home, I have a Korg Concert-7000 digital piano, a Korg Symphony Orchestra module (which comes with several sampled instruments), and a Yamaha EMR-1 Digital Drummer. These devices are all connected to each other via both MIDI and audio cables, so that the orchestra and drum boxes can be "played" from the piano, and the output from all three can be blended together. But anyone playing (usually my wife) is still limited pretty much to playing in real time with two hands.

Enter the Macintosh. The first step is to establish a hardware interface between the MIDI instrument(s) and the Mac. Since MIDI is a serial technology, the equipment involved forms connections between the modem and/or printer ports and the MIDI cable(s). Companies such as Opcode Systems (415/369-8131) and Mark of the Unicorn (617/576-2760) offer a variety of boxes and rack-mount devices to do that. My home setup uses the Opcode Systems Studio Plus Two. It provides two MIDI inputs and six MIDI outputs, but I use only half of them: one input (from the piano) and three outputs (to the piano, orchestra box, and drum box).

The MIDI hardware interface by itself doesn't help; you need some sequencing software to take advantage of it. As mentioned above, a sequencer records MIDI information for later playback; Macintosh-based sequencers give you tremendous flexibility in creating, modifying, and saving multitrack compositions. Sequencing software available includes EZ Vision, Vision, and StudioVision (Opcode Systems); Performer (Mark of the Unicorn); and Cubase (Steinberg/Jones, 818/993-4091).

The process of creating a multitrack composition is simple, at least in concept. First, you launch the sequencing software and make sure it's talking to the correct serial/MIDI port. You then select which track to record first (typically, you have 16 or 32 to choose from), click on the Record control, and start playing on the MIDI instrument. The MIDI codes produced by the instrument—which contain information about pitch, volume, and duration—are recorded in the Mac's memory by the sequencer. When you're done, you click on the...
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Stop control. (If you’re smart, at this point you save the file.)

You can now play back the track you’ve created. The Mac itself doesn’t play anything; instead, it sends the MIDI codes back out over the MIDI outputs. You chose beforehand which MIDI channel the track is associated with; any connected MIDI device that has one or more instruments assigned to that channel plays the incoming notes on those instruments.

You can do a lot more than that, too. Sequencing software lets you edit what you’ve played on a note-by-note basis, rerecord selected segments, transpose what you’ve played into different keys, adjust the playback tempo, overdub new notes onto an existing track, and (of course) record additional tracks. Each track can be assigned to a different MIDI channel (and thus drive a different instrument), or several tracks can all drive the same channel, allowing performances not possible without electronic assistance. Some sequencers let you do dynamic mixing, changing the volume and pan (left-right positioning in stereo output) of each track as it’s playing. And, of course, you can save the entire composition to disk and reopen it at a later date for modification and playback.

Once you start playing with a keyboard and sequencers, you find yourself craving more instruments to play. After all, you want to use those tracks for something other than piano. You can invest in external MIDI devices (such as the Korg orchestra box I have), but there are other solutions. One is the MacProteus board from Digidesign (415/688-0600). This board, which plugs into any NuBus slot, emulates the E-mu Systems Proteus synthesizer. It has 192 sampled instruments (organized as three 64-instrument banks), it is 16-voice polyphonic, and it offers a wide array of functions and features. The MacProteus doesn’t have direct MIDI input; instead, it relies on the Apple MIDI Manager and the Patch Bay DA (both included with the MacProteus board) to establish internal and external connections. Thus, you can drive it directly from a keyboard or through a sequencing program. Audio output is via a headphone jack and a standard pair of left/right audio line-outs.

One of MacProteus’s bundled utilities (and there are several) lets you make and change channel and instrument assignments, even while music is being played. This lets you easily try out different instrument combinations for a given composition. You can also load new instruments—up to 64 at a time—into the MacProteus board, since one of its three banks is RAM-based (the other two are burned into ROM). Once you have a configuration you like, you can save it out to disk, to be loaded back in at any time.

Variations on a Theme

OK. You’ve got the keyboard, the MIDI interface, the sequencer, and the extra instruments. What more could you ask for?

How about a way to record your compositions? Sure, you could route keyboard (or MacProteus) output to a stereo system and record the output on a cassette tape, but you lose quality in the process. And if you copy that tape, you lose more quality, and so on until your masterpiece sounds like strained mush.

Relax, there are solutions. One is Audiomedia, a NuBus board from Digidesign. The Audiomedia board has a Motorola 56001 DSP chip, the same chip used for sound and music processing in the Next family of computers. Using the DSP, the Audiomedia board can sample incoming sound at full CD quality: 44.1kHz stereo, 16 bits per channel. It can also play back digitized sound and music at the same rate. You can do direct editing and manipulation of digitized sound, create playlists of sampled sound and music to be played in a certain order, and create sound resources to be used in HyperCard, Macromind Director, and other programs.

To use Audiomedia with MacProteus, just use standard audio cables to connect the MacProteus outputs to the Audiomedia inputs. The only tricky part is that the tape deck panel in the Audiomedia software is modal (bad design, folks). This means that once you bring the panel up, you can’t switch back to your se-
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sequencing software to start it playing. Instead, you have to leave enough dead time (empty measures) at the start of a composition to allow you to switch from the sequencer to Audiomedia, bring up the tape-deck panel, and punch Record before the music starts playing.

Be aware that if you’re going to use Audiomedia, you need a large, fast hard drive. CD-quality music eats up 10MB of disk space for each minute of playtime, and the disk itself has to have an access time of 28 milliseconds or less to handle the incoming stream of digitized sound.

If you want (or need) to get really fancy, Digidesign distributes Deck, a software package from OSC Products that turns the Audiomedia board into a four-track digital recorder/mixer. Some of its features are handled by sequencing software, but it does allow you to readily mix sequenced and live sound. Of course, you need lots and lots of disk space, and high-capacity removable media of some sort (Bernoulli box, optical drives) would help multiply disk storage. But you might find it worth it.

Coda

You’re almost set. You can play at your keyboard, create sequences, select instruments, and produce CD-quality, four-track recordings. Anything else you might want?

How about automatic transcription of a composition, with hard copy music sheets as a result? The company is Coda Music Software (612/854-1288), and the products are MusicProse and Finale. MusicProse is described as “music composition and publishing software,” and that’s pretty much what it does. Coda intended the program to be a smaller, less-expensive, and easier-to-use alternative to Finale. In this case, smaller means more than 250 pages of documentation, and cheaper means $399. For that, you get a product designed (according to Coda) for creating, editing, and printing lead sheets, piano-vocal scores, and small ensemble scores. It includes special fonts for music notation and guitar chords and supports real-time transcription of MIDI input; in short, it writes music notation as you play.

After looking at MusicProse, one could ask what more Finale has. A lot. More, in fact, than can be reasonably described here. Here’s a clue: it comes with three 7-by-12-inch spiral-bound manuals totaling nearly 1000 pages of documentation—and it appears to be meaningful, well-written documentation, detailing more about music notation than I believed existed. It’s probably the only $1000 (well, $995) software product I’ve seen that looks as though it’s worth $1000, though I’ll leave it to professionals to decide that.

While none of these products are cheap, you can put together a low-end system for surprisingly little. A basic MIDI interface can be had for under $100; sequencing software is also fairly inexpensive (EZ Vision lists for $149), and you can use both on a Mac Classic. You can find MIDI-compatible keyboards for under $1000, so your complete setup (including a Mac Classic with hard drive) should cost less than $3000.

On the other hand, you can spend a lot of money surprisingly fast. Vision lists for $495; MacProteus, for $895; Audiomedia, for $995; Deck, for $349; and Finale, for $995. Grand total: $3729. And that doesn’t include the Mac IIc (or better) that you’ll need, along with the 4MB to 8MB of RAM and the fast, high-capacity disk drive. You may even find yourself wanting a large-screen display, since even a Mac II display gets crowded with several of these applications up and running at the same time.

Before rushing out to buy any of these wares, examine your needs, wants, and resources carefully. Reviews of most items mentioned can be found in recent issues of Macworld, though in some cases later versions have been released. Also, remember that you can start small and build up as skill, money, and interest dictate. And who knows? Maybe you’ll finally get out those songs you’ve had inside for so long.

Contributing editor Bruce F. Webster is vice president of R&D at San Diego-based Pages, Inc. He can be reached via BIX (bwebster) and via MCI Mail (Bruce Webster).
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- Keytronics MacPro Keyboard w/Tempo II Software
- HyperCard & MultiFinder
- Virex Anti-virus Software
- Adobe Type Manager Software
- Norton Utilities, Total Recall and Loads of Free Shareware
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Apple Delays Backlit Portable

A problem with addressing memory on the system board has delayed Apple’s introduction of its backlit LCD version of the Macintosh Portable, and has put the machine’s future in doubt. Apple originally planned to introduce the backlit Portable on January 10 at the Macworld Expo and to begin shipping that day, but at press time Apple said that the system would not be available until mid-February at the earliest. One knowledgeable source inside Apple said there was a 25 percent chance that the backlit Portable would be cancelled completely.

The RAM addressing problem occurred after Apple designed in pseudostatic RAM to replace some of the costly static RAM on the backlit Portable’s system board. It was not clear at press time whether the problem was directly related to the use of pseudostatic RAM. Apple said the new, less expensive RAM design was part of the reason the company intended to lower the new Portable’s retail price by about $1800 while adding the adjustable backlighting feature.

At the moment there are three possibilities: Apple may decide to fix the glitch, ship the new Portable with the glitch, or kill the project entirely and devote its engineering resources to other projects in the area of portables. If it decides to ship without fixing the problem, the amount of addressable RAM might be limited to 5MB, and there could be problems with third-party RAM upgrades.

Although the backlit Portable was intended to replace the current model, availability of the original Portable will not be affected, Apple said. The company described the backlit Portable as a “course correction,” and emphasized that Apple is committed to creating a family of portable computers of different sizes, implying that a true laptop is in the pipeline.

Even in normal lighting conditions, the added backlighting greatly improved the legibility of the new Portable’s display on a prototype shown to Macworld. Apple said at the time of the original Portable’s introduction that it decided against backlighting because of the power drain and resulting shorter battery life. The battery life of the backlit Portable is rated at three to six hours with the backlighting on, depending on how high the backlighting is set, frequency of drive accesses, and so on. With the backlighting off, the battery life is the same as the original Portable’s six to twelve hours.

When and if it becomes available, the new Portable will come in two models: the Macintosh Portable 2/40 with 2MB of RAM and a 40MB hard drive, and the Macintosh Portable 4/40, which will have 4MB of RAM and the same internal drive. The Macintosh Portable 2/40 will have a new list price of about $4200, down from about $5998 for the original Portable. The Portable 4/40’s list price will be about $4700. Prices were not firm at press time.—T.M.

Ray Tracing for Laypeople

The folks who wrote Ray Dream Designer spent their programming days up in the Santa Cruz mountains looking down across Silicon Valley, instead of buried in a dark well of monotonous (continues)
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"We use the Model 10 with our Mac II in package design. It saved time and gave us a better product because we can quickly see color combinations instead of waiting hours or days for match prints."

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office cubes. Maybe that's why Ray Dream Designer presents three-dimensional space in a way that the visually illiterate can grasp.

Ray Dream Designer is really two programs: LightForge, where you create objects and describe their surfaces; and SceneBuilder, where you bring objects together and render them.

LightForge has a typical modeler's three-window view. You draw a 2-D base for an object, and then extrude it along any combination of lines, splines, and beziers. Setting points to stretch, squeeze, or bend the object is like setting tabs on a word processor's ruler. You can also lasso and autotrace a piece of a PICT image and apply all LightForge tools to it.

Ray Dream's rendering tools are impressive. Its solid shaders can create effects like extremely gnarly wood, or marble that looks like concrete with hot pink veins. It supports bump maps (for example, sandy surfaces), and when you apply a texture map (for example, putting a label on a bottle) Ray Dream provides 3-D registration marks to line everything up.

In SceneBuilder, each object projects an outline of itself against two walls and the floor of a room, making it impossible to get lost in space. If your scene gets too complex, you can collapse hierarchically linked objects like subheads in an outline (for example, hiding the chairs surrounding a table) or zoom in on a single object's subobjects. Object hierarchies can be rearranged in a tree-chart window, an ideal interface for managing animation—too bad Ray Dream has no animation.

Ray Dream images are highly compressed in memory (a 6MB file fills only 100K of RAM) so it easily shares a Mac with other programs under MultiFinder. It can batch-render images in the background, interrupt and resume a job, and replace the background without re-rendering. Its ray tracing is fast . . . set the index of refraction) , but it leaves edges unpleasantly hard and exact.

Ray Dream is also developing a utility, code-named Dark Edge, that will antialias batch flies such as frames of an animation.

Ray Dream Designer lists for $895 and requires a math coprocessor; a demo version is available for $39.95. For more information, call Ray Dream in Woodside, California, at 415/851-0943.—D.L.

A Language for Aphasics

Strokes and head injuries can affect the victim's ability to use language. This condition, called aphasia, can range from what one linguist describes as a constant, mild "tip-of-the-tongue" feeling to being completely unable to read, write, speak, or even understand what others say.

Unlike the hearing impaired, who have elaborated a subtle, sophisticated language of gestures, aphasics have had little alternative but to struggle with rehabilitation. Now a group of scientists have created Lingraphica, a graphical language for speech pathologists to use with aphasics—and that aphasics may learn to use to communicate among themselves or with their families.

Lingraphica strings together icons representing words and concepts into sentences. A speech pathologist draws up words from the database of icons using text typed into a Mac Portable; aphasics can also access words using a graphical searching method. Lingraphica's syntax is simpler than English, so it is not possible to merely convert English text to the new language. The first version of Lingraphica is text dependent: only people who can read and write will be able to add new icons to the database. Later versions may be completely independent of text.

(continues)
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Requirements for Mac version of CompuServe: Mac Plus or later model Macintosh with at least one megabyte of RAM. Mac System 6 or later version: hard disk, one 800K (or higher) floppy drive. Hayes compatible modem recommended.

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Richard Steele, who holds a Ph.D. in linguistics and is one of Lingraphica's principal designers, wonders about the implications of creating a new language: What will happen to his company's copyright when, as is inevitable, Lingraphica users begin to evolve the language? How long will it be until someone puts up an online information service for aphasics? And what if the Mac Portable proves too bulky a platform and someone clones Lingraphica for a notebook computer?

Pricing for Lingraphica was undecided at press time. For more information, contact Tolfa in Palo Alto, California, at 415/494-3220.—D.L.

By March, In Focus expects to have sample quantities of a color LCD with a refresh time of less than 80ms, which should eliminate cursor ghosting. In 1991 the company hopes to have a version that will support the video refresh rate of 30 frames per second.

When unfolded for carrying, the six-pound device has about the same length and width as a Mac II. It folds up into an easel arrangement for display; its 50w light source reflects off a mirror in back and then projects forward through the LCD panel. Because the light source is an incandescent bulb, the 5000M does not emit the extremely-low-frequency magnetic fields common to most CRTs.

Slated to ship to OEMs in the first quarter of 1991, the 5000M will initially come in versions for the Mac SE or Mac II series. The company had not set prices at press time, but said it hoped that retail prices for the color LCD monitor might be as low as $2500. For more information, contact In Focus Systems in Tualatin, Oregon, at 503/692-4968 or 800/327-7231.—T.M.

Color Display to Go

In Focus Systems, maker of color LCD projection panels, has adapted its technology to make a portable color monitor intended for presentations. The 5000M monitor, the first in the company's planned Direct View series, uses multiple stacked LCD panels and the subtractive method of producing color. Three panels produce cyan, magenta, and yellow, respectively. Each panel can produce its color in 17 different intensities, so the number of colors that can be displayed at once is 17 to the third power, or 4913.

The first version of the 10½-inch-diagonal 5000M will operate at 14 frames per second, not fast enough to eliminate ghosting when the cursor is moved rapidly across the screen.

The Mature Excel

Some military wit once remarked that China's air force flies the world's most advanced obsolete aircraft. Like those Chinese aircraft, Excel 3.0 is highly sophisticated and an inexhaustible workhorse of a program. Still, other products are redefining what a spreadsheet is and leaving Excel a little behind the times.

Excel 3.0 has Word-like style sheets for formatting text and numbers, and an outlining system that collapses rows or columns intelligently (such as, creating a hierarchy based on subtotals).

You can consolidate multiple worksheets into a summary sheet using row or column headers instead of cell numbers, so that links survive changes to the source worksheets. Data sheets can be combined as a Workgroup, with formatting and even formulas propagated to all sheets.

Excel 3.0 has buttons, a Full Impact-like (but unchangeable) icon bar across the top, and Wingz-like 3-D graphing tools. Graphs float with a set of drawing tools on a transparent layer above your data.

Excel 3.0's data-analysis tools are also improved, with a single-variable linear optimizer called Goal Seek built in, and Solver, a nonlinear, multivariable add-on that will be bundled.

More useful improvements in Excel 3.0: double-clicking widens columns to match the widest cell's content; Page Preview is a menu command, and its dialog box can go directly to Page Setup; for table designers, text can wrap inside cells; number formatting can change based on thresholds (for example, red below zero, black from zero to 10, and green above 10); and you can enter and calculate fractions.

Less mature data-analysis products are changing the turf under Excel's toes. Lotus Improv (announced for Next but not for the Mac) will understand data well enough to select related information (for example, several subtotal rows)
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elderly women. Bones weakened by
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have been used for years to detect
mineral loss. Quantitative Computed
Tomography (QCT), developed in
the late 1970s, uses low-intensity X rays
produced by a CT scanner to measure
bone density in the spine, but the
practice requires meticulous attention
to technique.
Researchers at the University of
California, San Francisco, have de-
signed new software to help stan-
dardize QCT test procedures. QCT-
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any Macintosh from the Plus on up, and
is compatible with most modern
CT equipment. It requires a special
device called a calibration phantom
that fits into the CT scanner under the
patient.
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sis costs $2500. For more infor-
mation, contact Image Enhancements
in San Francisco at 415/291-8772.
—Franklin N. Tessler

Power Requirements
Limit Mac Ilsi Expansion

Because the Mac Ilsi costs
about $2000 less than a Mac
Ilci, users may be tempted
to try to expand it into an engineer-
ing workstation. The Mac Ilsi has one-
slot expansion capability, but not all
NuBus expansion boards can be safely
used with the new system because of
the limited power design of the Ilsi.
Those seeking 24-bit true-color
systems should be very careful about
the board they buy for the job. Re-
placing the internal hard drive sup-
plied by Apple with a more power-
hungry one can push some 8-bit, dual-
page color boards into the red zone
(see “Power Drain of Some Ilsi
Graphics Boards”).

Apple has always insisted that
NuBus boards should draw less
than 15 watts per slot, but since previous
systems allowed 35w total power,
some manufacturers ignored Apple’s
warning and made 24-bit color boards
drawing over 15w. They reasoned that
people don’t really use all of the slots,
so there is power left over. But Apple’s
own NuBus adapter spec for the Ilsi
calls for no more than 13.3w to be
drawn by the single NuBus board.

Even Apple violated its rule, when
it designed the 24-bit Macintosh Dis-
play Card 8·24 GC, which draws 20w.
Other boards that went over the line
include the Radius DirectColor/24
(17.5w) and SuperMac’s ColorCard/24
(19.15w with graphics accelerator),
Spectrum/24 Series III (18.75w), and
Spectrum/24 PDQ (16.8w). All these
boards are used with two-page moni-
tors (1024 by 768 resolution or high-
er), except the ColorCard/24, which
(continues)
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Tektronix Introduces Color Printers

Tektronix recently replaced its PostScript-based Phaser PX color wax-transfer printer with the Phaser II PX, a smaller and lighter device that uses a new Sharp print engine. The company simultaneously introduced its first QuickDraw-based color printer, the Phaser II SX, which users can upgrade to a Phaser II PX. The Phaser II SX is Tektronix’s lowest-cost color printer ever at a suggested retail price of $4995; the price includes 1MB of RAM, expandable to 13MB. The Phaser II PX lists for $7995 and includes Adobe’s Color PostScript, 35 fonts, and 6MB of RAM, expandable to 10MB.

The Phaser II SX uses the TekColor method of matching monitor colors with printer colors, while the II PX is certified compatible with the Pantone color-matching system. Both machines output 1 page per minute at 300 by 300 dpi on letter- or legal-size paper. The II PX can produce 16.7 million colors, while the II SX can produce an unlimited number of colors, according to Tektronix.

The Phaser II SX comes with SCSI and parallel connectors. The Phaser II PX includes SCSI, a parallel port, and an AppleTalk connector, and it can receive data from several systems simultaneously. When purchasing the II SX, the buyer chooses between a personality kit for the Macintosh or for Windows 3.0. Each kit includes the cable, instruction book, driver, and a copy of Freedom of Press publishing software for the appropriate personal computer. The II SX kit for the Mac includes a Chooser-level driver. For the Phaser II PX, Tektronix licensed Apple’s LaserWriter driver and included HPGL capability for IBM PC-compatible systems.

At press time the II PX was slated to ship in January, with the II SX to follow in February. To upgrade from the II SX to the II PX, the user replaces the printer’s main logic board. Tektronix expects the cost of the upgrade to be the difference between the prices of the two printers, about $3000. For the new printers Tektronix has extended its warranty from 90 days to one year. For more information, contact Tektronix in Wilsonville, Oregon, at 800/855-6100. —T.M.

Apple Announces Plug-and-Play Ethernet

In what may be the initial step toward faster built-in networking, Apple has introduced two new Ethernet add-in boards, one for the Mac LC and the other for NuBus-based Macs. The Ethernet LC Card and Ethernet NB Card attempt to make Ethernet networking more of a plug-and-play (continues)
"YOU WANTED A BETTER DRIVE AT A LOWER PRICE. YOU GOT IT."

Thank you for helping us design an even better drive. Through your input, 40 improvements were made to our already successful M-series drives. But it was our idea to lower prices. The advantage of purchasing factory-direct is that when we negotiate lower prices we can pass the savings directly to you. No middlemen. No retailers. Period.

As always, you have my risk free '30 Day Love It or Return It' guarantee. Most orders ship the same day so you can be using your new Mirror Drive tomorrow. Try us and see for yourself!

Ronald Ebenstein, President/CEO

40 Improvements, And We Still Lowered The Price!

Just as the competition was catching up, we made over 40 improvements to our M-series drives. We beefed up our cabinet, added features (see diagram below), radically updated our disk management utilities, and bundled award winning utilities from CE Software and Microlytics. We did all of this and still lowered our prices!

EXCLUSIVE!
MediaManager™ Software With Every Drive.

MediaManager™ Mirror's exclusive disk management utility lets you format and partition your drive into multiple volumes, and add password protection to each. Its Drive Spanning™ feature allows several drives to be viewed as one contiguous volume. In other words, two 650Mb drives can be turned into one 1.3Gb volume!

EXCLUSIVE!
VolumeBackup™ Software With Every Drive.

VolumeBackup's sophisticated scripting feature lets you create custom backup procedures that automatically back up your data when it's most convenient (like when you sleep). Back up to floppies, tape, another drive, or a SyQuest cartridge.

FREE!
Award Winning Microlytics And CE Software...A $400 Value!

With every drive, we're including a collection of over a dozen CE Software utilities that includes QuickKeys Lite, DiskBp (v3.0), MockPackage, Ask, and Vaccine. And we've included Microlytics' GoFor, a high-speed text search and retrieval utility, and Inside Information, the first hierarchical dictionary for the Macintosh. Several of these wonderful utilities received MacUser Eddy awards and MacGuide Golden -Gate awards.

The Anatomy Of A Truly Great Drive.

16 Gauge DriveStiffener is attached to the mechanism before installation to eliminate warping.

Gold Plated 50 Pin Connectors ensure superior electrical connection.

External Termination Block: is supplied to let you terminate your drive from the rear panel, the way Apple recommends.

Bear Panel Fuse Holder has an extra fuse tucked away in a hidden compartment, should you ever need it.

Polyurethane Polymer Feet keep your desk scuff-free.

Pilfered AC Receptacle filters incoming power, and steps RF interference from traveling to your electrical system.

Whisper Quiet Cooling Fans maintain cool operating temperatures.

International Power Supply automatically adjusts for 110 or 220 volt and has a built-in protective fuse.

Gold Plated 50 Pin Connectors ensure superior electrical connection.
A Complete Line Of Mass Storage Solutions.

Mirror Technologies helped pioneer Macintosh mass storage back in 1985. Since then we have developed the most comprehensive line of storage and back-up solutions available. We offer internal and external hard drives, 45Mb removable drives, tape and DAT backup, rewritable optical, and CD-ROM.

Our T150 is a rugged European engineered tape drive based on 3M's DC600 format, allowing 150Mb to be backed up on each cartridge. Complete with automated software for unattended backup.

Our new T1200 incorporates the latest digital audio tape (DAT) technology that stores 1.3Gb of data on a pocket-sized cassette. Complete with Automated software for unattended backup. Tapes and AppleShare compatible.

Our DriveCare Technicians Repair Our Competitors' Drives!

Since DriveCare's introduction in August 1988, our Technicians have repaired thousands of drives from almost every one of our competitors. And their data recovery expertise has earned them a place in the hearts of many MIS managers.

All of our drives are covered by generous warranties and come with free lifetime technical support by the same professionals that have made our DriveCare third-party repair service an institution.

Choose A Better Drive At A Lower Price.

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>M20</td>
<td>20Mb</td>
<td>$247</td>
<td>$287</td>
</tr>
<tr>
<td>M30</td>
<td>30Mb</td>
<td>$257</td>
<td>$347</td>
</tr>
<tr>
<td>MP40</td>
<td>40Mb</td>
<td>$337</td>
<td>$427</td>
</tr>
<tr>
<td>M45</td>
<td>45Mb</td>
<td>$327</td>
<td>$387</td>
</tr>
<tr>
<td>M80</td>
<td>80Mb</td>
<td>$427</td>
<td>$487</td>
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<td>80Mb</td>
<td>$527</td>
<td>$617</td>
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<td>MP105</td>
<td>105Mb</td>
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<td>130Mb</td>
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<td>$947</td>
</tr>
<tr>
<td>M595</td>
<td>595Mb</td>
<td>$927</td>
<td>$997</td>
</tr>
<tr>
<td>RM42</td>
<td>45Mb</td>
<td>$617</td>
<td>$657</td>
</tr>
</tbody>
</table>

MP designated a Quantum drive mechanism.

Our RM600 is the high capacity storage solution that can't crash! Using laser technology, the RM600 stores 600Mb of data on a 5.5" re-writable cartridge. Full ANSI/ISO compliance ensures industry-wide compatibility.

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The freedom to write and think is for all of us. Now, there is a new word processor that’s just right for us, too. It’s called MacWrite® II, and it’s made by Claris. MacWrite II makes it possible to share your ideas and thoughts with other computers and word processors. You’ll be free to open documents from over 50 word processors, on all kinds of computers, with all kinds of speech, and work on them without reformatting.

But there’s more you can do. (The feature is called XTND.) You can import graphics, not only from Macs, but many computers, guaranteed. And you can scale and crop them, one and all, in your MacWrite II document. In short, MacWrite II with XTND is a powerful word processor that lets you freely exchange text and graphics. You’ll find also that your MacWrite II lets you change fonts, styles, sizes and colors, as well as text with its find/change feature. And you can create custom styles and save them as stationery — with all formats preset. You’ll share your reports and letters quickly.

But what good is freedom of expression if you find your editing to be a hassle? That’s why the page layout and editing is fully WYSIWYG: the thoughts you see are the thoughts you get. This WYSIWYG feature, by the way, is found only with MacWriteII.

It’s another way Claris simplifies word processing for you, whether you’re 52, 22, or 72.

Called upon daily MacWrite II smooths your writing assignments and other chores. There’s MacWrite II spell checking, for example, and foreign dictionary programs that are optional, and a host of other features that come standard. (Like a thesaurus, and a mail merge feature you’ll discover saves lots of time.)

What it adds up to, you’ll find, is a simple and powerful tool designed for people. All the people. It is for writers, and it is for business people. And it is for those of us in between. The freedom to write is liberating. Now technology is, too.
Apple has introduced self-terminating Ethernet boards for the LC and Mac IIs, and a variety of transceivers and cables.

propagation for users by offering separate external transceivers for thin coaxial cable and unshielded twisted-pair (UTP) cable.

Both the Ethernet LC Card and Ethernet NB Card are self-terminating boards, making reconfiguration of an Ethernet network similar to LocalTalk network reconfiguration. Adding a Mac will not disrupt the network. Unlike the Ethernet LC Card, the Ethernet NB Card is based on the Macintosh Coprocessor Platform (MCP) and is an intelligent board that features its own 68000 microprocessor, memory, and multitasking operating system. Thus, it can offload network data transfer functions from the main Mac processor, allowing Macs to take greater advantage of Ethernet's data transfer rate (10 megabits per second). Apple's TokenTalk NB board, which allows a Macintosh to connect with IBM Token-Ring networks, is also based on MCP.

Transceivers attach to both boards via a proprietary interface called the Apple Attachment User Interface (AUI). According to Apple, the Apple AUI is designed to draw less power than conventional Ethernet AUIs, which may exceed Apple power recommendations. The Apple Ethernet Thin Coax Transceiver allows Macs to be connected to Ethernet networks created with thin coaxial cable, or 10Base 2. The Apple Ethernet Twisted Pair Transceiver enables users to link into Ethernet networks based on UTP telephone wiring, or 10BaseT. A third transceiver, the Apple Ethernet AUI Adapter, is an adapter that makes the new add-in boards compatible with Ethernet devices equipped with non-Apple AUIs. All three transceivers are compatible with the IEEE 802.3 specification. The Ethernet Thin Coax Transceiver is currently available; the UTP transceiver and AUI Adapter will be available in the second quarter.

Although third-party vendors already offer 10BaseT options for Macs, the Ethernet Twisted Pair Transceiver marks Apple's first venture into the medium. Apple's Macintosh II EtherTalk NB Card, to be discontinued, only offers coaxial-cable interfaces.

The Ethernet LC Card is $200 without a transceiver, and at $375 with one transceiver. The Ethernet NB retails for $424 without a transceiver, and $599 with a transceiver. The three transceivers cost $175 if purchased separately. For more information, contact Apple at 408/996-1010. —Britta Meng

The 3-D Scratch Pad

Is anyone keeping count of the 3-D modeling packages that run on the Mac? They probably outnumber word processors, spreadsheets, and databases combined. Upfront is a new stripped-down 3-D modeler that—its publisher Alias says—can replace doodling.

Upfront's 3-D world has a single perspective window instead of the three abstract orthogonal views of most modelers, and the design palette provides a freehand sketch tool, five primitives (Upfront is splineless), and an cutting tool. As you draw, it guesses what edges you want to join or what surface you want to intersect.

Upfront lacks some obvious features but has subtle touches that other packages lack. For example, the sun is its only light source, but you can set it for any time of day, day of the year, and latitude. Upfront's object linking is primitive (its lack of animation capability makes linking less important), but you can compare and edit objects' attributes in a table environment. It has no text tools and provides only simple flat-shading, and must export to other programs to dimension or render. On the other hand, it has some amazing features: scan in a photograph, trace a perspective line, and Upfront overlays the scan with a live 3-D grid. If you cut a hole in a wall and cover it with a pane of glass, you can still select objects that are visible through the glass.

Alias plans more for the Mac—"a spline-based product, something with video, our own rendering technology, and an interface to standards like RenderMan," says one Alias engineer.

Upfront lists for $895. For more information, call Alias's Style division in Toronto at 416/362-9181. —D.L. |
How to recycle your Macworld Magazine.

Protecting the environment is one of the most important issues facing the 1990's.

The Macworld Earth Conservancy, developed by Macworld employees, continually explores ways to conserve our resources.

We've instituted conservation measures and a comprehensive recycling program.

Our concern for the environment has directly affected the production of Macworld Magazine.

We are continually exploring alternatives to our printing process and the latest breakthroughs in printing inks and recycled paper.

But until the tools are in place to recycle old Macworlds into new ones, we have a suggestion.

You can recycle Macworld yourself by passing your issue along to a friend or co-worker.

Or donate your Macworld to a school or computer center.

Any of these ideas will help minimize the waste of our resources and give us hope for the future.

MACWORLD

E A R T H
CONSERVANCY
Tomorrow's
Upgrade For Your
Mac Is Only
$59*

A MacWarehouse Expansion Kit will dramatically increase the power of your Mac. And our fast, reliable overnight service will have your Kit in your hands tomorrow!

MORE BRAIN POWER FOR YOUR MAC
Never again will you have to quit your word processor just to answer a question about a spreadsheet. Install extra memory and you can leave your letter open while you refer to last month's sales figures. You can edit those monstrous scanner files with advanced graphics applications or develop your own custom HyperCard stacks. More memory means more power at your fingertips.

PLUG IN INSTALLATION
Adding memory doesn't require technicians in lab coats. Just open your Mac, slide out the main circuit board and plug in your SIMMs. Our FREE video will give you STEP-BY-STEP installation instructions. Every type of Mac is covered and we think we've made it a breeze.

WHAT DO I NEED?
Our helpful sales and technical staff is standing by to answer any questions and take the mystery out of memory upgrades. Memory cards come with one megabyte on each card and are usually sold in pairs (2 @ $59 ea.).

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Memory chips come factory-installed on plug-in cards, called SIMMS (Single Inline Memory Modules). Each one megabyte SIMM card holds eight top quality memory chips. We carry chips by all the major manufacturers like Texas Instruments, Intel and Samsung. We also carry the full line of Dove memory products. Prices can vary a lot, based on quality, speed and demand. At press time our price for 1MB, 100ns SIMMs is $59. Please call for the very latest prices and availability. Our sales staff will tell you what you need and help you make your choice an easy one.

SPEED
Do you need 80, 100 or 120 Nanosecond (ns) chips? Nanoseconds are billions of a second, so an 80 ns chip responds faster than a 100 ns chip. The original Mac used relatively slow 150 ns memory chips. The 68020 processor runs 120 ns (or faster) chip, and the 68030 Macs like the speedier model.

OVERNIGHT DELIVERY
Place your order by 12:00 am (E), weekdays and we'll deliver overnight for just $3.00. There's never been a better time to consider a memory upgrade. Call our toll-free number now and tomorrow morning your Mac will be off to a brand new start.

To open your Mac Plus or SE, you'll need a specially designed tool - it's available from us as part of a handy tool kit for just $9.

To upgrade a 4-socket Mac Plus or SE to this amount of memory,

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2MB</td>
<td>Remove all four existing 256K SIMMs, install two 1MB SIMMs, leave two sockets for future expansion.</td>
</tr>
<tr>
<td>2.5MB</td>
<td>Remove the two 256K SIMMs, install two 1MB SIMMs.</td>
</tr>
<tr>
<td>4MB</td>
<td>Replace all four 256K SIMMs with four 1MB SIMMs.</td>
</tr>
</tbody>
</table>

To upgrade an 8-socket Mac II, IIf, IIX, or SE to this amount of memory,

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4MB</td>
<td>Remove all four existing 256K SIMMs, install four 1MB SIMMs, leave remaining sockets for future expansion.</td>
</tr>
<tr>
<td>5MB</td>
<td>Keep existing 256K SIMMs, install four 1MB SIMMs in remaining sockets.</td>
</tr>
<tr>
<td>8MB</td>
<td>Remove all four 256K SIMMs, install eight 1MB SIMMs.</td>
</tr>
</tbody>
</table>

WHAT IS A SIMM?
SIMMs are special cards that plug into your Mac. They come with one megabyte on each card and are available in pairs (2 @ $59 ea.).

MWC1P

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If, for any reason, you are dissatisfied with your MacWAREHOUSE Memory Kit, you may return it for a full refund within thirty days of purchase. All you have to do is call us for a return authorization number and return this product, postage paid, in its original condition, with the original packaging and documentation.

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Create a variety of graphics in addition to regular drawings. Use it for simple desktop publishing projects (flyers, invitations, business forms). Create illustrations, logos, and maps. Or design floor plans, landscapes, and products. MacDraw II prints everything from 8.5 x 11 documents to color 35mm slides, and generates four-color separations. Comes with FREE MacPaint 2.0 and custom clip art. Also, FREE upgrade to MacDraw Pro. A $345 value.

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Let Smart Alarms and Appointments Diary take care of your daily schedule. Just enter your appointments into the diary, and let Smart Alarms remind you of the important events. With the Auto layout function, you can create custom diaries that display information in the format you prefer. New features include automatic backup, a snooze button, the ability to turn off alarms while using specified application (such as modern software), and a choice of beep options. Multi-User versions are compatible with TeleTalk, MacServe, TOPS, allShare, and AppleShare. Single Use: DAC 0033 $64.

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**NEW!** WriteNow comes with Grammar 2.0, a top grammar/style checker (a $99.95 value). FRED. The two-time winner of the prestigious MacUser Eddy award, WriteNow features a 1.4 million word thesaurus, 135,000 world dictionary (the largest thesaurus dictionary in the Macintosh world) and compatibility with Microsoft Word. In addition to being one of the most affordable, easiest Mac word processors available, WriteNow can still run on a floppy disk system.

**WriteNow**

**NEW!** WriteNow offers the speed, convenience and advantages of both erasable and write-once operation. In both modes, it sorts data on a removable dual-sided optical disc cartridge with a capacity of 654 MB.

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- Of Press 3.0
- 35 fonts, supports more than 50 while and color printers.
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**Data Modem/9600** 0 Send/Receive many exclusive features. Including grey scale support; plus fax capability. The Only V.32 Data Modem with MNP-5 data compression and V.42 error correction. With Cordless Cursor and Cordless Pen for maximum flexibility and convenience.

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**Timeslips III 2.0** (Timeslips Corp.) Timeslips III is a complete timekeeping and billing program for people whose stock in trade is time. You gather time data with the TS Timer DA. When the time comes to send the bill, The Report will extract the data and generate invoices and reports in a wide variety of formats. And Timeslips can handle the big jobs: 250 users, 250 different activities, and over 3,000 clients, with up to 120 projects per client. BSU 0043 $195

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T/Maker BUS0182 Satteri Brindl ................................ 215.
Vertical Solutions BUS0113 FastInvoicing ......... 45.
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Business Sense
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UT 0067 Symantec Utilities for Macintosh II (SUA) 99

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LNG 0002 THINKS Pascal 3.0

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A critical comparison of the Macintosh and IBM PC worlds
Some people say comparing the Mac and the PC is like comparing apples and oranges. The truth is, it's more like comparing apples and almost every other fruit. The PC world is that huge: roughly 71.8 million machines compared to about 4.4 million Macs. Dozens of computer manufacturers, not just one. Hundreds of computer models of varying speeds ranging in price from a few hundred dollars to over $15,000. Several types of system software, four disk formats, four expansion-slot designs, and a half-dozen video standards. It's an anarchic cornucopia from which spills everything from one-pound laptops to mail-order imports to premium-priced powerhouses.

Because the PC world isn't uniform, making direct comparisons between specific machines is difficult and of little value. A more useful approach is to step back and evaluate both camps from several standpoints: affordability, ease of use, hardware expansion flexibility, networking flexibility, and performance.

We aren't here to contrast corporate cultures or jabber about left-brained versus right-brained com-
puting. Let the zealots debate the
gestalt of personal computing. What’s
important to us consumers is finding
the tool that does the job and provides
the best mix of performance, versatil-
ity, and value. And by those yardsticks,
the ideal tool may not always be a
Macintosh.

Affordability
It doesn’t matter what a computer can
do if you can’t afford it. To judge each
camp’s overall affordability, I com-
pared the cost of various systems,
common add-ons, and software.

System
Until last October, Mac
prices couldn’t compete with PC
prices. Today, thanks to the unveiling
of three low-cost Macs, Apple’s prices
compare favorably to those of the PC
world’s two leading manufacturers,
IBM and Compaq.

All Macs include more standard
features than do comparable PCs.
Networking, Small Computer Systems
Interface (SCSI), and sound-playback
circuitry are built into every Macintosh,
but are options on nearly all PCs. (A
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Face to Interface

Windows 3.0 (left) and the Mac (right) look similar at first glance, but there are significant differences in their interfaces and underlying system software. A guided tour of these Aldus PageMaker screens shows that the Mac's beauty is more than skin deep.

Windows' Minimize command lets you shrink an application window to an icon (like those shown here) without quitting the program—great for avoiding screen clutter. Another command, Maximize, enlarges a window to fill the screen. The Mac's System 7.0 will offer a similar convenience.

Windows' screen fonts aren't as attractive as the Mac's, and they're slower to appear—so much slower that most Windows word processors have draft viewing modes that show all text in one font and size.

The Mac's Apple menu allows fast access to desk accessories and other open programs. Windows provides accessories such as a calculator, Control Panel, and clock, but you have to double-click on their icons to use them. The Mac's System 7.0 will provide both options.

Now that's more like it. No draft mode needed on the Mac, and what you see is a lot closer to what you get.

Special offer for PageMaker Customers

Windows runs on top of the aging MS-DOS operating system, which limits file names to 11 characters, versus the Mac's 30. Disk drives aren't referred to by name as on the Mac, but by letter. The names (evaluate) and (filters) are subdirectories, rough equivalents to the Mac's folders.

Buttons and scroll bars in Windows 3.0 have an attractive, three-dimensional look.

A file system to die for. No need for cryptic, 11-character file names here, and disks have names, not letters. And easy-to-navigate file folders take the place of muddy concepts such as paths and subdirectories.

written for Windows and OS/2's graphical Presentation Manager, which uses a system-level printer drivers similar to the Mac's. If a printer is supported by Windows or Presentation Manager, you can use it with any Windows or Presentation Manager program.

Software Mac hardware may cost more, but software generally costs less. A study conducted in 1989 by SoftLetter, a software industry newsletter, found the average price for PC software was $270, compared with $195 for Mac software. To see for myself, I compared the mail-order prices of numerous programs available for both platforms. The results were similar—the average price of the MS-DOS version was $321, versus $271 for their Mac counterparts.

Ease of Use Here's where Mac diehards expect the usual praises: Once you've learned one Mac program, you've learned them all. Every PC program works differently. The Mac is an intuitive, plug-and-play machine, PC setup requires hours of switch fiddling and head scratching.

These statements were true back in 1984. Some are still valid. But today's PCs are friendlier than those of yesteryear, and the Mac has grown more complex as it's grown up. Overall, Macs are still easier to set up and use, but the gap is narrowing.

Hardware Setup Some economy-priced PCs still require you to flick small logic-board switches to configure memory and tell the system what kind of add-ons you have. More often, however, you'll find self-configuring features similar to those of the Mac II family. IBM's MicroChannel expansion slot design is a good example: when you get a new expansion board, you run a simple configuration program that activates the board's features. And although it's currently available only on a few expensive PCs, the Extended Industry Standard Architecture (EISA) expansion-slot design, a competitor to MicroChannel, has similar self-configuration talents.
Even many machines that use the aging Industry Standard Architecture expansion bus—which first appeared in the IBM PC AT—provide some self-configuration features. Take AST's Bravo/386SX and Bravo/286. They won't automatically configure a system for every new expansion board, but they do automatically adapt to newly installed memory upgrades. And you can install those upgrades yourself. In contrast, the Mac Plus, SE, SE/30, and Classic are factory sealed, and upgrading their memory requires adjustments to the power supply and other internal components.

Yesterday's PCs rarely included video display circuitry or hard drives. Assembling a system meant researching, choosing, and then installing a variety of options—and hoping they would coexist with each other. Compared to that, the original Macs offered plug-and-play operation.

Today, most PCs (including IBM's PS/2s) include basic necessities such as built-in video circuitry and hard drives. You usually buy system software and a mouse separately, but at least PCs include keyboards; Apple sells keyboards separately for all Macs but the Classic and LC. And except for the IIci and Illsi, the Mac II family doesn't include video hardware. So, PCs are acquiring the plug-and-play virtues of the original Macs while the Mac has acquired the PC's expansion flexibility—and the extra headaches that sometimes accompany it.

But on the whole, the Mac family still has the edge in setup simplicity. Compact Macs remain a breeze to set up, and their sealed-box design makes upgrading easy, since a technician does it for you. And it's generally easier to set up or upgrade a member of the Mac II family than a PC- or AT-bus machine. I spent two hours getting a Sitka's FlashCard network board to work in the AST Bravo/386SX. But the gap between the Mac and Micro-Channel machines is smaller. I've installed several expansion boards in IBM PS/2s and have never needed to venture beyond the setup utility's automatic configuration menu.

**Sizing Up System Software** Newcomers need system software that's straightforward and easy to learn; veterans need software that lets them operate quickly and efficiently. The most visible member of the Mac's system software—the Finder—is superbly suited to the beginner. A few minutes of clicking and dragging is all it takes to learn how to start programs and manage disks.

When you open the Mac's System Folder, however, you're suddenly faced with managing printer drivers, start-up documents, Control Panel documents, fonts, desk accessories, and more. The Mac is still a computer, and mastering it means learning more than just clicking and dragging. System 7.0, with its new options for organizing files and customizing your desktop, will be even more complex.

IBM's PS/1 and Tandy's 1000 RL provide graphical interfaces to shield beginners from traditional PC interfaces. But they're clunky, simplistic, and have a condescending feel. Just as some people yell at foreigners in the hope that the extra decibels will overcome the language barrier, IBM and Tandy seem to feel that huge, gaudy icons and large type will help beginners understand their machines. What's more, you can't apply your knowledge of these interfaces to those of more sophisticated PCs. Upgrade to a more powerful PC and software, and you have to learn all over again. In contrast, the entire Mac family shares the same simple, elegant interface. It just runs faster as you climb the family tree.

As for MS-DOS, the PC world's leading operating system, it is to a beginner what a tightrope is to an acrophobe. While the Mac's Finder lays all your options on the desktop, MS-DOS makes you delve. To see what's on a disk, you have to ask by typing a command in response to a simple prompt. To copy files, you type another command. To delete files, you type a third command. To start a program, you type its name. In all, you need to memorize about a dozen commands for day-to-day computing.

Once you do, you can often navigate more quickly and efficiently than with the Macintosh, whose graphical training wheels can get in the way. You can even avoid MS-DOS's challenges by using a DOS shell utility, which stands between you and MS-DOS, and provides menus for managing disks and starting programs.

Then there's Microsoft Windows, which enhances MS-DOS with many Mac-like features and provides a graphical shell for managing files and starting programs. Windows has been around since 1985, but it's only recently become a contender (see "Face to Interface"). Windows 3.0, unveiled with much Apple-like hoopla last May, is attractive and, unlike previous Windows versions, performs well. As a graphical environment, Windows 3.0 is a serious challenger to the Mac, given the generally lower cost of PCs.

But setting up a PC for Windows is much harder than installing the Mac's system software, which usually takes but a mouse click. To get the best performance from Windows, you need to understand its various microprocessor operating modes—real versus standard versus 386 enhanced—and you need to know the differences between the three types of memory MS-DOS can access—standard, expanded, and extended. The Windows manual discusses these matters in detail, under catchy headings like "Moving the EMS Bank Line in Large-Frame EMS Mode." And these aren't trivial topics that a beginner can ignore. Fail to configure Windows properly for your hardware, and the program runs slowly and coexists poorly with non-Windows programs such as Lotus 1-2-3. In short, Windows provides those training wheels that are the hallmark of a graphical environment, but you have to be a unicyclist to get rolling in the first place.

But wait, there's still more: OS/2, the PC world's most technically sophisticated operating system, and its Presentation Manager graphical interface. Presentation Manager in OS/2 version 1.1 did a poor job of hiding the operating system's complexity. In fact, you had to use several separate, awkwardly designed applications to perform the same functions you'd perform in the Mac's Finder.

OS/2 version 1.2 improves on things, but its overall look-and-feel differs from 1.1's. You run programs and manage files differently in 1.2 than in 1.1; even the icons are different. This is consistency? Consider this: for all the improvements the Mac's hardware and system software have seen.

**MAC VS. PC**

**Sizing Up System Software** Newcomers need system software that's straightforward and easy to learn; veterans need software that lets them
COMPARING THE TWINS

Wingz Another toss-up: Informix's spreadsheet and charting program is as impressive under Windows as it is on the Mac. Recalculation speeds are about equal, but the Mac version is a bit faster at tasks such as previewing a page and displaying complex graphs. The Windows version, however, supports DDE.

PowerPoint Microsoft's twin PowerPoint look and work nearly identically, but the PC version boasts powerful chart-generating features, including a minispreadsheet window that lets you type values or import them from an Excel spreadsheet or chart. The PC version also supports more graphics file formats, including TIFF. But the Windows version is significantly slower than its Mac counterpart. The multitude of printers in the PC world complicates formatting tasks, and color presentations aren't displayed as attractively on the PC as on a Mac. Thus, despite its lack of built-in charting, the Mac version wins.

Microsoft Word Word for Windows can make a Macintosh user jealous. It does everything Mac Word 4.0 does, and then some. A built-in programming language, WordBasic, lets you create complex macros with custom dialog boxes that prompt you for information. You can customize the user interface to add your own menu commands that execute macros when chosen. You'll also find revision-tracking features that are sorely missing in Word 4.0. And there's full DDE support for creating hot links between Word and other applications. Spend some time with Word for Windows, and you might not want to switch back to Word 4.0 on the Mac.

Numerous other programs will be available on both platforms soon. A Macintosh version of Xerox's best-selling Ventura Publisher should be available by the time you read this, as should a Windows version of Aldus Persuasion 2.0. Look for a Windows version of QuarkXPress later this year. Also available for Windows are Spinnaker Software's Plus, a HyperCard clone, and Software Ventures' MicroPhone II, a communications program.

Some Mac hardware vendors are venturing into PC waters, too. RasterOps and Radius now offer video hardware for PCs. You'll find Windows versions of Caere's OmniPage and Typist optical character recognition products. And The Voyager Company is converting its HyperCard-based AmandaStories and CD ROM and videodisc titles to work with Asymetrix's HyperCard-like ToolBook, which runs under Windows 3.0.

Hmmm. Maybe the Mac is being cloned after all.
Comparing Performance

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<tr>
<th>Model</th>
<th>Mac Classic</th>
<th>PS/1</th>
<th>Mac LC</th>
<th>Bravo/386sx</th>
<th>Mac IIci</th>
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1 Out of production, but sold while supplies lasted.
2 System software versions are listed as Finder/System for Macs, and MS-DOS version/Windows version for PCs.
3 Retail prices do not include monitors or video cards, if separate ones are required.

PowerPoint

Times in seconds

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</table>

For Microsoft PowerPoint I used the Columbus sample document that accompanies both PowerPoint versions. It's no contest: the Mac version left its Windows counterpart in the dust.

Excel

Times in seconds

<table>
<thead>
<tr>
<th>Model</th>
<th>Apple Model</th>
<th>Sunrise Model</th>
<th>Save</th>
<th>Average</th>
</tr>
</thead>
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<td>3.5</td>
<td>38.8</td>
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<td>76</td>
<td>11.0</td>
<td>2.6</td>
<td>29.9</td>
</tr>
<tr>
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<td>2.0</td>
<td>21.3</td>
</tr>
<tr>
<td>Bravo/386sx</td>
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<td>7.5</td>
<td>1.9</td>
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</tr>
<tr>
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<td>3.6</td>
<td>1.6</td>
<td>15.4</td>
</tr>
<tr>
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<td>12.5</td>
</tr>
<tr>
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<td>3.1</td>
<td>1.4</td>
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</tr>
<tr>
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<tr>
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<td>3.7</td>
<td>1.2</td>
<td>9.3</td>
</tr>
<tr>
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<td>27</td>
<td>2.1</td>
<td>1.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Mac IIfx</td>
<td>16</td>
<td>1.4</td>
<td>0.8</td>
<td>6.1</td>
</tr>
</tbody>
</table>

The Apple Model in my tests comprised a series of Excel macros, worksheets, and charts created by Apple's Ted Barnett designed to simulate an Excel work session. The Sunrise Model refers to Russell C. Anderson's calculation-intensive shareware model that graphs sunrise and sunset times and other meteorological information. The Windows version of Excel usually beat its Mac cousin—despite the fact that most of the PCs I tested lacked math coprocessor chips. Microsoft took great pains to optimize Excel for Windows, knowing it would be benchmarked against the fast, character-based Lotus 1-2-3. The effort clearly paid off.
### Word

<table>
<thead>
<tr>
<th>Start</th>
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<th>Average</th>
</tr>
</thead>
<tbody>
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<td>43.0</td>
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</tr>
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<td>4.4</td>
<td>1.7</td>
<td>19.0</td>
</tr>
<tr>
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<td>8.3</td>
<td>2.4</td>
<td>24.5</td>
</tr>
<tr>
<td>Mac Ilii</td>
<td>3.5</td>
<td>1.2</td>
<td>13.9</td>
</tr>
<tr>
<td>Deskpro 386/20</td>
<td>4.2</td>
<td>1.4</td>
<td>15.0</td>
</tr>
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<td>1.0</td>
<td>10.3</td>
</tr>
<tr>
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<td>4.1</td>
<td>1.1</td>
<td>11.1</td>
</tr>
<tr>
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<td>1.2</td>
<td>10.4</td>
</tr>
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<td>Deskpro 386/33</td>
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<td>8.2</td>
</tr>
<tr>
<td>Mac IIfx</td>
<td>2.2</td>
<td>0.9</td>
<td>4.3</td>
</tr>
</tbody>
</table>

I used a 5-page, single-space document containing several styles of Courier. The search-and-replace test involved changing 1375 lowercase e's to pound signs (#). The Mac version of Word may not have all the features of its Windows counterpart, but it's generally faster.

### PageMaker

<table>
<thead>
<tr>
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<th>Autoplay</th>
<th>Switch</th>
<th>Save</th>
<th>Average</th>
</tr>
</thead>
<tbody>
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<td>5.2</td>
<td>1.5</td>
</tr>
<tr>
<td>PS/1</td>
<td>20.0</td>
<td>26.0</td>
<td>6.7</td>
<td>0.9</td>
</tr>
<tr>
<td>Mac LC</td>
<td>8.2</td>
<td>15.5</td>
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<tr>
<td>Bravo/386sx</td>
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</tr>
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<td>Mac Ilii</td>
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<td>11.4</td>
<td>3.4</td>
<td>0.8</td>
</tr>
<tr>
<td>Deskpro 386/20</td>
<td>9.0</td>
<td>11.4</td>
<td>3.2</td>
<td>0.4</td>
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<tr>
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<td>0.4</td>
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<tr>
<td>Deskpro 386/33</td>
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<td>Mac IIfx</td>
<td>3.0</td>
<td>5.9</td>
<td>1.6</td>
<td>0.6</td>
</tr>
</tbody>
</table>

I used a 1-page PageMaker 3.0 document containing numerous bitmapped graphics and text in several styles and sizes of Helvetica. The autoflow test used a 4-page Microsoft Word document. There's no cut-and-dried winner here, although the Macs were generally faster at opening documents and switching viewing scales—two graphics-intensive tests.
mat text and choose other commands while importing a large text file. OS/2 also provides memory protection features that help prevent one crashed program from crashing the entire system. In all, it's a technically impressive operating system. OS/2, however, has been slow catching on—due in part to its hardware requirements, but mostly because few programs have been developed for it.

The Application Angle The Mac's graphical operating style is also significant from an application software perspective. The advantage is consistency—by and large, all Mac programs work in basically the same way. In the PC world, Windows and Presentation Manager lay the foundation for consistency by providing a Mac-like user interface. However, as mentioned earlier, most PC programs don't use Windows or Presentation Manager.

Some character-based MS-DOS programs provide pull-down menus, dialog boxes, and mouse support without the steep hardware requirements of Windows or OS/2. PC programs such as Microsoft Works, Microsoft Word 5.5, and Fox Software's FoxPro don't look as appealing as true graphical programs, but they provide users with many of the same ease-of-use advantages.

Windows users, meanwhile, can make a conscious effort to choose only Windows applications—capable Windows programs now exist for all major application categories, and many of them began life on the Macintosh (see "Comparing the Twins"). Still, most Windows users alternate between Windows and nongraphical, also called character-based, applications. Nor are there enough Presentation Manager applications to allow OS/2 users to spend all their time in a graphical world.

But let's ask the greater question: How important is consistency between applications? It's a boon if you use numerous programs, but many people use only one or two—a word processor and a spreadsheet, for instance. For these users, adapting between two interface designs isn't such an inconvenience. Your stereo and your car radio have different knobs, but you've probably managed to master both.

And are there things you can do with one platform's programs that you can't with the other's? One big gap that Apple's System 7.0 will close is inter-application communications (IAC)—the ability of applications to exchange information on the fly. IAC enables you to create so-called hot links between programs. Both Windows and the Presentation Manager support IAC, called Dynamic Data Exchange (DDE) in the PC world. In Windows, for example, you can set up a link between an Excel chart and a Word for Windows document so that when the chart's spreadsheet data changes, the chart in the Word document automatically updates.

Expansion Flexibility What a machine can do today is one thing; where you can take it tomorrow is another. How do the Mac and PC compare from a hardware expansion standpoint? On the whole, it's a choice between the PC's selection and the Mac's sophistication.

One way to measure hardware flexibility is to count expansion slots, which fend off hardware obsolescence by providing room to grow. In the PC world, slots are common. Most machines offer between three and five, although some have as many as seven. Even the Tandy 1000 RL mentioned earlier has one. IBM's PS/1 doesn't, but it does accept an external expansion chassi containing three slots.

The compact Mac line offers little room to grow. The Plus has no expansion slots. The SE and SE/30 are only slightly better, each providing one slot. Although you can squeeze accelerators and large-screen monitor adapters into those Macs, there's a limit to what will fit in such a small box. And the new Mac Classic is déjà vu all over again—it, like the Plus, is slotless.

Then there's the modular Mac II line. The IIfi and IIfx each provide three NuBus expansion slots, the IIt and IIfx six, and the IIfi, when equipped with Apple's NuBus Adapter Card, one. The IIfi and IIfx each also contain one processor-direct slot (PDS). Straddling the fence between the compact and modular Macs is the new LC, which has one PDS.

But having slots and filling them are two different things. The PC world offers a larger selection of expansion boards, especially for the classic PC expansion bus—the so-called industry-standard architecture (ISA). And the variety is mind-boggling. You'll find multifunction boards that cram memory and additional printer and serial ports onto one board. Internal modems are a dime a dozen. (Or almost: I've seen 1200-bps modem boards for as low as $49.) A raft of versatile video boards can support all the PC world's popular video standards. You can even buy boards containing ultracompact hard drives. And there are boards you wouldn't expect in the pinstriped PC world, such as digital audio adapters, MIDI interfaces, even music synthesizers.

In the Mac world, most expansion boards are video boards—not surprising, given the Mac's superb color and gray-scale display capabilities and its ability to drive several monitors at once. (The latter is something PCs generally can't do, by the way.) Although network and fax boards are available, the selection is sparse compared to the PC world. Only a few internal modems are available, and all cost at least a few hundred dollars. The Mac does have the edge in digital audio boards, thanks to Digidesign, whose Sound Accelerator and AudioMedia boards can turn Mac IIs into digital audio workstations without PC peers.

Another way to judge hardware expansion flexibility is to assess the upgrade paths a computer manufacturer provides. The Mac wins here. You can turn an SE into an SE/30 for $1699. Or, turn a used Mac II into a top-of-the-line IIfx for just $2999 plus memory. Some people whine about Apple's upgrade prices, but the fact is, very few major PC manufacturers provide similar options, especially for their low-end machines.

Networking Flexibility In the business world, the ability to network machines to share data and expensive add-ons—laser printers and hard drives, for example—is a big asset. The Mac world leads in small networks, but the PC's business heritage gives it the edge in large networks where speed, security, and reliability are critical.

Low-end Mac networking is a relatively economical proposition. A
LocalTalk interface is built into every Mac. As a result, you can connect Macs to share a printer by simply adding a connector and cable to each machine. PCs don't have built-in network interfaces. So if you want to put a PC on a network—whether it be LocalTalk, Ethernet, or Token-Ring—you must buy an expansion board. Obviously, low-end Mac networking is much less expensive.

When it comes to high-speed networking, however, the tables get turned. It's much more economical to network PCs than Macs with Ethernet and Token-Ring, simply because such PC expansion boards are less expensive than their Mac counterparts. Apple's new Ethernet Cabling System may allow future Macs to have built-in Ethernet interfaces, but the fact remains that Ethernet and Token-Ring networking costs more now for Macs than for PCs.

A similar situation occurs with network software—as a network grows larger, PC-based software takes the lead, in particular where file-server security and reliability are concerned. Mac-based AppleShare file servers can't match the extensive security and reliability options that PC products such as Novell's NetWare provide. (You can, for example, set up a NetWare file server to simultaneously write data to two separate hard drives for extra safety.) What's more, Macs that join Novell and 3Com networks don't have access to all the features those networks provide. Although the Mac has proven itself in business, it's still treated like a second-class citizen by the giants of PC networking.

**Performance**

You can't compare two computing platforms without pitting them against each other on the test track. To find out which camp provides better performance, I ran several tests using programs available for both platforms on representative machines (see "Comparing Performance").

On the whole, Macs finished ahead of their PC counterparts running Windows. In fact, when you compare each machine with its technical counterpart—that is, to the machine with a similar processor clock rate—the Mac is faster overall. (The specific results vary from program to program.) But it's important to remember that relatively few PC programs use Windows or OS/2's Presentation Manager; the vast majority of PC applications are character based. When I compared two Mac applications—FoxBase and Microsoft Word—against their character-based PC counterparts, the Macs finished a distant second.

As you can see, arriving at cut-and-dried performance conclusions is difficult. But I can generalize: with graphical applications, a Mac usually runs faster than a similarly equipped PC. However, if you're willing to forgo a graphical environment, you can often find character-based PC applications that run faster than equivalent Mac programs.

**And the Winner Is**

In the end, the Mac is the better computer, but the PC remains the better computing value. Windows and OS/2's Presentation Manager give PCs many of the Mac's most desirable traits—a more attractive, bitmapped screen display; a variety of fonts; device-independent display and printer drivers; and the foundation for consistency between programs. But these attributes are grafted onto computers that would be just as happy displaying an MS-DOS prompt. Despite Microsoft's attempt to make Windows 3.0 "cool," PCs seem happiest in gray flannel suits. But flannel costs less than silk. For the price of a 2MB Mac Classic with a 40MB hard drive, you can buy a mail-order clone that runs faster, supports color, and is more expandable. If you plan to do some word processing or bookkeeping—if your computer will fill a small niche in your life—or if your budget won't let you combine the Apple logo with all the features you want, by all means consider the PC. And if you want a truly portable computer, the PC world is the place to be.

If you plan to immerse yourself in computing and establish a large software library, you'll be better served by the Mac's consistency, large selection of software, and elegant hardware design. And when it comes to the worlds of computer-aided design, image scanning, interactive video, digital audio, and color publishing—the Mac is by far the best choice. With the Mac, Apple has shown that the best graphical environments run on computers that were designed for them—from the ground up. ☐

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**Contributing editor Jim Heid has been working with the IBM PC and the Mac since each was introduced. His latest book, coauthored with Peter Norton, is Inside the Apple Macintosh (Brady, 1989). He is currently working on a complete guide to the Mac, to be published in early 1991 by IDG Books Worldwide.**
recently stopped by Sears to buy a new socket wrench for my already overstuffed toolbox. I cruised the aisles admiring row after row of shiny new tools: wrenches and screwdrivers and clamps—oh my. There are few things I admire more than solid, well-crafted tools. And there's nothing more useful to a do-it-yourself home owner than a tool chest filled with them. Needless to say, I walked out of the store with more than a socket wrench.

Just as a toolbox of quality tools keeps house and home operating smoothly, you and your Macintosh will work more efficiently, more safely, and more productively if you keep a well-stocked, well-integrated utility tool kit at your side. Indeed, as the Mac becomes more complex and the lapses of Apple's system software become more apparent, a carefully chosen collection of utilities has become an essential part of every Mac owner's software repertoire.

But just as Sears has hundreds of tools of every description, software catalogs are stuffed with dozens and dozens of Mac utilities. Over the years, I've tried just about all of them—and become fond of quite a few. As a result, my utilities toolbox bulges at the seams. When I must, however, I cut back to the ten or so that I consider essential.

In the following pages, I describe the ten types of utilities that should be in every Mac owner's toolbox—the equivalent of the basic hammer, wrench, and screwdriver set that even the most ardent don't-do-it-yourselfer can't live without. I also recommend the top-of-the-line tool in each category. I leave the less-than-essential utilities—the Mac equivalents of tile nippers, joiners, and the like—to the utility-addicted. (You know who you are.)

**Better than Vitamin C**

In scientific circles, there's a lot of argument over whether or not computers can (or should) think the way humans do. Well, the Mac may or may not think like a person, but it is quite capable of getting sick as a dog. A computer virus can put a Mac out of commission just as effectively as a flu virus can lay me low. Even worse, a really nasty virus can destroy data stored on a hard drive or floppy disk. Since the only Mac immune to virus attack is one that's off, an antivirus program is the most important utility you'll ever own.
B.com's 911 Utilities to be the most complete recovery is often possible with corrupt files that refuse to open. Norton Utilities can shake down a troublesome disk better than anything I've seen. The program checks that the number of files in a hard drive directory and the number on the drive are the same. It searches out duplicate System and Finder files; it fixes folders that won't open and files that won't delete. Not only that, but it checks every file on the disk for missing Finder icons, incorrect Finder information (bundle bits), and more. If a disk isn't clean and sober when Norton gets through with it, nothing will straighten it out.

SUM II (Symantec Utilities for Macintosh) is also a popular choice for file and disk recovery. I've used it frequently with success, but it's not my favorite. However, it's cheaper than buying both Norton and 911. Anyone who purchases SUM II definitely gets his or her money's worth.

The Ultimate Safety Net

Sadly, heroic efforts from the best recovery program cannot resuscitate a disk whose time is up. When your hard drive is laid to rest atop Boot-No-More Hill, there'd better be a recent backup of your critical files. Unfortunately, backing up is an onerous task. Everyone talks about it, but too many people do nothing.

Most backup programs succumb to the proverbial features double-bind: the more flexible the program is (offering all kinds of options and customizable features), the more difficult it is to use. Two backup programs, SuperMac's DiskFit and Microseeds' Redux, relieve backing up pain better than most. Both programs are easy to use, yet relatively powerful, and impose no size limit on the file to be backed up. Both also reclaim and reuse space on existing backup disks during incremental backups (many programs simply tack new and changed files onto the end of the current backup sequence).

Some backup programs store backup files in standard Finder file format; others, in a quest for greater speed, store files in a proprietary backup format. If you don't like the idea of not being able to view and retrieve backup files in the Finder, use DiskFit. It always creates Finder-readable backup files. DiskFit is also notable in that it can perform an unattended backup and turn off the Mac when it's finished.

Redux is an excellent choice for backup, so long as you're not concerned about backup file format. It only stores backup files in Finder-readable format if all the files you want to back up fit on a single backup volume (such as a removable hard drive). Otherwise, the program stores backup files in a format only Redux can read. Backing up with Redux is about as easy as it gets (see "Ready Backups with Redux").

Endless Fonts (and DAs)

Turning from morbid topics like dead disks to the fun stuff, what is more fun than an Apple menu loaded with desk accessories (DAs) or a font menu full of fonts? You can, of course, install fonts and desk accessories in the System file with Font/DA Mover, but that limits you to only 15 DAs. And, having a large number of fonts bloats the System file to excessive proportions. An easier, more flexible alternative is to use a font/DA utility that

Ready Backups with Redux. Pop-up menus make it easy to view and select files for Redux to back up; information about the selected folder (left) and all currently selected files (top) is always available. In addition to selecting files and folders by hand, you can also automate backups and tailor them precisely to your needs with Redux's scripting facility, BackTalk.
STARTING WITH A COMMERCIAL UTILITY COLLECTION

Some people buy tools one at a time. Others prefer to buy one of those specially priced, 250-tool collections and then supplement it as the need arises. If you’re the type who likes to start with all-things-to-all-people collection, then you may want to buy one of the major Macintosh core utility collections—SUM II, The Norton Utilities for the Macintosh, 911 Utilities, and MacTools Deluxe—and build your tool kit from there.

None of the four major collections contain a font/DA utility, a macro program, a screen saver, or an INIT organizer. So you need to put these four types of utilities on your shopping list no matter what. Which and how many of the remaining six should be added to complete your toolbox depends on which core collection you start with.

The Norton Utilities is perhaps the most complete core collection. It provides top-rated disk- and data-recovery utilities, an excellent disk optimizer, a file finder, and a file/folder navigation aid (not to mention a Finder customizer, a Key Caps DA replacement, and more). You need to add virus protection and a backup program to your essential utility shopping list.

MacTools Deluxe includes utilities for disk and data recovery, a backup program, a hard drive optimizer, and a file finder that can search for both file names and file contents. It also offers a disk-partition program, a file-encryption utility, and several other utilities. You have to add virus protection and a file/folder navigation aid to your utility toolbox—as well as the four utilities all core collections lack—if you start with MacTools Deluxe.

SUM II owners already have disk- and data-recovery utilities, a backup program, and a disk optimizer. (In fact, SUM II’s backup program is actually a scaled-down version of Redux.)

SUM II also provides a disk-partition program and a file-encryption utility, among others. Thus, you need to fill out your toolbox with virus protection, a file/folder navigation aid, and a file finder.

911 Utilities is the only core collection to include a serious antivirus utility: Virex (also available separately from Microcom). Its other utilities are all related to file and disk recovery. Thus, if you start off with 911 Utilities, you need to shop for a backup program, a file/folder navigation aid, a file finder, and a hard drive optimizer.

Finally, keep in mind that some utilities in these four core programs are clearly not the best available in their category. If your core collection contains a backup program or a file finder, for example, you may want to set aside a few dollars a week and replace it with Redux or DiskTop when there’s enough money collected in the cookie jar.

can make any number of fonts and DAs (as well as sounds and F-keys) available without installing them in the System file.

Of the two major contenders in this category, I use Fifth Generation Systems’ Suitcase II, primarily because it is a more intuitive program. But MasterJuggler, from AllSoft, is equally commendable. Both make it easy to organize and load (or unload) fonts and DAs. Both can compress screen font files to conserve disk space, and both offer utilities that check for and correct font ID-number conflicts.

File Ho!

In the average Macintosh hard drive, applications, documents, and more are stored in a complex hierarchy of folders within folders. To find a file or application, you frequently must climb laboriously out of one nested sequence and dive into another. Often, the shortest route to a needed file is anything but a straight line, and wrong turns are frustratingly easy.

HandOff II from The Handoff Corporation or On Cue from Icom Simulations can help you navigate such crowded waters. Both create a menu (standard menu bar variety or pop-up, your choice) containing a user-defined list of commonly used applications and documents. Instead of searching through folders, you simply select the desired file or application from the menu. Both also allow you to switch between applications under MultiFinder with user-defined key commands.

Of the two, HandOff II is the better equipped for tough jobs. You can group applications in the Handoff menu into submenus (see “Handy HandOff II”), or specify a collection—what HandOff calls a briefcase—of documents from several applications. Select the briefcase, and the applications and their documents all open at once. You can specify a color or depth (black and white, 16 colors, 256 colors) for each application, and when you switch from one to the other in MultiFinder, the color depth changes accordingly. And HandOff II eliminates the Application Not Found dialog box by letting you assign any application to any document. As good as the program is, however, HandOff II’s manual is one of the worst I’ve seen in a while. Plan to spend some time figuring out just what HandOff II can do and how it works.
useful complement to a menu-maker like HandOff II is Aladdin Systems’ Shortcut or Super Boomerang (part of Now Utilities from Now Software). Both these utilities allow you to move quickly to commonly used files and folders, delete files, rename files, and create new folders from within the Open and Save dialog boxes. The file and folder menus in both list the most recently opened files and folders; you can also ask the programs to list certain files and folders in the menu at all times.

In Super Boomerang, you can also create permanent lists of files and folders specific to individual applications. Super Boomerang also appends a submenu of files to an application’s Open command. Shortcut, on the other hand, is distinguished by its ability to work with files archived by Aladdin’s StuffIt Classic and Stufflt Deluxe. Shortcut can list the files in a Stufflt Classic compression archive; unstuff a stuffed file; and if you own Stufflt Deluxe, compress a file from within the Open and Save dialog boxes.

Lost in Space
Not many Macintosh owners have a hard drive as commodious as mine (345MB). But even a 40MB hard drive is plenty big enough for a file to get lost in. Apple’s anemic Find File DA can help you find misplaced documents, but it can only search one floppy disk or hard drive at a time. What’s more, it can only search for part or all of a document name. If you want to search for a key phrase within a document, Find File gets you nowhere.

CE Software’s DiskTop remains my first choice when I’m searching for a file based on its external characteristics: file name, type, creator, size, or creation or modification date. (My paean to DiskTop 4.0 appeared in Macworld’s July 1990 issue.) What DiskTop can’t do, however, is search file contents.

On Location from On Technology (see Reviews, Macworld, September, 1990) is no match for DiskTop in searching file characteristics, but it is miraculous when searching for text in a file. If the price for this modern miracle is too steep, second-choice Microlytics’ Gofer is significantly cheaper (and currently a free bonus if you buy DiskTop). But it’s slower. On Location’s manual, by the way, deserves an award for that all too uncommon combination of clarity and brevity.

All the King’s Horses and All the King’s Men
When you use a hard drive, the files tend to become fragmented—stored in sectors scattered throughout the drive, instead of in a single group of neighboring sectors. As fragmentation increases, performance declines because the drive mechanism has to work harder to find all the parts of a fragmented file. Top performance is easily restored, however, by defragmenting—moving the parts of each fragmented file to a sequence of contiguous sectors. You can defragment a hard drive by backing it up (twice, just in case one backup goes bad), erasing it, and copying all the files back on again. But only a masochist with lots of free time defragments a hard drive this way.

I use DiskExpress II because I’m not a masochist, and more important, because the program is fast and easy to use. DiskExpress II can defragment disks while you work, and it can also prevent fragmentation from recurring once a disk has been defragmented. Speed Disk, part of the Norton Utilities, offers some unusual enhancements (see “Speedy Gonzalez”). But because Speed Disk can neither defragment a disk as you work, nor prevent future fragmentation, I prefer DiskExpress II.

Let Mac Do the Walking
Most users would prefer to issue a single command, rather than a sequence of 10 or 20 keystrokes, to achieve the same result. Such commands are called macros, and a macro utility is a great way to eliminate repetitive typing and boost productivity. For a compendium of several macro programs along with tips on creating useful macros, see “The Desk Potato’s Guide to Macros” which will appear...
in *Macworld* next month. (My favorite is CE Software's QuicKeys.)

**Screen-Saving Equipment**

For the Macaholic, preventing burn-out isn't always easy. Preventing screen burn-in, on the other hand, is simple. Burn-in occurs when the same image is displayed at full brightness for long periods. The image gets etched onto the screen, and creates a ghost that haunts it forever.

The only surefire way to prevent burn-in is to use a screen-saver utility that automatically displays a safe, ever-changing (preferably humorous) image after a specified period of inactivity. Both top screen savers, Fifth Generation Systems' Pyro and Berkeley Systems' After Dark, offer a variety of animated displays to choose from.

After Dark, however, tops Pyro in two ways. It provides optional sound effects for many of its displays, which means that lightning bolts crash and aquarium bubbles go *glug-glug*. In addition, After Dark offers a greater number of displays that are more entertaining and more colorful—to my taste anyway. For its squadrons of flying toasters (toast darkness is adjustable) and its ability to turn a screen into a sliding-square puzzle, After Dark is irresistible.

**Preventing INIT Gridlock**

Most of the utilities in the essential toolbox are INITs—System Folder files that the Macintosh automatically loads at start-up. Indeed, many handy programs come in INIT format; many types of hardware—such as CD ROM players, and large-screen monitors—also require INITs. Frankly, INITs have a tendency to proliferate like coat hangers in a dark closet. Unfortu-nately, when a lot of INITs congregate in a System Folder, they can misbehave. A conflict between two or more inimical INITs can prevent one or more of them from functioning properly, or worse, cause the Mac to crash.

To determine the cause of or to solve conflicts, an INIT organizer is extremely handy. I've always preferred Microseeds Publishing's INITPicker, but a recent newcomer, INIT Manager from Baseline Publishing, is currently hard at work in my System Folder. Both programs allow you to turn INITs on and off, create and select start-up sets containing different combinations of INITs, and rearrange the order in which INITs load (a common technique for eliminating conflicts). Both reduce System Folder clutter by allowing you to store INITs in a separate folder, and both are able to identify and disable some, if not all, troublemakers.

INIT Manager can generate a detailed start-up report, which the technically inclined can use to pinpoint intractable problems. INIT Manager also offers a Control Panel subpanel for storing infrequently used controls, thereby increasing the speed with which the Control Panel opens. INITPicker has a more elegant interface (see "Picking INITs"), a better manual, and only takes the time to scan the System Folder for new INITs when you ask it to. I find it hard to recommend one over the other.

**A Tool for All Seasons**

Even with the best tools, it's possible to smash a finger if your aim is off, or make a bad situation worse. But with a little preparation (such as reading the manuals) and practice, a small collection of basic, good quality tools can make a world of difference. So don't wait till disaster strikes; start filling—and using—your Mac utility toolbox today.  

See *Where to Buy* for contact information.

Robert C. Eckhardt is a contributing editor of *Macworld* and *Publish*. His latest book is *Inside Microsoft Word* for the Macintosh (Bradycorp., 1990). He's eagerly awaiting a utility that will help him keep track of all his utilities.
Midrange

Hard Drives

Just Right

EVERY TIME MACWORLD LAB gets ready to test hard drives, we just know that there can't be more products than there were the last time. But the market hasn't gotten any less crowded—if anything it's even bigger, bringing on a flurry of price wars. For instance, you can get a 115MB drive from Club Mac for only $679—that's $5.90 per megabyte or about as much as you'd pay for three high-density floppies.

For you, the consumer, this crowded hard drive market brings good news and bad news. First the good news—you have many more choices than ever before and you can get some real bargains. The bad news is that finding a bargain can be rough.

Where to go and who to believe? Start here with our review of 115MB to 250MB external hard drives (most of these products are also available as internal drives for all Macs except the Mac LC, IIsi, and Classic which require lower-capacity one-third-height drives). We tested 64 products from 30 companies to find the best buys in performance, price, and features. Keep reading to find out which drives come out ahead and why.

Inside a Hard Drive

Except for Rodime and Toshiba, which manufacture their own mechanisms, all of the hard drive vendors purchase the actual drive

MACWORLD LAB TESTS 64 HARD DRIVES FROM 115MB UP TO 250MB TO HELP YOU FIND A PERFECT FIT
mechanism from another company, usually Quantum, Conner, or Seagate. Vendors also purchase power supplies, fans, and cables from other companies. The vendors then assemble and test the drive.

You'd think that you could just pick a drive based on what mechanism it contains and know exactly what type of performance and reliability you were buying into. Ah, if life were only that easy. The driver software (the software that makes the Mac work with the drive) that a vendor uses can affect performance, ease of use, and reliability of the drive. Components such as the fan can make a huge difference in how quietly the drive runs. The thoroughness of manuals, as well as the types of service and support provided, vary widely from vendor to vendor, and pricing schemes bounce all over the place—you can get a drive with a 210MB Quantum mechanism direct from companies such as Alliance Peripheral Systems, Club Mac, or Hard Drives International for just under $1000 or you can pay Advanced Gravis, iDS, Liberty, Microtech, or Relax another $600 or $700 for a drive with the same mechanism. (Some vendors claim that their drive is 200MB and others claim 210MB. The actual capacity depends on the formatting software.) Since no drive has everything, you'll need to sort out your priorities and then pick the drive that scores best in the categories that are most important to you.

Matching a Drive to the Mac
Before you jump to buy the fastest drive you can find, stop to consider which Mac you'll use it on. All of the drives we tested can send data much faster than the Plus can process it. Therefore, if you have a Plus you won't pay a penalty for buying a slower drive. In general, we found that drives with a Fujiitsu mechanism—such as those from Jasmine, Mirror, and CMS—ran a bit slower than drives with a Quantum or Seagate mechanism. On the other hand, most of these drives are quite reasonably priced—for instance, Mirror's M180 is only $877.

The Macintosh SE and Classic have a faster SCSI port than the Plus. In fact, a few drives could not keep up with the Mac SE or Classic on our SCSI Evaluator read and write tests (see "Hard Drive Speed Tests"). These included all of the drives that use a Hitachi or Fujitsu

BY CHERYL ENGLAND SPENCER
photography by Robin Ginzberg

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Compact, portable drives include the Liberty 170, Advanced Gravis Hardpac, and iDS Wip

mechanism as well as Data Enhancements’ ProDisc 170, Club Mac’s Hard Disk 115, and PLI’s Pl. 200 Turbo. Only one drive—FWB’s hammer-155FMF—could send data faster than the SE/30, the Mac LC, and any member of the Mac II family other than the Mac IIfx. But as much as I appreciated the hammer155FMF’s speed, the iDS Pro, the Liberty Systems’ Liberty, or the Relax Sierra. The iDS Wip is especially compact and light—if there’s such a thing as a cute hard drive, this one is it. If you stack all of these drives next to each other, the Wip looks a bit long and very skinny; the Pro is only slightly fatter (an extra inch lets it hold higher-capacity mechanisms). The stubby Hardpac is fatter and shorter than either of the iDS drives; and the Liberty and Sierra are a bit taller, wider, and heavier than the others.

The Liberty has an excuse for being a tad overweight when compared to its sleek neighbors. It’s the only one of these drives that contains an internal power supply and a fan. The Wip, Pro, Sierra, and Hardpac all draw power from a Mac’s floppy port. If you own a Mac II (which doesn’t have a floppy port), then you need either an external power supply or an adapter. Relax includes a power supply with its Sierra drive; Advanced Gravis and iDS offer a power supply as a rather expensive option ($155 for the power supply from Advanced Gravis; $95 for the one from iDS).

Advanced Gravis and iDS also offer an optional adapter board for the Mac II series. Both companies’ adapter boards must be installed in a NuBus slot, and both boards cost at least half of what an external power supply does. Installing the board isn’t hard, but it is a kludgy solution, especially if you plan to use the drive on different Mac II machines.

On the positive side, drives that take their power from the Mac’s floppy port are easy to travel with overseas. In Europe, all power outlets provide 220 volts, but in the U.S. they provide 110 volts. Since all Macs except the Plus and older SEs contain universal power supplies that automatically adjust to the proper voltage, you won’t have to worry about damaging the power supply should you take your drive to Europe.

Most drives that include an internal power supply also use one that works with different voltages. Some of these are self-adjusting; others require you to flip a switch to set the voltage on the drive’s power supply so that it coordinates with the voltage of the power outlet. The compact Liberty drive does not include a universal power supply, although Liberty will substitute one for $50 extra.

Drives of Different Sizes

While they aren’t quite as portable as the Hardpac, Wip, Pro, Liberty, or Sierra, La Gie’s Tsunami and Cirrus and Optima’s MiniPak are still small enough and light enough to be carried easily. (La Gie offers users a carrying case for the Cirrus and Tsunami drives for $89 and Optima offers one for the MiniPak for $25.) With their vertical design, the Cirrus, Tsunami, and MiniPak take up very little desk space when placed next to a Mac. The Tsunami and Cirrus drives are notable for their modern design, and if you buy more than one, you can place them horizontally and snap them together so that they form a solid stack. The MiniPak is also nicely designed, but it tends to wobble when placed vertically, even though that is the way Optima intends it to be placed.

Most of the other drives are designed to fit neatly under a compact Mac such as the Classic or SE. If you use a Mac II-class machine or an LC, however, and you opt for one of these rectangular drives, make sure that it can run while sitting vertically; otherwise, the drive takes up too much desk space. Although many drives can run while sitting either horizontally or vertically, only the Optima DiskJoy, PLI PL Turbo, Procom MD Series, and EMac Metro include removable feet that balance the drive and give the fan enough clearance to work properly no matter which position it runs in.

Termination Blues

Other than physical size, you should also check out a drive’s termination. The first and last peripherals attached to a Mac should be terminated to prevent signal noise on the cable. Some drives come with terminators installed inside the case—you can usually remove these internal terminators easily, but it does require some extra work. Also, these internal ter-
## Hard Drive Speed Tests

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<thead>
<tr>
<th>Overall Fastest</th>
<th>Duplicate (in seconds)</th>
<th>Open (in seconds)</th>
<th>Save (in seconds)</th>
<th>Seek (in MBs)</th>
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<td><strong>Percent slower than fastest</strong></td>
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<td>0%–10%</td>
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<td>11%–20%</td>
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<td>30% or more</td>
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*Current models ship with different mechanisms.*

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The Mac SE's SCSI port can transfer data at a rate of 6717 kilobits per second (kbps). According to our SCSI Evaluator tests, several drives could not keep pace with the Mac SE during data reads and writes. Nearly all of the drives, however, are slower than either the Mac SE/30 or the Mac II family's SCSI port, which is rated at 11,469 kbps. We also performed a seek test to find out how long the drive's head takes to move to a specific sector.

On the application tests, we tested each drive's ability to duplicate a large (3.2MB) file and search a database for a specific record. We also averaged the drives' speeds for opening and saving files from several applications including PageMaker and Excel.

The drives are listed from best overall performance (top) to worst overall performance (bottom), based on both application and SCSI Evaluator low-level tests. To determine the ranking, we indexed overall performance numbers against the fastest drive. Thus, the speedy FWB hammer FMM gets a 1.00 and the slow CMS Platinum 130 (F) gets a 0.55. Indexed numbers are listed next to the product name.
More and more vendors are supplying external terminators (50-pin connectors) with their drives. These terminators attach between the Mac's SCSI port and the SCSI cable. You'll want external termination if you have (or plan to purchase) several SCSI peripherals, if you move the hard drive to another Mac frequently, or if you're working on a Mac IIfx. (The Mac IIfx includes a special terminator that you must use instead of the standard external terminator.)

The best termination solutions,
<table>
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<th>Software Included</th>
<th>Partitioning Software Included</th>
<th>Password Protection Software Included</th>
<th>Capacity/Mechanism/Sound level</th>
<th>Price</th>
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<td>Advanced Security</td>
<td>•</td>
<td>•</td>
<td>210/442dB/31595</td>
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* This drive takes its power from the Mac via the floppy port. ** This feature is optional. It will cost extra. * SUM II and Virex are sold as options for $30.

however, come with drives from La Cie, Procom, and PLI. All of these companies include switches on the back of the drive for setting termination. You don't have to worry about losing an external terminator or removing internal ones. Also, even though Apple says to terminate the first and last SCSI peripherals, this scheme isn't foolproof. Sometimes peripherals won't work unless the terminators are placed differently. For instance, you may need to remove the last terminator in a chain. In times like these, you'll be glad that changing your hard drive's termination is as easy as flipping a switch. Drives from La Cie and PLI contain a bank of DIP switches, which you set in a specific pattern depending on whether you want to terminate the drive or not.
The Procom MD Series includes one recessed on/off switch, which is much easier to set.

The Software Factor
All of the drives include basic formatting and diagnostic software. If you are an experienced Macintosh user, you'll be able to get any of these drives up and running. But if you are new to the Mac, installing a hard drive for the first time, or just want a bit of elegance in the software you use, then you need to know which vendors provide the best utility software.

Some of the most direct and logical software comes from La Cie, Rodime, Storage Dimensions, and SuperMac. Drives from DJK Development, Data Enhancements, and Club Mac also include one of the better pieces of work—DJK's SCSI Commander. Although not as graceful as the software from Storage Dimensions, SCSI Commander is logically organized and even includes a utility similar to SCSI Evaluator (the utility Macworld Lab uses to test a drive's read, write, and seek times) for performing your own benchmarks on drives.

The software that comes with MacTel's drives has one of the nicest-looking interfaces in the bunch. The software sports a 3-D cursor and 3-D buttons and includes color and sound. If you click on an item, a pop-up balloon appears, giving you help. MacTel's software is both intuitive and extremely easy to use.

Numerous vendors include handy file- and disk-recovery utility software such as SUM II, The Norton Utilities for the Macintosh, 911 Utilities, or MacTools Deluxe with their drives. I don't consider these programs to be unnecessary frills or marketing gimmicks—any Macintosh user would be wise to own one or more of the three. Jasmine offers SUM II to its customers for a reduced price of $30.

Some vendors also include the proven backup packages DiskFit (SuperMac), Redux (Alliance and Rodime), and MacTools Deluxe (Ruby Systems). (Most vendors, however, include Apple's HD Backup utility—a bare-bones program that is quite awkward to use.) Other vendors include software that they have designed in-house. For instance, PL1 includes spooling and disk-optimizing software and Advanced Gravis includes its own security program. Optima includes mirroring software that copies every action you perform to two hard drives at once (assuming, of course, that you are lucky enough to have an extra hard drive just for backup). While the software supplied can sway your decision between a few otherwise comparable choices, it shouldn't be the first feature you consider.

The Best Manuals
As with software, experienced users may not care about manuals. If you already understand termination, interleave, and other arcane issues, you may not even give a second thought to the manual. But many users will appreciate a bit of explanation.

Among the better manuals are those from GCC, SuperMac, Mirror, MacTel, Optima, Storage Dimensions, SuperMac, and Jasmine. They all provide information about both the drives and the software in a clear, concise manner. Manuals from GCC, Optima, Storage Dimensions, and SuperMac are especially slick and well illustrated.

Other companies, such as Mac-Products and Club Mac, don't even include a manual with their drives. Instead they enclose a mimeographed sheet with a bare minimum of instructions on how to set the SCSI ID. Data Enhancements puts its manual on a floppy disk in an effort to help our environment, but I couldn't use the manual well by reading it on screen and ended up printing the whole document.

Technical Support
Technical support is something you don't think about until you need it. But when you do need it, you'd better hope it's good. All hard drive vendors offer at least a one-year warranty on drives, and the standard is creeping up to two years. Microtech offers an outstanding five-year warranty on its hard drives. Other companies sell extended warranties for the years after the original warranty expires.

If your drive breaks, most companies claim that they will repair or replace it within two or three days, not including shipping time. (We could not test these claims, but keep reading Deborah Branscum's Conspicuous Consumer column for information on vendors who are responsive and those who aren't.) Toshiba has an extremely long turn-

For a good bargain, check out the Mirror M Series, Third Wave, and Hard Drives International PowerDrive.
around time of 30 days. Mirror and MacProducts offer an optional plan (for a yearly fee) in which the companies will loan you a hard drive while they repair your broken one. Under this plan, Mirror and MacProducts ship the loaner drive to you overnight as soon as you call. If you buy a drive through a dealer, you can frequently get the dealer to give you a replacement immediately. The dealer will then send the broken drive back to the company in exchange for a new replacement drive. Several vendors will try to recover data from a crashed disk if you ask; some charge, some do so for free. I've heard several good reports about Mirror's hard drive-repair and data-recovery services. Mirror charges based on the amount of data you need to recover. For instance, recovery of data on a full 200MB drive costs $187—a pittance if you really value the data.

The Grand Finale
The overall crowd pleasers at Macworld were the La Cie Tsunami and Cirrus and the Microtech Nova. These drives are reasonably priced, quick, and come with a nice assortment of software. Microtech’s quiet Nova comes with a lengthy five-year warranty; La Cie offers a respectable two-year warranty.

If you just want a basic drive and don’t want to pay any more than you have to, then I recommend the drives from any of the low-price leaders: Alliance Peripheral Systems, Club Mac, Hard Drives International, Jasmine, MacLand, MacProducts, Mirror, and Third Wave. Drives from Third Wave are especially quiet. I also found the drives from Mirror to be a good bargain. Ehman normally offers some of the more inexpensive products, but in this capacity range the company uses a more expensive Seagate mechanism, thus boosting the retail price of its drives.

For portability, the iDS Wip and the higher capacity Pro are solid choices for anyone but Mac II owners. I also recommend the Liberty 170MB and 200MB drives highly—these drives maintain the smallest possible size for a drive with a power supply and a fan. The Advanced Gravis Hardpac is a close runner-up to these three, but it’s a bit larger than the iDS drives and doesn’t include a power supply as the Liberty does.

Finally, there’s a large group of drives that I’d recommend based on aesthetics, features, and support. Most of these drives display a higher retail price than the drives from La Cie or Microtech, but you can often find them at a discounted price at a dealer’s store. Among our favorites in this category are the drives from Deltiaic, DJK Development, EMac, GCC, PLI, Rodime, Ruby, and Storage Dimensions.

Only a few drives made our “don’t buy” list—Toshiba’s MacKit, CMS’s Platinum drives, the Hitachi-based Liberty 250MB, and FWB’s hammer-155FMP. Toshiba’s MacKit has a clunky case and is one of the slower drives. The CMS Platinum drives and the Hitachi-based Liberty 250MB were the noisiest and were also among the slowest. The hammer155FMP, while fast, is overpriced and the software is unreliable (it failed to format three different times). Generally, the quality of the midrange hard drives we tested was quite good—and that’s good news for consumers.

See Where to Buy under Midrange Hard Drives for contact information.
GREAT GRAPHICS

Winners of our third annual Macintosh art contest

This article marks the completion of the third Macintosh Masters art contest. Like a family album full of snapshots, the articles we’ve published recognizing the winning entries each year trace the growth of the Mac as an artist’s tool.

Last year’s article, for example, recorded the coming of age of two new family members: for the first time color and animated entries showed up in appreciable numbers. Mac Masters III saw both trends deepen and develop. In a single year the Mac color standard matured from 8 to 24 bits, and a far greater percentage of color entries made it to hard copy. The same story holds for animation; the trickle of obviously experimental entries last year came in almost exclusively on disk. Mac Masters III brought in a crateful of videotapes, many of which were produced for real clients.

One pronounced trend this year is that advances in image-editing software—chiefly the release of Adobe Photoshop—have sparked a fad for photo-illustration. Though surrealistic, moon-jumping cows and orbiting eyeballs remain the rule in this genre so far, a few digital photographers, like grand-prize winner David Herrold (facing page), are turning the technology to good account.

Perhaps the most significant shift this year was the sharp increase in the number of interactive works. The judges and I browsed disk magazines full of graphics, games, and even articles. Via laserdisc we wandered a Zen garden in search of a mystery woman. We rendezvoused—through the agency of CD ROM—with a digital dream date at her place for, ahem, interaction. We watched a futuristic jam session in which a musician and a visual artist controlled sounds and scenes via voice commands. We free-associated through the information in kiosk-type displays. We experimented with an “art engine” that put imagery through mathematically derived permutations.

You won’t find any of these projects on the following pages, but though most are imperfectly realized, they’re still worth taking note of because they mark the birth of something truly new. After all, look at the works presented here; the bulk could have been made without the Mac (albeit often with more expense and effort). Interactive art may have existed before computers, but the complexity of the interactions available via computers is unprecedented. In the dimension of interactivity, the computer artist has the opportunity to go beyond aping other media, to find something uniquely his or her own. In recognition of this, next year we plan to inaugurate a category for interactive projects, most of which have been forced to compete in None of the Above.

Judging the collection this contest brings in requires a special mix of talents; once again we drew our panel from both the computer and art worlds. Ed Catmull, a noted computer-graphics scientist and innovator, is chairman of the Academy Award–winning animation-software company Pixar. Robert R. Riley is curator of media arts at the San Francisco Museum of Modern Art. Installation and performance artist Perry Hoberman, best known as a longtime collaborator of Laurie Anderson, has exhibited extensively throughout the United States and Europe. Sharon Anderson is a former art director of Publish magazine. And Ron Chan is a widely published Mac illustrator.

The Mac Masters contest wouldn’t have taken place without the participation of hundreds of artists around the world, or the generous support of the sponsors—Agfa Compugraphic, Adobe Systems, Apple Computer, Claris Corporation, Deneba Software, Pantone, Radius, QMS, and Truevision. On behalf of Macworld, I thank both groups. I hope everyone enjoys the following additions to the Mac art album. If history gives any indication, next year’s event will be even more impressive; check these pages in about six months for an announcement.

BY JOE MATAZZONI
David Herrold, FIRST PLACE AND GRAND PRIZE / Forest Home

Dogs and Propane

High Speed Chase
FINE ART

FIRST PLACE AND GRAND PRIZE
Digital Collages (previous page)

David Herrold likes to plan his wide-format photo collages carefully, and then abandon the plan once the creative process is under way. (Planning ensures that the perspectives in the various shots Herrold will take agree.) Using a Thunder-Scan and Digital Darkroom, Herrold usually begins a scene by blending four or five 35mm prints together to form a background. Some of his scenes, however—like Forest Home—are completely artificial. The forest in this image was made from three trees, altered and repeated; the forest floor is a cloned texture.

In the future, Herrold's photo-graphic explorations will no longer be limited to black and white. His Grand Prize was a 32-bit Truevision Nuvista+ board, and as his prize for winning in this category Herrold chose Adobe Photoshop.

HONORS

Modern Problems
New York illustrator and printmaker Scott Baldwin uses SuperPaint to produce limited-edition books of his evocative drawings.

Signs of Life
Barbara Nessim relies on experience and trial and error when creating the 3-D effect in her stereo slide images. Once she has completed a design, Nessim copies it and then goes to work manually offsetting parts of the copy to make them recede or come forward when viewed in a stereo viewer. Nessim painted Signs of Life in Photoshop.

Who Needs Sleep?
This piece is titled for the experience of making it, not the content: David Perk completed the ColorStudio collage during a 30-hour binge the weekend before a gallery show. The original color thermal printouts were tiled to yield a 5-by-7-foot work.

The Revelation
This piece, created for a video in progress, combines color printouts with gouache painting on paper. Bigtwin modeled the dogs in Swivel 3D.
**Full Bleed**

Dave Plunkert, Joe Parisi, and Tim Thompson used Aldus FreeHand to produce this cover for the magazine of the Art Director's Club of Metropolitan Washington. They made scans on a Sharp JX-450 scanner, then output the entire page as four-color film.

**1991 Nintendo Calendar**

Since the characters in the games this piece depicts are built from just a dozen or so pixels apiece, Jim Ludtke created his own interpretations rather than using screen captures. He painted most of the characters in Studio8 and Photoshop; a few he modeled in Swivel 3D. Ludtke finalized the page designs in Photoshop, adding glows and other effects, and then saved the completed files in TGA format. To achieve the piece's Pantone-awarding color, Ludtke sent the TGA files to a service bureau, which used a film plotter to produce them as 8000-line, 4-by-5-inch transparencies.

**Graffito, Full Bleed**

Jim Ludtke

1991 Nintendo Calendar

PANTONE COLOR AWARD

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**FIRST PLACE**

*Fun with Computers* "We were trying to bring some humanity to the subject of computer graphics, which often seem cold and mechanical," says Louis Fishauf of this promotional poster for a computer-animation firm. Fishauf designed the piece, which includes ScanMan hand scans, entirely in Illustrator 88. Partly because of the poster's 2-by-3-foot size, the drawing was saved as PostScript, converted to Scitex format via V.P., and output as four-color film on a Scitex plotter. Since he has all the graphics software he needs, for his prize Fishauf chose to get organized with Claris's FileMaker Pro.

**HONOR**

Lapis Display Server Packaging

Art director Paul Curtin and designer Peter Locke produced these eye-catching packages using Illustrator 88, PageMaker, and an Apple Scanner. As their prize for winning one of this year's two Pantone Color Awards the two men received $500 worth of Pantone Color Reference Books. The Pantone awards were started this year to recognize creative use of printed digital color.

Graffito, Joe Parisi / Design Reach brochure (not shown)

Studio MD, Jesse Doquino, Glenn Mitsui / AIGA Currents Display Brochure (not shown)
TECHNICAL ILLUSTRATION AND RENDERING

HONORS

Cellular Design David Rumfelt used UltraPaint to render this conceptual drawing, which was based on a design by Bob Rauchman.

Dayton Progress Punches Tony Mantia imported Scitex scans of the blueprint and punches directly into Photoshop, where he composited them with FreeHand-drawn wire frames. He saved the completed design in Scitex format, and output four-color film at poster size from a Scitex Raystar.

Theodore G. Huff / Femur Lengthening Device (not shown)

David Rumfelt
Cellular Design

Zebra Electronic Design Studio
Dayton Progress Punches

ANIMATION

FIRST PLACE AND GRAND PRIZE

Domestic Blitz The adventures of three archetypical cartoon figures—dog, cat, and mouse—Domestic Blitz cleverly mixes Mac-generated character animation with video backgrounds. Jim Ludtke modeled the story's mismatched roommates in Swivel 3D. To position the animation in relation to the backgrounds, Ludtke exported the Swivel frames to MacroMind Director, where he could match them up against live video piped in via a Computer Friends' TV Producer Pro video board. To composite the animation and video, Ludtke simply played the Director movies with a transparent background color on top of the video sequences; using the Computer Friends board again, he ported the NTSC signal directly to tape. Michael Whiteley composed the piece's suitably wacky music in

Cathy Malkasian
An Argument in the Art World
Mark of the Unicorn's Performer software; Christopher Cave did the editing on Interactive Media Technologies' Mac-based system.

Ludtke's Grand Prize is a 32-bit Truevision NuVista+ board; he chose Adobe Illustrator 3.0 as his category prize.

An Argument in the Art World Cathy Malkasian painted these café confreres in PixelPaint Professional; bringing them to belching, bickering life with MacroMind Director. A graphics tablet helped achieve the piece's soft, nondigital look.

Dish-Nippon Hideaki Ebata used System Soft's Shade, a 3-D program available in Japan but not yet in the United States, to model and render this still life.
Fifth Place and Grand Prize

The One Who Knows God
Robyn Miller drew this elegant FreeHand illustration for the cover of a book of writings by third-century Christian theologian Clement of Alexandria. Although graphics first brought Miller to the Macintosh, he is now chiefly interested in software design. His work in that area will be familiar to fans of the whimsical interactive adventures The Manhole and Cosmic Osmo. Miller's grand prize was a QMS ColorScript 100 Model 10 printer. For taking first place in Illustration, Miller selected Adobe Photoshop.

Honors

Shoemandingo "It’s about a robot who has a fascination with shoes and shopping for shoes," explains John Hersey of his FreeHand illustration. We knew that.
Megalopolis Antonio Angulo painted this glowing scene entirely in Photoshop for part of an exhibition design proposal on the theme of Cities of the Future.
Crown James Haney composited images of two buildings from his alma mater, the Illinois Institute of Technology, in Chicago, to create an illustration for a poster celebrating the school's 100th anniversary. He performed various mathematical manipulations on the photographs in custom software, and then adjusted the colors and separated the final image in Photoshop.

Vincent Wai / Warbird (not shown)
Sharon Steuer / Kolobolo Bird (Not shown)
Brian Hill
Chicago Title and Trust
Barricade
FIRST PLACE

NONE OF THE ABOVE

FIRST PLACE
Chicago Title and Trust Barricade
Brian Hill drew the designs for this traffic barricade in Aldus FreeHand.
He easily created comps for approval by printing color versions and gluing them to cardboard. Hill chose Adobe Photoshop for his prize.

HONORS
Tri-Avian
David C. Roy designs his limited-edition kinetic sculptures—which run for hours on the power of something called negator springs—in Illustrator 88. To visualize his creations’ complex motion before rendering them in wood and brass, Roy creates animated prototypes using Swivel 3D and MacroMind Director.

Sound Sculpture
In the “auditory environments” of composer, instrument maker, and hardware designer Trimpin, electromechanically controlled instruments surround audiences with pulsing, resonating waves of music. Trimpin designed and built a special MIDI adapter to enable a Mac running Professional Composer to pluck, pound, and otherwise play his custom-made and modified acoustic instruments with a sensitive touch and a variety of dynamics.
Almost everyone has some sort of problem with money, whether it's a supposedly simple chore like balancing a checkbook or a more complex task like tracking a varied portfolio of investments. Paying taxes can become quite painful as you struggle to fill out all the proper forms (in ink, no less). Thankfully, a wide variety of personal finance programs exist to help you budget, write checks and organize your checkbook, and track your assets and debts. There are even programs to help you through the happiest time of the year—the days when you prepare federal and state tax forms. Some of these finance programs take you beyond basic money management. High-end investment programs let you analyze and track investments, calculate how much monthly payments on loans will be, and figure out how much you can pay for a house. There's even a program to record and analyze gas and electric bills. Checks and Balances The simplest (and often most useful) personal finance programs are the bare-bones electronic checkbooks, Intuit's Quicken and Aatrix's CheckWriter II. With these programs, you can easily call up an electronic check on your screen, enter the data, and then print the check (or store it in a queue and print several checks at once). Deposits or cash withdrawals are handled in a similar manner, using simple electronic forms that resemble deposit slips or withdrawal forms. Quicken and CheckWriter II shine in ease of use; if you're not an analytical type who likes to pore over...
the fine details of your finances, one of these basic programs will serve your needs well. One limitation of these programs, however, is that you can enter only two categories of transactions—income and expense. So although you can use Quicken and CheckWriter II to, say, track stocks and investments, you have to do some extra work—for instance, entering adjustment transactions. Another check-writing-only program is Provue's Personal Finance, a template that works with Provue's Panorama database. Similar in function to Quicken or CheckWriter II, the program costs only $25, which makes it an attractive purchase if you already own Panorama. If not, you're better off going with Quicken or CheckWriter II, which offer more power. A slightly different type of check-writing program, CheckFree from CheckFree Corporation, combines electronic check writing with a check-mailing service. You subscribe to CheckFree for $9 per month; you then write checks and have them delivered via modem, rather than mailing them yourself. As with standard check-writing programs, you can charge checks to expense categories and deposits to income categories. CheckFree enables you to keep your account balance current (what you send is what you're paying out of your account) and makes reconciling
MONEY MANAGEMENT CURES

Several programs give you access to financial information. You can download current financial data on thousands of public companies, get price quotes on stocks, and even buy and sell securities through various brokerage houses.

Managing Your Money provides separate screens for stocks, bonds, and other investments. If you enter all your data and keep the figures current, you'll not only be able to see what your investments are worth, but you also have excellent records on the age of these investments and how much you’ve made (or lost). You’ll also have a complete data file that details all the items in your financial portfolio. Managing Your Money also enables you to do such things as calculate loan payments, project the future value of investments or savings accounts, figure out how much insurance you’ll need, and get approximate projections on what you’ll owe in income taxes.

Balancing Act Television writer-producer Linwood Boomer has

Managing Your Money from MECA Software. This extensive program enables you to do everything that you can in MacMoney or Dollars & Sense, plus you'll get specific screens for handling investments and taxes. The program is updated at least once a year to accommodate tax law changes, but even so, you won't get the level of detail that dedicated tax-preparation programs such as SoftView's MacInTax provide.

Several programs give you access to financial information. You can download current financial data on thousands of public companies, get price quotes on stocks, and even buy and sell securities through various brokerage houses.

Checking Your Net Worth

If you want a more-detailed level of money management, check out Survivor Software's MacMoney and The Software Toolworks' Dollars & Sense. These programs offer income and expense categories as the check-writing programs do, and they also enable you to track liabilities and assets. If you take the time to enter all the data called for, you can produce a balance-sheet report that tells you exactly what all your assets, like your house and car, are worth, as well as create a detailed list of your liabilities—like how much you owe on various credit cards. The programs then total your assets and liabilities and tell you exactly what your net worth is.

MacMoney and Dollars & Sense can also perform basic calculations. For instance, MacMoney can calculate how much the payments will be on any potential loan. You simply enter the amount you want to borrow, the interest rate, and how long it will take to repay the loan, and voila—MacMoney tells you exactly how much you’ll have to pay each month. You can also track stocks and investments in these programs. But as with the check-writing programs, the more financial information you want to track, the more difficult your record-keeping chores become.

Users with a temperament that can withstand lots of detail work should check out Andrew Tobias' Managing Your Money from MECA Software. This extensive program enables you to do everything that you can in MacMoney or Dollars & Sense, plus you'll get specific screens for handling investments and taxes. The program is updated at least once a year to accommodate tax law changes, but even so, you won't get the level of detail that dedicated tax-preparation programs such as SoftView's MacInTax provide.

Managing Your Money provides separate screens for stocks, bonds, and other investments. If you enter all your data and keep the figures current, you'll not only be able to see what your investments are worth, but you also have excellent records on the age of these investments and how much you’ve made (or lost). You’ll also have a complete data file that details all the items in your financial portfolio. Managing Your Money also enables you to do such things as calculate loan payments, project the future value of investments or savings accounts, figure out how much insurance you’ll need, and get approximate projections on what you’ll owe in income taxes.

Balancing Act Television writer-producer Linwood Boomer has

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Investing Wisely
Some of the most popular personal finance programs are those that help you manage investments (such as stocks or bonds). To use most of these effectively, you need to own a modem and be willing to pay the fees for downloading information from financial databases such as Dow Jones News/Retrieval. You'll also need to spend time setting up the programs correctly and then ensuring that the data is kept up-to-date.

Most investment programs let you enter assets manually or download information from an online database. Then you establish financial goals and evaluate potential investments using graphs or text reports to compare those investments to various standards (such as inflation, the price of gold, or the Standard and Poor's 500). The programs then track your progress.

Several programs such as Pro Plus Software's Wall Street Investor, The Right Time from T.B.S.P., Market Manager Plus from Dow Jones, Wall Street Watcher and Stock Watcher from Micro Trading Software, and The Investor from Arminius Publications give you access to financial information contained in the Dow Jones News/Retrieval database. You can download current financial data on thousands of public companies, get price quotes on stocks, and even buy and sell securities through various brokerage houses. Some of the programs, such as Wall Street Watcher and The Right Time, automatically update the value of your investments once your Mac has connected to the database.

If these programs are too hard-hitting, other companies offer products for tracking only certain types of investments. Larry Rosen Company offers programs for tracking and analyzing stocks, bonds, and real estate; calculating the cost and yield of loans; and analyzing whether or not you should refinance a mortgage loan.

Another niche product, GenMicronics' Financial Decisions includes 115 Excel templates that enable you to set goals (for example, retiring or making a large purchase) and then project what your investments will yield toward meeting those goals. Suppose, for instance, you want to buy a house in five years. Using Financial Decisions, you can learn how much you have to invest, say monthly, and for how long, and at what rate of dividends or interest to reach your goal.

Microsoft Press publishes Money Manager, a book and a disk with 31 Excel templates that cover the gamut of investment options. For instance, there are templates that help you analyze whether it's financially smarter to buy a house or rent, or to secure a fixed- or variable-rate loan. Other templates help with tax planning, saving strategies, debt management, and real estate investments. The book has excellent explanations and even goes into such basics as balancing a checkbook. Money Manager offers you, for $34.95, many of the features that Managing Your Money does—minus integrated check writing, financial reporting functions, and Andrew Tobias' humorous commentaries.

While you can perform many analyses within Excel, if you're so inclined, the advantage of templates lies in paying someone else a small fee to create the correct formulas and program the macros for you. Overall, templates are an excellent buy.

As for the higher-end programs, Stock Watcher is the best value, since it offers a num-

HEIZER SOFTWARE

Heizer Software offers over 75 programs for managing personal finances. The programs are inexpensive and designed to perform specific functions. Here's a sampling of products.

<table>
<thead>
<tr>
<th>General Finance Programs</th>
<th>Price</th>
</tr>
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<tbody>
<tr>
<td>Check Book</td>
<td>$15</td>
</tr>
<tr>
<td>Loan Payoff Analysis</td>
<td>$6</td>
</tr>
<tr>
<td>Net Worth Calculator</td>
<td>$10</td>
</tr>
<tr>
<td>Personal Budget</td>
<td>$15</td>
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<tr>
<td>Personal Financial Planning Set</td>
<td>$96</td>
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<tr>
<td>Tax/Cash Flow</td>
<td>$36</td>
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<tr>
<td>Insurance Analysis</td>
<td>$16</td>
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<tr>
<td>Education Financing Analysis</td>
<td>$14</td>
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<tr>
<td>Estate Analysis</td>
<td>$16</td>
</tr>
<tr>
<td>Asset Management/Financial Independence</td>
<td>$34</td>
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<tr>
<td>Retirement Plan Feasibility</td>
<td>$10</td>
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<tr>
<td>Investment Programs</td>
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<tr>
<td>Bond Portfolio</td>
<td>$25</td>
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<tr>
<td>Break-even Analysis</td>
<td>$8</td>
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<tr>
<td>Mutual Fund Evaluator</td>
<td>$15</td>
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<tr>
<td>Mutual Fund Reinvestment</td>
<td>$15</td>
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<tr>
<td>S &amp; P Indexes (monthly and daily)</td>
<td>$12-$99</td>
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<tr>
<td>Stock Portfolio</td>
<td>$15</td>
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<tr>
<td>Time-Weighted IRR</td>
<td>$12</td>
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<tr>
<td>Variable Compounding of Investment/Loan</td>
<td>$10</td>
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<tr>
<td>Real-Estate Programs</td>
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<tr>
<td>All-Purpose Mortgage Calculator</td>
<td>$20</td>
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<tr>
<td>Added Payment Mortgage</td>
<td>$15</td>
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<tr>
<td>Rent versus Buy</td>
<td>$9</td>
</tr>
<tr>
<td>Bi-weekly Mortgage</td>
<td>$25</td>
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<tr>
<td>Tax Programs</td>
<td></td>
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<tr>
<td>1040 Individual</td>
<td>$39</td>
</tr>
<tr>
<td>Individual States</td>
<td>$19</td>
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<td>(AL, CA, IL, MA, MI, MN, MS, NY)</td>
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</tbody>
</table>
In the past few years, the most popular comprehensive tax-preparation program has been MacInTax. It offers a wide range of forms that import data from personal finance programs such as Quicken and MacMoney. MacInTax offers many helpful features, such as linking the forms, so that an entry on one form carries over to the other forms that require this data. The program also provides extensive help and explanations, such as helping you select the forms you'll need for your return. If you buy MacInTax before all of the current year's tax forms are completed by the IRS, and send in your registration card, SoftView will send you upgraded forms in plenty of time to do your taxes.

I am happy to report that Chipsoft's TurboTax (a popular IBM PC program) is finally scheduled to become available on the Mac for 1990 tax year returns. I used TurboTax for several years, and was one of many users begging Chipsoft to get out of the MS-DOS gutter and join the Mac crowd. The Mac beta version of TurboTax that I looked at was similar in features and use to MacInTax. Both programs are direct and intuitive—that is especially important since you only use these programs once a year. TurboTax, in what to me seems a cruel attempt to inject fun into taxes, includes a Tax Trivia Quiz game—the equivalent of placing a method-of-execution quiz game in death-row prison cells.

If you've been using MacInTax there's no reason to switch—you're better off with a program you're already comfortable with. On the other hand, if you've been using TurboTax on the PC, you may want to switch to the Mac version when it's available. People purchasing their first tax-preparation program have a tougher choice, although MacInTax has an advantage with its proven track record on the Mac.

These programs' weakness lies in the lack of supplemental state forms. SoftView offers only 14 state programs for 1990 taxes, while Chipsoft plans to publish 10. The state supplements are sold separately, at just over half the price of the federal program. But for those users whose states are supported, these programs eliminate an extra tax-preparation chore.

SoftView is also expanding its product line to include other tax-time helpers. For instance, ifxPersonal Tax Analyst lets you perform "what-if" analyses to see how various strategies will affect your tax liability for the year and beyond. Another program, ifx Business Expense Reports, enables you to complete your expense reports and compile your business deduction forms simultaneously, thus eliminating the middle step of aggregating your expenses for your tax forms (while also making sure your deduction ducks are all lined up in an auditable row).

Several other programs are available to assist in preparing your taxes. HyperTax Tutor from
SoftStream International lets you select a tax area (such as charitable contributions) and then shows you the applicable tax laws and gives you tax-saving explanations and advice. Island Computer Services provides TaxSmith, a group of four Excel templates for different levels of needs. For $9.95, you can get a basic program that prepares a Form 1040 and Schedules A and B. As you move up in levels and price, you get more and more forms, until you reach the $74.95 TaxSmith Pro, a program that offers expanded forms for more complex family taxes along with forms for small businesses, rental property, employee business expenses, and alternative minimum tax. With any tax-preparation program, be sure to check that the forms you need are included.

The Heizer Catalog

The Heizer software catalog has such an extensive array of personal finance templates for Excel and Works that it ranks a category unto itself. Heizer publishes specialized personal finance programs written by various authors—at shareware prices. Heizer offers a wide range of other programs that run under HyperCard and SuperCard. There's even a $15 program on mixing drinks, which could be used as a tax-preparation supplement if you're so inclined.

On a more serious side, Heizer's personal finance programs include a check-writing program, a budgeting program, a daily income and expense log, a spreadsheet for recording and analyzing gas and electric bills, a program to analyze the advantages of insulating your house, a loan calculator, an analyzer for life-insurance policies, an analyzer for disability-insurance needs, and a program to record an inventory of items in your home (for insurance purposes), all priced from $12 to $20 each. Heizer also offers a personal finance-planning set, including tax planning, insurance needs, education financing, estate analysis, and asset management. This set of programs, priced from $14 to $36 separately, will set you back a total of only $96.

Don't be misled by the low price of the Heizer programs. They're all first-rate. While the programs generally don't work together like one comprehensive financial program, each delivers what its author promises, and is a solid bargain.
Putting Your Estate in Order

When you have made a fortune by tracking all of your investments, minimizing your taxes, and generally managing your personal finances well, you are ready for the last personal finance program you will ever need—WillMaker 4.0 from Nolo Press—which makes estate planning easy, if not fun. With WillMaker, you can leave property to your family, friends, and favorite charities by making up to 28 separate bequests; name alternate beneficiaries if your first choices don't survive you; name a guardian to care for your children; and in case you're visited by three spirits some Christmas night, you can even cancel debts others owe you. Nolo Press created WillMaker with help from a lawyer, so resulting wills are perfectly legitimate.

Nolo Press also publishes a companion program, For the Record, that enables you to list your assets and liabilities and calculate your net worth, to facilitate the processing of your estate and also for insurance purposes. In addition, For the Record offers various screens where you can enter all sorts of details on personal valuables such as your car, collectibles, credit cards, and even your pets. After recently having my wallet stolen, I was glad that I had filled in the requested information—having all the relevant information neatly recorded in a database rather than scattered throughout paper files made it much easier to replace my missing valuables.

Picking the Programs You Need

From start to finish (literally), there are a lot of programs that can help you manage your personal finances. If you just want to write a few checks and track overall income and expenses, Quicken or CheckWriter II will serve you well. If you want a more detailed tracking system, look at MacMoney and Dollars & Sense, and if you want to broaden into investments and insurance or tax planning, you should consider Managing Your Money.

If Managing Your Money is not sophisticated enough for your investment needs, look at the niche programs if you only need one or two functions or, if you need to manage a variety of investments, at one of the more sophisticated general programs. Investment programs cover a wide price range—from a Heizer program costing under $20 to a comprehensive program selling in the $500-to-$700 class. I consider Stock Watcher an especially good buy for a high-end program.

A good tax program is indispensable. MacinTax has built a solid reputation as a comprehensive tax program, and TurboTax looks promising. At the very least, you should consider the more limited TaxSmith program, which provides the forms that anyone with simple tax-preparation needs will need.

See Where to Buy for contact information.

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Alan L. Slay is a freelance writer based in Saint Louis. He specializes in financial and accounting software.
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Professional 24-Bit Animation System

FILMMAKER

Pros: Good concept; compact animation-definition files; easily generates superb 24-bit animation; antialiasing, antiflickering, and single-frame recorder controller support. Cons: Poor manual; weak phone support; interface hard to grasp; animations very slow to compile.


Apple may herald the Mac as a multimedia machine, but no personal computer has the memory, storage capacity, or speed to create full-color animations in real time. Look at it this way: just one full-screen, 24-bit color image can consume over a megabyte of space on a hard drive. You need at least 24 of these images per second to create convincing motion; so even a 30-second animated commercial would require at least 720MB of space. Clearly, it would take more than a Mac to process that much data in real time.

You have several compromises. You can animate in black-and-white, with a program like Studio/I. You can keep the number of color objects in your animations to a minimum, with a program like MacroMind Director. And now Paracomp’s FilmMaker offers a different kind of compromise.

Separation of Powers

In essence, FilmMaker separates the actual animation work (defining the motion of various objects) from the display work (showing color graphics on the screen). You program an animation in a black-and-white wireframe mode, where each element is represented by a straight-line skeleton (see “Framed”). For the Mac, it’s hundreds of times easier to move these wire frames in real time than to manipulate slow-to-draw color objects.

In this way, FilmMaker is akin to Adobe Illustrator, where you must use the Preview command to temporarily view your work with its colors and layering intact. FilmMaker has two similar commands: Show Picture, which (after a few moments) shows you a full-color still image of the current frame, and Run Sequence, which plays the actual animation, but using the wire-frame skeletons.

To program the movement of on-screen objects (which you create as color PICT files in your own paint or draw programs), FilmMaker provides three terrific tools. There’s one for movement, one for rotation, and one for resizing. You establish an object’s position, angle, and size on frames 1 and 50, for example; FilmMaker instantly tweens the object, interpolating its status on each of the intervening 48 frames automatically. By making an object grow as it moves, you create a convincing illusion that it’s coming toward you; by tipping it slightly as it changes course, you give it inertia and gravity; by placing one completed sequence into another, you create complex movements-within-movements. All of the spinning and resizing is done to the original object, too; the program doesn’t generate a series of jaggy, memory-eating duplicates, as Director does. And because the Mac isn’t computing real-time color graphics, FilmMaker’s animation-programming mode is quick, smooth, and solid.

Developing Negatives

You do pay a price for this convenience and speed, however. First, the whole concept of working with representations (instead of the actual images) takes some getting used to. At a glance, you can’t tell which of two overlapping objects is in front. Programming movement simultaneous with rotation or size-changing presents an even greater intellectual hurdle: for most effects, you must first create an invisible master object, which does the moving; to it you then attach the spinning and/or growing
object with its own independent motion. You’re probably in for a couple days of head pounding before you understand FilmMaker’s interface and its concepts. Furthermore, you do this programming mainly by entering numbers into dialog boxes—the numeric keypad gets an incredible workout with FilmMaker.

Then, sooner or later, FilmMaker must marry your animation programming (saved in one very small file) with the actual color PICT images those wire frames represent (in their own files on your hard drive). In the process, FilmMaker offers two of its most spectacular options: antialiasing, which blends colors smoothly at the edges of objects to eliminate jaggies, and a special antiflickering feature that softens any 1-pixel horizontal lines, to eliminate the annoying flicker typical of Macintosh NTSC (video) transfers.

Here, however, is the second price you pay for being able to work in a tickety-split wire-frame mode: FilmMaker takes forever to compile the animation programming into a finished sequence. If you’re using the antialiasing and antiflicker features, it can take from 1 to 15 minutes to compile each frame; a complex 30-second commercial could take a day or two. And as you’d expect, the finished animation files are often huge.

In the Can
The results are worth it. The compiled animations—even your first attempts—are smooth, stunning, and extremely professional-looking. Once you understand how FilmMaker thinks, you could define the animation for a spectacular animated logo, exploding diagram, or growing bar chart in a half-hour’s time (not counting compilation time). One of FilmMaker’s raft of separate utility programs lets you add digitized sounds to specific frames. Another lets you animate the colors of an object, so that it shimmers, darkens, or changes hue over time. Yet another—a desktop-presentation module—lets you play a series of FilmMaker files in a sequence that includes still PICT graphics (such as bulleted text charts). At each film-to-PICT or film-to-film juncture, you can tell this miniprogram to wait for a few seconds to pass, for a mouse click, or for a user-defined keystroke before proceeding.

Incidentally, FilmMaker is now marketed by Paracomp, its third parent since it was born in France as an in-house production tool. As a result, the manual is a mishmash hybrid. French words creep in; frequent references are made to versions and features that no longer exist; numerous features are described or pictured incorrectly. And that’s not to say that it would be a good manual even if those problems were corrected; it’s woefully insufficient, venturing a few awkward words about each feature without even hinting at its purpose. To make matters worse, Paracomp’s technical personnel are still learning the newly acquired program themselves; at this writing, although they were friendly and apologetic, they couldn’t answer some questions, and answered others incorrectly.

Lights, Camera
FilmMaker isn’t as effective a multimedia/presentation program as Macromind Director, which has extensive XCMD support for controlling videodiscs and MIDI (and a far more accessible interface). But for pure, effect-intensive animation, particularly for transfer to video, FilmMaker shines. FilmMaker also talks directly to the DiaQuest NuBus board, which controls single-frame recording decks. In such a configuration, FilmMaker can compile and record one frame at a time directly to tape; in other words, you never have to generate a multimegabyte, compiled-animation file on your hard drive.

Make no mistake: mastering FilmMaker is no picnic, particularly if the manual is all you have to go on. But for the professional or corporate animator, FilmMaker is an important prospect. It separates the work that’s easy for the Mac (making calculations) from work that’s hard for it (drawing multicolored images in real time). In so doing, it affords great flexibility, makes better use of the animator’s time, and provides some welcome new creative options.—David Pogue

LASERMAX 1000
Pros: High resolution; fast on dedicated Mac II; 135 Type 1 fonts included; background processing doesn’t interfere with foreground operations.

The LaserMax 1000 looks like a normal laser printer based on the Canon SX engine (the same one used in the LaserWriter IINT). It is billed as a “personal typesetter,” however, and with its 1000-dpi resolution (400 by 100 for bitmapped graphics), it goes a long way toward earning that moniker. But because the LaserMax uses toner instead of photographic paper, you don’t get the quality

(continues)
ground. When the resident Mac is running with the Finder, you print the job to disk, and then you start the LMPM to process the job. Because printing under the Finder is a two-step operation, it is more efficient to run MultiFinder on the resident Mac. You can do other work on the resident Mac while LMPM prints in the background, though dedicating a Mac to the job speeds up printing immensely.

The LMPM is not nearly as intrusive on foreground operations as Apple's Print Monitor is (the application that runs when you enable Background Printing in the Chooser). You hardly notice the LMPM running, except when a page is actually coming out of the printer; then everything on the resident Mac stops for about ten seconds. Because the LMPM works so hard to be unobtrusive, it slows down immensely if you are doing any work in the foreground; the LMPM lets you work, but in the process doesn't do much work itself.

**PostScript Compatible**
The LaserMax uses a non-Adobe PostScript interpreter, or PostScript clone. Like other PostScript clones, the LaserMax's interpreter doesn't print everything perfectly, notably fancy PostScript patterns and halftone fills, as well as relatively simple things like distorted type (see "This Is Only a Test"). Sometimes it fails to print at all. The same is true with Adobe interpreters, of course, but the LaserMax failed to print some jobs that printed fine on an Apple LaserWriter IIINT.

Since the PostScript processing happens in the background, you do not get the same kind of feedback you get from a regular PostScript printer over AppleTalk. About the only messages are "busy" and "processing job." You also cannot download fonts in advance, so every time you print, the Macintosh has to download the fonts, as well as reinitialize the board with LaserPrep (or Aldus Prep for PageMaker).

When the LaserMax fails to print a job, it doesn't do a very good job of cleaning up after itself; the file hangs around in the spool folder, which spurs the LMPM to fruitless attempts at printing the document. The Cancel Printing button also doesn't work in the version I tested. The only solution is to quit the LaserMax Print Monitor and then quickly—before the LMPM starts up again—throw away the file in the Spool folder.

The big question is how the output looks. The answer? Pretty good, as long as you avoid gray tints and small sizes of serif type (see "Strong, Silent Type"). Gray tints aren't nearly as smooth as the almost invisible half-toning you get from an imagesetter regardless of the printer's density setting. Where dark objects are on top of

### Strong, Silent Type

These three samples, set in Palatino, were printed on a LaserWriter at 300 dpi (top), a LaserMax 1000 at 1000 dpi (middle), and a Linotronic 300 at 1270 dpi (bottom). The type from the LaserMax has almost no visible jaggies, but even with Palatino's sturdy serifs, the type starts to get chunky at small sizes.
The Macintosh is known for being user-friendly. So Mac reference books should be, too. Here’s a three-book library with no intimidating jargon...no complicated procedures...just straight-forward advice on:

• What to buy
• How to install it
• How to maintain and repair your Mac
• How to upgrade your Mac
• Answers to commonly asked questions

**Inside the Apple Macintosh**
by Jim Heid and Peter Norton.
Hundreds of programming techniques, tips and ideas are illustrated with photographs, video displays, line drawings, charts and graphs in this handy guide to understanding the technology behind the Macintosh.

You’ll learn:
• What makes your Mac go
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**The Big Mac Book**
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• Generic
• Philips
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gray tints, a halo-like effect of lighter gray is apparent around the dark objects. Serif type, especially in smaller sizes, doesn't have the fine elegance that you get from imagesetters.

If you use the LaserMax and want imagesetter quality, you have to compromise. Don't use serif type smaller than 10-point size, and avoid grays entirely. If you can work within these constraints, or if you need print quality somewhere between a 300-dpi laser printer and an imagesetter, the LaserMax is worth considering.

If you produce a wide variety of jobs, however, especially jobs containing special PostScript effects, you'll need to think seriously about spending $8000 on a printer that's based on a somewhat-less-than-reliable PostScript-clone interpreter. —Steve Roth

See Where to Buy or circle 649 on reader service card.

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**THE STRING QUARTET: THE ESSENCE OF MUSIC**

**Pros:** Easy to install and run; good beginner tutorials and historical background; includes numerous musical examples. **Cons:** Requires 6.5MB of hard drive space; initial orientation can be difficult; sketchy manual. **Company:** Warner New Media. **Requires:** Mac Plus; hard drive; CD-ROM drive; earphones or audio playback equipment. **List price:** $66.

"It is the world's own dance," Richard Wagner wrote concerning the finale of Beethoven's String Quartet No. 14, Op. 131. It contains "wild pleasure, painful weeping, the ecstasy of love, supreme joy, fury, voluptuousness, and suffering," he continued, a description that would serve as well for the entire work. One of the Late Quartets, this seven-movement quartet was considered by Beethoven to be his best; it now serves as the centerpiece of Warner New Media's The String Quartet: The Essence of Music.

Following Warner's first CD ROM release, Mozart's opera The Magic Flute (see Reviews, October 1990), and nicely complementing the first in The Voyager Company's CD Companion Series, Ludwig van Beethoven Symphony No. 9 (see Reviews, June 1990), this new addition to Warner's Audio Notes line is a combination HyperCard stack, audio CD, and CD ROM disc. Installation is straightforward: you insert the CD in a CD ROM player and drag the seven HyperCard files from the CD to the hard drive. Beethoven needs almost 6.5MB as compared to 13MB for The Magic Flute and 1.7MB for the single-CD Symphony No. 9. This stack doesn't install a button on the Home card (you can, of course, install one yourself).

Wagner seems to have progressed since Magic Flute, which requires, among other things, that you replace your usual Home card with a special Magic Flute Home card each time you want to play the CD; The String Quartet, however, is as easy to launch as any HyperCard stack. The 1-page information sheet, although still inadequate, is nonetheless an improvement over The Magic Flute's manual; The String Quartet's manual at least carefully enumerates all the CD ROM system files that the program requires. (It also warns that the program runs better with Adobe Type Manager turned off; a minor inconvenience.)

Wagner has chosen the Vermeer Quartet's recording of the piece—a good performance (quite good to my ears), but to most critics, not one of the very best. Unfortunately, as sometimes occurs with closely miked recordings, the listener is subjected to a lot of heavy breathing as well.

As with both The Magic Flute and Symphony No. 9, The String Quartet offers the listener a variety of ways to approach the music. Four musical analyses provide running commentaries on different aspects of the quartet. The first commentary is an introduction that combines discussion of general musical concepts with nontechnical descriptions of the quartet's major elements. The second commentary explains the structure of the quartet in greater depth, while the third discusses its tonal and harmonic aspects. If I have any quarrel with these three commentaries, it is only that they are often too brief the intense feeling for the music so evident in Voyager's treatment of Symphony No. 9.

The fourth commentary is a graphical display of the four voices and—measure by measure—the subjects, themes, questions, answers, bridges, and other musical material each one is playing. Warner gives you the option of entering your own observations in a fifth commentary section, consisting of a set of blank pages—each page keyed to a particular section of the quartet.

While the quartet is playing, you can click on a number in the upper-left corner of the screen to switch from one commentary to another. You can also open a special quartet map and use it to move to any part of the quartet, open CD-player controls at the bottom of the screen to skip a track, scan or stop the music, or pause to explore a related topic. If you have two CD ROM players and the Juilliard String Quartet version on a standard audio CD, you can also use the quartet map to switch back and forth between the two different performances and compare interpretations.

Three major musical side trips, each divided into numerous subtopics, are also available. One—the most complete remedial music-appreciation course yet on CD ROM—covers such basic concepts as musical notation, rhythm and meter, pitch, intervals, and harmony. Another describes musical forms, the origins of chamber music, the stringed instrument family, the musical relationships among the Late Quartets, and the (continues)
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melodies used in each movement of No. 14.

A third side trip is historical; it includes brief essays on such topics as Beethoven's deafness, his use of the metronome, and the first performances of Quartet No. 14. In addition, there is a glossary, an index, and a concise timeline of Western music, all with entries that expand when you click on them. These sections are enhanced with many delightful period illustrations; indeed, elegant graphics enliven all aspects of the program.

In almost every part of the program, explanations of unfamiliar terms, related topics, the main topics menu, and the point in the quartet at which you last digressed are only a mouse click away (see "Navigating a Musical Masterpiece"). Many discussions are peppered with audio examples—from Quartet No. 14, other Beethoven quartets and symphonies, and a variety of other sources—that can be easily played and replayed. There are also nonthreatening (and nontrivial) quizzes that test you on all aspects of the program.

Although The String Quartet demonstrates the benefits of hyper-text and multimedia to great advantage, like The Magic Flute, The String Quartet remains a victim of hyper-text's great curse. Namely, that despite all its navigational aids, it is easy to get lost within the program, hard to know where to begin (especially if you don't know much about classical music), and almost impossible to know whether or not you've overlooked something important. A little more assistance from the manual would not be out of place.

I grew up on New York Philharmonic Young People's Concerts, conducted by Leonard Bernstein, and it seems I have yet to outgrow the joy of learning about music. Warner's Audio Notes (and Voyager's CD Companion Series) may well be an improvement on what was once, by necessity, a one-sided musical conversation. Just as chamber music itself is one of the more intellectual and challenging forms of music, The String Quartet tends to be more cerebral than either Symphony No. 9 or The Magic Flute. People raised on a strict diet of pop music may thus find The String Quartet tough going at first.

one interested in music of any kind, however, can fail to be rewarded, in enjoyment and increased musical understanding, by The String Quartet. I know I found both in large measure and eagerly look forward to Warner's next CD ROM release.

—Robert C. Eckhardt

See Where to Buy or circle 724 on reader service card.

**MACBACK 8000**

**Pros:** Handles unattended backups; enables network administrator or workstation user to schedule a backup; maintains log of all actions for both server and client; software can be used to back up to other (non-tape) devices.

**Cons:** Cannot run concurrently with other AppleShare tasks; server application stops if screen saver is running.

**Company:** Advanced Digital Information Corporation.

**Requires:** Mac Plus; System 6.0.2. **List price:** $5295.

If you are running a network, one of your major concerns is likely to be maintaining an adequate system of backups for both the servers and the workstations on the network. Rather than depending on users to back up their Macs regularly (they don't back up regularly, do they?), it's easier to schedule a backup for them. It's even easier if you can schedule the backup from one central Mac. The MacBack 8000 offers these advantages.

The MacBack 8000 includes software for both local (attached directly to your Mac) and networked use. The MacBack 8000's hardware is a relatively large (16 by 7 by 10 1/4 inch) unit, which uses either DC2110 or DC2165 tape cartridges in an eight-tape magazine; its total backup capacity is either 800MB (DC2110 tapes) or 1.2GB (DC2165 tapes). The unit automatically cycles through the eight cartridges and can be locked with a key for added security. Although the unit requires only one SCSI cable to connect to the Mac, it uses two SCSI ID numbers internally, so you need to be careful when attaching other devices to the same SCSI port.

When you set up the MacBack 8000 for a networkwide backup, you designate one Mac on the network as the backup server; you attach the MacBack 8000 to it and install the MacBack Server software. All users expecting to back up files to the 8000 run the MacBack Client software. If you want to perform scheduled, unattended backups, each Mac must also have the AutoStart INIT installed.

**Creating a Backup Document**

Every backup needs a backup document. This document is created either by the server administrator (using MacBack Server) or by a client (using MacBack Client). The backup document contains information on the files, backup frequency, backup schedule, and to which cartridge the backup should be written.

The MacBack software lets you select files for backup either specifically by name or by application. Instead of having to remember the Mac's four-character creator code for applications, the MacBack lets you use an application's actual name, which simplifies matters. You can also back up all files, or specify that only documents, or only applications, or only System files, be backed up.

The MacBack's interface for scheduling backups is easy to use (see "Let Me Check My Calendar"). You simply select the days that you want backups performed from the calendar, such as every Tuesday in a month. You can also select a given date, or you can decide to back up only on the even months of the year.

When scheduling a backup, you can use either the next available cartridge (continues)
Performing a Backup

Once a backup document has been created, either the server administrator or the user can perform the backup. In either case, both the MacBack Server and the MacBack Client software must be running. For scheduled backups, the Autostart INIT automatically launches the MacBack applications at a scheduled time. Each user, however, must have logged on to the backup server before Autostart can work on his or her files; this extra step enables the MacBack Server software to identify each Mac and verify that the user is authorized.

As the server administrator, you could create a series of backup documents for backing up files from your workgroup's Macs at 1 a.m. To implement the backup, you keep the MacBack Server application running on the server Mac and see that all the other Macs to be backed up are turned on, logged on to the MacBack server, and running Autostart before you leave work in the evening. Everything is automatic after that. For added security, the backup document can also contain instructions to shut down the Macs after the backups are performed.

One caution, however: I've found that screen savers interfere with the MacBack's automatic operation, both on the client and the server Macs. Pyro and After Dark prevent the MacBack from continuing with the backup if they activate to save your screen.

The MacBack offers all the control you need for networked backups. Network managers can define backup documents for customized backups. Users can also define their own backup documents for special backups or to use specially designated cartridges. In each case, the backups can be scheduled for those times least likely to affect the network and the other users. And MacBack's automation makes changing and maintaining media quite easy.

Speed Tests

Unfortunately, the MacBack is no speed demon. Using a Mac II client and Mac SE/30 server, I clocked file-transfer rates in the range of 2.2K to 8.5K per second over both LocalTalk and EtherTalk networks. (For comparison, Finder-based copies to an AppleShare hard drive over EtherTalk fell in the range of 19K to 24K per second.) Backups over EtherTalk did not offer much of a performance advantage, being about 25 percent faster than backups over LocalTalk. The main bottleneck seemed to be the tape cartridge system, since local backups (using the SCSI port) from the SE/30-to-tape system weren't any faster than the backups over EtherTalk.

If you're looking for a high-performance backup system, DAT systems or removable hard drives (like the Syquest or Bernoulli cartridges) coupled with software like Retrospect or NetStream, might be better choices than the MacBack 8000. But, if the idea of an automated mult cartridge system that can run at any time of day (which might offset the speed limitations) appeals to you, the MacBack 8000 is a good choice. —Dave Kosier

See Where to Buy or circle 551 on reader service card.

SPYGLASS DICER 1.0

Pros: Truly spectacular color inspection of data in 3-D space; only Mac product to provide these supercomputerclass functions. Cons: Slow; occasional mystery crashes. Company: Spyglass.

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SPYGLASS TRANSFORM 1.0


SPYGLASS VIEW 1.0


Mac software comes from some surprising sources. For example, the National Center for Supercomputer Applications in Champaign, Illinois, developed the precursors of Spyglass's unique suite of programs—View, Transform, and Dicer. If the connection between Macs and supercomputers isn't obvious, it goes something like this: supercomputers are often used to create complex simulations in fluid dynamics, astrophysics, or other fields that generate huge volumes of data in three dimensions simultaneously. These megabytes of numerical results translate the numbers into pictures. If you have a system (the Mac, in this (continues)
Fortunately, critical patient data is tucked into the safest place of all. A Sony data cartridge.

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case) that can display results offline, you can use a supercomputer’s precious computational time only for generating the data and use the desktop computer for the weeks or months that you might need to analyze and understand the results.

**View**

Visualizing data usually means translating tables of numbers into color raster images on a monitor screen, and this color-image generation is where these programs excel. View lets you import data tables in ASCII, Excel, or Hierarchical Data Format files (HDF might safely be said to be more familiar to mainframe FORTRAN programmers than to Macintosh users) and look at the numbers as surface, contour, differenced, or shaded plots; with a huge variety of false-color palettes and user-defined or default scaling schemes (the range of data values is scaled to 256 color values). Using the palettes and scaling is extremely easy; the amusingly named Fiddle tool, for example, lets you shift and compress a data-table representation just by moving the Fiddle cursor around the image. Assuming that you eventually want to view images on other monitors or print them in color, the color editor works with RGB, CMY, HSV, and HSL color models. If data warrants closer inspection, another tool lets you drag a line across the color image and view a standard x-y chart of the data along that linear cross section; yet another tool tabulates a histogram from pixel values in the image. View offers a particularly simple type of animation (see “Voom with a View”). If your data-generating program gives you a sequence of computed tables of the same size at regular time intervals, you can call these up automatically (rapidly from memory, more slowly from a disk) in an animation window. Controls include stop, fast forward and back, and step; for watching a computation in dynamics evolve through time it’s just wonderful.

**Transform**

View is the tool for studying data generated by other programs; if you want to manipulate the images of the data (without recomputing at the source) you’ll want Transform. Besides having most of the visualization capabilities of View (line graphs, histograms, color imaging), Transform has a few more tricks (rectangular-to-polar display conversion, for example), and it lets you assemble array calculations in a FORTRAN-like language using a notebook window. Different types of smoothing and interpolation are offered as standard menu items, but for fancier work—nonlinear transformations of data, arithmetic on pairs of tables, kernel convolutions (difference kernels and 5- and 9-point Laplacians are provided), or even use of external MPW C image-processing functions—you must resort to programming in a Transform notebook. Transform, however, resembles programs (Photoshop, Enhance) familiar to Mac graphics users. Transform’s ability to select rectangles in the image display that are directly connected to the corresponding display of primary data might actually be the program’s most useful feature (see “Transform Your Vision”).

A new Spyglass product, Format, generates HDF files for use with Transform; the alternative is to use the HDF subroutines for Language Systems’ FORTRAN provided with Transform as utilities.

**Dicer**

View and Transform provide special features, but basically represent well-executed, science-oriented versions of capabilities available in less-polished form in other programs (to be fair, you’d need a small collection of programs to replace either View or Transform). About Dicer, however, the appropriate observation is “Wow!” There’s just nothing else like this program, so it’s gratifying that Spyglass did such an impeccable job on it. With Dicer, you can view cross sections and combinations of cross sections of a three-dimensional data table (see “Sliced, Diced, and Very Nice”). These views can further be modified by choice of color palette and by most of the other tricks available in two dimensions with View. In principle all the data is available, and you select the viewing segment using slicing tools. Three-dimensional data sets bring their own problems: they’re big, so the little memory watch in the Dicer screen is a critical bit; and they call for some formatting convention, so Dicer requires that you get your data into 8-bit 3-D HDF format using utilities provided. This last requirement might seem cumbersome, but the fact is there aren’t many people who have 3
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Take a close look and you’ll find it has no equal.
D data sets at all who don't have some familiarity with FORTRAN or C (you'd have a hard time even generating a serious data set of this type from anything less than a mainframe program). This program is especially useful for inspecting acquired 3-D data—magnetic resonance imaging files would be a good example—rather than the often more symmetrical computed data sets, but the ability of Dicer to export sequences of data slices to View for animation means that the Dicer-View combination is the best way to view any kind of suitably formatted 3-D data on a Mac. Despite being Spyglass's most sophisticated program, Dicer is the easiest of the trio to use, and it's one of the few Mac programs to succeed in creating the illusion that you're working with a high-end workstation.

The Strengths
Although Transform and View overlap a bit in function, their strengths are clear: View's color-manipulation and animation make it the basic tool for inspecting 2-D data. Transform is the right program if you need to manipulate data tables without logging back on to the mainframe, and Dicer is the only game in town for serious study of 3-D data sets. They're reasonably priced compared to the alternatives, fairly well debugged for 1.0 versions, and were designed by some of the most experienced scientists in technical graphics.—Charles Setter

See Where to Buy or circle 718 (Dicer), 720 (Transform), 721 (View) on reader service card.

CHESIRE 1.0

Pros: Quick and easy; expandable.
Cons: No pie charts; only charts up to three series of data; main dialog box can't be sent to back; uses of charts not described.

If you need to quickly create no-frills charts and place them in documents created with PageMaker 3 and 4, Microsoft Word 3 and 4, MacWrite II, or MacDraw II, you need Cheshire.

Indeed, all software should be this easy to use and this useful. I created and placed a thoroughly serviceable chart in Word in less than three minutes. I did it in as few as five simple steps: key in the data, select it, call up Cheshire with a hot key (the program is an INIT), choose from 21 chart types by double-clicking on the one you want, and click on an OK button. The chart is automatically placed in your document. Before you place the chart you can view a fully formatted thumbnail sketch of it in the Cheshire window.

In PageMaker you can resize the chart in the same way you would resize any other graphic. In MacDraw II you can do even more: each of the chart components is a separate object and thus fully editable.

Simple Setup
Cheshire uses a standard tab-delimited format, which means you press the Tab key to separate data on a line and you end each line with a carriage return.

Cheshire lets you select any installed font, size, and style. You can choose whether or not the grid should have white, black, or gray lines and whether or not to use a drop shadow, a background, or a feature called Plot White. Used in conjunction with the background and drop shadow, Plot White gives the effect of reversing out the chart shape, producing a light chart on a dark background. You can also transpose data to switch the x and y axes.

You can edit a chart any time by simply selecting it and calling up Cheshire. The program keeps a record of the data along with the chart—except for those in MacDraw II documents. For MacDraw II you need to save a copy of the data as a text object and select the data each time you want to edit the chart.

True to the program's intent, Cheshire charts are very simple in appearance. They are a no-frills graphic representation of data—rather than splashy infographics à la USA Today—that you can quickly paste into a memo, a newsletter, or a report.

Pie Charts en Route
Abbott Systems created Cheshire so that it could be expanded (click on the initial C in the Control Panel device for some insight into the program's name). New chart types can be added to the program by dragging them into the Cheshire folder. Unfortunately, this version doesn't include the beloved pie chart. According to the company, the next version should have a pie chart option. Included with Cheshire 1.0 are five types of bar charts, nine column charts, four line charts, and three surface charts.

You can plot up to three data series in any Cheshire chart (and the Line/Points chart accepts up to four data series). But you can't, for example, plot quarterly sales over a four-year period with bar, column, or surface chart in this version of Cheshire; three years is the maximum.

Another feature I would like the company to add is the immovability of the main Cheshire dialog box. I would like to be able to bring a window from behind the Cheshire main dialog box to the front—to view the placement of a chart, for example—but Cheshire won't budge. You have to close the main window before you can work in any other window.

For the most part, however, if you need quick, no-nonsense charts for direct placement in PageMaker, Microsoft Word, MacDraw II, or MacWrite II, Cheshire is almost guaranteed to bring a smile to your face.

—Philip Bishop

See Where to Buy or circle 614 on reader service card.
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SERIUS DEVELOPER 2.1

Serious Corporation promises a lot. It claims that Serious Developer, basically a programming tool kit in which icon-diagrams are used to call and manipulate function and program modules, is better than traditional programming languages for developing custom applications. Remarkably, Serious Developer actually delivers the goods. Within its limitations, it makes possible rapid development of reliable applications that exhibit very little penalty in terms of size or execution speed.

Now for Something Different
Serious calls its program modules objects, and calls the mode in which you connect objects an Object Interaction Protocol. It turns out that these "objects" aren't the same as objects in Smalltalk or C++; Serious's objects are not generally modifiable and do not operate under the same hierarchical organization you would find in a classic object-oriented language.

When you start up Serious Developer, you see a screen with three windows displayed against the programming area: a blank object window, a little window full of usable objects, and another small window that displays sets of functions. The "objects" are in fact modules of compiled code for which Serious has defined a special input/output protocol. The level of sophistication of these objects can be estimated from their names—Database is representative and refers to an object that can be used to generate a custom database application. You start a new program file (called a Worksheet in Developer usage) and start dragging objects into the empty object window. Typically, a first set of objects would construct a menu bar and the File menu common to all Mac applications, and the following sets, in their own object windows, would contain the "action" menus and menu items. Once you have done this bit of definition-by-dragging, you begin work on individual menu items. For Quit, under File, for example, you find the Quit icon in the function window (under General, one of dozens of function sets), haul the icon out to the programming area, and hook it up by drawing a line from the Quit icon to the lower connector that's associated with Quit in its object window. Other File menu items, such as opening or closing windows, require two or three function icons, which, once again, you connect to one another and to menu items simply by drawing lines (see "Fettuccine Code?). Obviously, if your menu item is going to be Repaginate Document or Fourier Transform things aren't quite so automatic, but Serious has included a huge assortment of high-level functions so that you won't have to resort to the type of ground-floor programming that's awkward to do with diagrams.

The plan here is to clear up all basic functions when possible; version 3.0 of Serious Developer (scheduled for 1991), for example, offers not only the objects Spreadsheet, XCMD, Linear Algebra, Report, Graph, CL1, and MIDI, among others, but also an aggregate type of abstraction at a level higher than object.

The Big Picture
If you have previously programmed an application for the Mac in Pascal or C, you'll find that constructing applications is three to six times faster with Serious Developer. The final applications carry about 30K to 65K overhead in compiled form over their real-language equivalents, but no noticeable speed penalty. That's a shocking accomplishment and sets Serious Developer apart from other approaches—from Smalltalk to HyperCard—that improve "productivity" at the expense of speed or size in the final program. If you have programmed applications in FoxBase+/ Mac or 4th Dimension you'll find the database (especially database search functions), network, and communications sections of Serious Developer surprisingly strong, and will note that applications in real life custom application typically means a hand-tailored database or transactions system for a vertical market) are robust; the Serious system virtually rules out subtle or mysterious bugs. But if you haven't programmed much before, you will find you have a lot to learn and nowhere to learn it. Serious documents its conceptual universe in language that's as correct and terse as a logical proof; it's admirable and complete, but a relatively hospitable environment for beginners (who should perhaps work through Symantec's Just Enough Pascal for a fast orientation on the rudiments of Macintosh programming).

Compilation
Experienced developers report that it takes several months to become comfortable with Serious Developer's icon/diagram programming format, but that this time is rapidly recovered when the first applications are written. Technical support is philanthropically lavish, and besides offering fixes and a score of additional objects for Developer, Serious is planning a text-based non-diagrammatic product that offers the same functionality for 1991. As it stands, Serious Developer is an utterly admirable product; it lets you program at warp speed without loading your compiled program with bulk or execution-speed disadvantages, and it forces, for all the effort of mastering diagram style, rigorously top-down program design. This is, no pun intended, one of the few new programming schemes to take seriously if you program for a living—Charles Seiter

See Where to Buy or circle 715 on reader service card.
LaserMAX 1000
Personal Typesetter

The LaserMAX 1000 utilizes the same resolutionary TurboRes™ technology to produce incredible 1000 x 1000 TurboRes™ output. TurboRes™ resolution enhancement technology controls the position and height of the pixels on the printed page and eliminates coarse steps between pixels, otherwise known as jaggies. With output this sharp, you won’t need to send out for expensive and time-consuming typeset output.

And, both the LaserMAX 1200 and the LaserMAX 1000 come standard with the LaserMAX 135 Typeface Classics—135 premium typefaces in Type 1 format.

LaserMAX 400
Personal Printer

Who said quality doesn’t come cheap? The LaserMAX 400 provides Macintosh users with 400 x 400 TurboRes™ output, 50 premium typefaces in Type 1 format and still sells for less than $2,000. That’s a bargain any way you look at it.

The LaserMAX 400 is a powerful PostScript-language compatible laser printer that works with many of your desktop publishing and graphics applications. The 4-page-per-minute printer is based on the same LBP-LX print engine that’s used with other personal printers, including Apple’s new Personal LaserWriter SC and NT and HP’s LaserJet IIP.

LaserMAX 1200
Personal Typesetter II

You knew it was only a matter of time before LaserMAX gave you more. With the introduction of the LaserMAX 1200, Macintosh users are given far more publishing power than ever: 1200 x 1200 TurboRes™ output in an 11 x 17-inch format.

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If you’re looking for an extraordinary resolution solution, call LaserMAX today: (612) 944-9696, Dept. 248.
This month I look at a total of 11 products.

**Color Convert 1.0**

Color Convert (55$ from BugByte) converts 32-bit and 8-bit color images to an 8-color image, which can be printed on an ImageWriter with a color ribbon. The image quality ranges from fair to poor, printing time is very slow, and color-ribbon life is very short.

Color Convert provides a number of features to help you tweak the quality of the image: you can select from two conversion methods, dithering or diffuse; and you can Lighten (add a flat value to all pixels to bring them uniformly closer to white) and Brighten (expand the intensity range of the image by about 15 percent).

To approach acceptable print quality you have to spend some time working with the images. I suggest you print a small sample, change the controls, and try again.

Color Convert does a good job of creating heat transfers for iron-ons (it allows you to print a mirror image). It also works for posters.

**Gamblin’ Times 3.0**

If you want to enjoy gambling without laying out real cash, or if you need something to help you while away the slow periods during your day, Gamblin’ Times (58.95$ from Bruce Wilson Advertising) might be the answer. This HyperCard stack is made up of ten games of chance including Craps, Slots, and Roulette (see “Place Your Bets”). Others are informal games such as Mix’s Poker and Tic-Tac-Toe. Each game has attractive graphics, many include animation and sound (such as the spinning roulette wheel), and all are programmed to provide (as far as I can tell) realistic odds.

The program includes an accounting module that tracks your fictitious net worth. You begin with $5,000 in cash, a $22,000 sports car, a $67,000 house, and a $5000 computer. If you lose your cash, you can sell your possessions or you can borrow money at loan shark rates of 10 percent a day. The program provides a continuous assessment of how well you’re doing.

Casino Master from Centron Software is a similar program for the serious gambler. Casino Master includes only real casino games, provides options to use different casino rules based on the country in which you expect to gamble, allows you to eliminate the graphics and sound, and includes tips for winning at each game.

Gamblin’ Times is more attractive, has a variety of games, provides passwords that make it easier to control a multiple-user tournament, and is more fun than Casino Master.

**TimeKey 2.0**

TimeKey (59.95$ from Mac & Murray) is a set of business organization stacks that connects client information with projects, costs, and time (see “TimeKey’s Linked Stacks”).

If you have looked at Focal Point or HyperWorks Organizer, TimeKey’s scenario will be familiar. Data is automatically transferred between the calendar, expense, project, and client stacks. For each completed project, the program collects all the relevant information and prints an invoice.

TimeKey, geared for desktop publishers and designers, includes categories for prepress paper and typesetting costs. It also has a time clock, relatively rare in HyperCard applications, that keeps track of the time you spend on a project. (However, you can’t turn the clock on and off while in other applications.)

TimeKey has the best screen graphics I’ve seen in any HyperCard organizer. For example, when you mark a screen for further reference, it appears as a dog-eared page; and time cards are depicted on attractively drawn clipboards.

**UltraKey 1.03**

A computer is a good tool to help you learn to type. It eliminates the need to juggle books and paper and stopwatches, and it can provide progress charts and reports.

UltraKey ($79 from Bytes of Learning) does a good job of teaching, testing, and charting. Compared (continues)
to other typing programs, however, UltraKey is relatively expensive and low on features.

Type (from Broderbund) and Mavis Beacon Teaches Typing (from The Software Toolworks) are less expensive but provide more charts and analyses of your typing. Both programs also recommend specific lessons or drills based on your typing difficulties, and include a typing game—neither feature is found in UltraKey. However, I'm not convinced that all the bells and whistles in Type or Mavis Beacon make it any easier to learn to type.

**IFS Explorer 1.02 and Fractal Clip Art**

Fractals are intricate geometric shapes made by joining random points on a page. IFS Explorer ($49.95 from Koyun Software) allows you to type in coordinates that represent parameters, and IFS chooses the random points. The program then begins the process of drawing the points and linking them together. As IFS Explorer draws the fractal, a box displays a running total of the number of points drawn. When the fractal is completed to your satisfaction, you can stop the drawing process. To view the intricacies of your fractal, IFS Explorer lets you zoom up to 100 million times.

Fractal Clip Art ($37.95 from Koyun Software) contains PICT images that were made using IFS Explorer (see "Intricate Designs"). These designs, which look like shapes often found in nature, are much more intricate than typical clip art.

If you're studying fractals, IFS Explorer is an excellent alternative to using the fractal program on a college's minicomputer. But if you just want a way to draw complex shapes for design work, the process of figuring out how to create images by typing in coordinates will probably be more work than it's worth.

**Balloon Stack**

Balloon Stack ($35 from BugByte) teaches you how to twist balloons into animal shapes. Most of the books on this subject use either photographs or line drawings. Balloon Stack uses both. The program first displays a scanned photo showing what each finished figure should look like. Then it displays clear line drawings showing how to make animals out of balloons.

Both programs also recommend specific lessons or drills based on your typing difficulties, and include a typing game—neither feature is found in UltraKey. However, I'm not convinced that all the bells and whistles in Type or Mavis Beacon make it any easier to learn to type.

**ClickArt EPS Symbols & Industry, ClickArt EPS Animals & Nature, and ClickArt EPS Sports & Games**

These packages ($129.95 each from T/Maker Company) contain traditional images. While there is very little that's startling in these sets of PostScript clip art, each package includes a nice variety of well-drawn and eye-pleasing images.

Symbols & Industry Volume 1 is preponderantly military and medical and includes an ambulance, an eye chart, a missile, and a military jet. Animals & Nature includes pets, wild animals, insects, and two plants. Sports & Games includes images for 25 team and individual sports. These are excellent sets for general office or home use.

**WillMaker 4.0**

WillMaker 4.0 ($69.95 from Nolo Press) asks you a series of questions and then generates a will. It lets you designate specific assets to pay debts, name a property manager, and create complicated beneficiary structures.

The latest version of WillMaker includes new laws and new techniques for estate planning. One major addition allows you to use a provision of the Uniform Transfer to Minors Act to set up custodianship of property transferred to children. The online help has been expanded and can be exported into a word processor for custom formatting.

If your will is relatively straightforward, and you have an earlier version of WillMaker, there is no need to upgrade. But if you’re shopping for a will program now, WillMaker 4.0 is extremely comprehensive.
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NEW PRODUCTS

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.

HARDWARE

20-Inch Trinitron Display
20-inch Trinitron color display system that has 8-bit performance; up to 256 colors; 1024-by-768-pixel resolution; and a screen-refresh rate of 74.6Hz. Display software includes pop-up menus; enlarged cursor and menu bar options; a screen saver; and a screen-copy feature. $2997. Mirror Technologies, 612/633-4450.

Athena Hard Drives
Line of compact external hard drives with cases 5 3/4 inches wide to match the width of Mac II-series cases when hard drive is placed vertically. Drives have an average access time of 17ms, push-button SCSI address selection, and a five-year warranty. 50MB model $8991; 100MB model $1549. Microtech International, 205/468-6223, 800/626-4276.

Kodak Diconix Color 4 Printer
Color version of the portable Kodak Diconix printer. The Color 4 printer uses cyan, magenta, yellow, and black ink for the four-color printing process. Prints at resolutions of up to 192 by 192 dpi and comes with the ability to print in near-letter-quality mode. $1595. Kodak, 800/255-3434.

Phaser II Series
The Phaser II SX is a PostScript-compatible printer that uses an intelligent multitasking interface to provide parallel, serial, and AppleTalk ports that can be used individually or simultaneously to connect to IBM PCs, other Macs, and workstations. Phaser II SX $4995; Phaser II PX $7995. Tektronix, 503/685-3585.

PM 9600 SA V.32/V.42bis Modem
SA V.32/V.42bis portable modem that features error control and supports V32, V.42bis, and MNP Class 5 error-correction protocols, and data compression of V.42bis and MNP Class 5. Compatible with all current domestic and most international modem types. $699. Practical Peripherals, 818/706-0333.

PM 9600 SA V.32/V.42bis Modem
SD-348 Disk Drive
FDHD SuperDrive-compatible floppy drive; works with 1.4MB and 800K disks. Works with all Macs. Compatible with Apple IIGS. $279. Sprite, 408/773-8888.

(continues)
About Cows

Algebra I Homework Tutor
Software designed to act as an algebra tutor. Student enters algebra problems in topics such as monomial and polynomial operations; equations; factoring; algebraic and complex fractions. Student can prompt the program to generate hints, or to generate a similar problem that will help him or her learn how to solve the problem. The computer checks for accuracy at each step of the student's progress in solving a problem. 1MB min. memory. $120. Missing Link Software, 212/787-6956.

American Heritage Electronic Dictionary
Reference and writing tool that works as a DA and is compatible with most Mac applications. Provides users with quick access to the American Heritage Dictionary. Search feature enables users to find words when only a definition, vague meaning, or related concept is known. Also comes with the complete Roget's II Electronic Thesaurus. 1MB min. memory. $89.95. Houghton Mifflin, 617/252-3098, 800/633-4514.

ClickArt EPS Symbols & Industry, Volume 1
Collection of more than 260 PostScript images created by professional artists. Includes general business images and international symbols in categories such as people, finance, travel, and politics; military armaments and ranks; and sci-

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The HP ScanJet Plus scanner provides 8-bit photographic-quality scanning.

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ence and engineering symbols and equipment, such as tools, parts, and instruments. 1MB min. memory: $129.95. T/Maker Company, 415/962-0195.

**Design Your Own Home, Landscape for the Mac**

Object-oriented landscape-design package that lets homeowners and professionals see how various tree and shrub arrangements will look around a home now and in the future. Users define the external features of a house, then place a variety of predrawn trees, shrubs, and yard objects around the house from a top view. Trees and bushes can be aged in the top view and four side views to give a picture of how the landscape will appear over time. 1MB min. memory: $99.95. Abracadata, 503/342-3030.

**DIP Station**

Interactive image-processing application that can be used in conjunction with spreadsheets and presentation packages. Supports three-dimensional images and has a proprietary 16-bit floating-point pixel format and an image processing library. Included User Support Module provides essential links between user-written programs, DIP Station, and the image processing library. 4MB min. memory: $495. Hayden Image Processing Group, 216/721-2388.

**Escape**

Keyboard remapping utility for the Mac Classic and Mac LC keyboards. Enables user to swap the position of the Escape and tilde keys on the new keyboards so they match those used in the standard Macintosh keyboard layout. 1MB min. memory: $9.95. Beagle Bros., 619/452-5500.

**FlexiTrace**

Data-acquisition software that converts hard-copy graphs and charts into the numerical data that was used to produce them. Analyzes a digitized line, area, bar, or scatter graph and returns the Cartesian coordinates and the area of regions within the image. Uses a palette of tools similar to those in MacPaint. 1MB min. memory: $249. Tree Star, 805/682-4096.

**The Hunk Manager**

Programming tool designed to be used with Pascal or C language compilers for data-storage and -retrieval functions. Provides a library of routines that are the analogues of those used in...

Jack Nicklaus Presents the Major Championship Courses of 1990

Third in a series of add-on course disks to be used with Jack Nicklaus’ Greatest 18 Holes of Major Championship Golf. Contains simulations of the host grand-slam courses of last year’s U.S. Open, British Open, and PGA Championship. Presents computer golf fans with the opportunity to play on the same courses the professionals played on during the 1990 summer season, and challenges Mac golfers to beat the scores of their professional counterparts. 1MB min. memory. $21.95. Accolade, 408/985-1700.

Master Plan

Project-planning and resource-management software that performs traditional project-planning tasks such as Gantt and PERT chart representations, as well as specialized functions such as “what-if” projections, cost-analysis charts, and resource-management and resource-loading histograms. 1MB min. memory. $249. New Latitudes, 415/563-8727.

Metronomefont

Type 1 laser font designed to enter metronome markings, proportions, and figured bass notation for musical scores. Optimized for convenient entry in word processors and page-layout programs. Compatible with all Mac systems and PostScript printers; includes double and triple screen sizes for use with dot matrix printers. 1MB min. memory. $12.95 plus $3 s/h. DVM Publications, 609/853-5580.

MIBAC Music Lessons

Music tutor that helps the user learn the elements of music theory at his or her own pace. Provides drills for mastering note names, circle of fifths, key signatures, major and minor scales, modes, jazz scales, scale degrees, intervals, note durations, and ear-training. Each drill has several levels of difficulty. Includes online help. 1MB min. memory. $89.95. MIBAC Music Software, 507/645-5851.

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**Mishu-Wuhan**
Desk accessory that enables Chinese characters to be inserted into nearly all Mac documents. Enables the user to select characters displayed in a separate desk-accessory window and paste them into the document window beneath. Comes with a glossary of all characters and their pinyin equivalents. 1MB min. memory. $259. Xanatech, 617/492-7463.

**Optix Desktop Imaging System**
Desktop imaging system that enables you to index images with either the built-in database or a database of your choice, such as SQL, Oracle, or Informix. Presents an entire multipage document as a series of miniature images; performs image enhancements such as noise removal, edge tracing, and rotating; and has a selection of MacPaint-style tools. 2MB min. memory. $495. Bluebridge Technologies, 703/675-3015.

**Org Plus for Macintosh**
Software that automates the process of drawing organization charts. User enters names, titles, and other facts; the program draws and spaces the boxes and lays out the connecting lines. Users can choose from more than 50 chart, box, and line styles to achieve a particular look. 1MB min. memory. $195. Banner Blue, 415/794-6850.

**Professor Mac**
Electronic tutorial for the Macintosh that provides step-by-step lessons, exercises, and quizzes that cover the range of topics necessary to benefit from using the computer. Some of the areas covered: learning basic principles such as cut, copy, and paste to the Clipboard; mastering MultiFinder; using networks and communications software effectively; printing; how to select appropriate programs for a variety of applications; and using HyperCard. 1MB min. memory. $49.95. Individual Software, 415/595-8855, 800/331-3313.

**Quick Card**
Software for creating business cards. Enables you to print two-sided cards, vertical cards, and multicolor cards and to use a foil overlay to create an engraved appearance. Compatible with any computer font and with any graphics format. Prints any image on the Clipboard. Program can automatically scale images to fit, or you can scale them manually. 512K min. memory. Quick Card Kit $39.95; paper for 250 business cards $32. Shaffer Software, 408/252-1972, 800/735-3450.

**Sun Clock II**
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given date and time. The shape that divides days from night changes with the seasons so the user can see the days lengthen and shorten as the year progresses. 512K min. memory, DA $40; screen saver $10. MIT Software, 503/220-5999.

**Command Console**
Surge-suppression unit with compact metal cabinet that fits under computer monitor. Provides central system control from lighted switches to power the computer, printer, and peripherals. Uses isolator-level spike, line-noise, and RFI/EMI suppression to protect all connected equipment. $124.95. Tripp Lite, 312/329-1777.

**Hanging Disk Filer**
Hanging disk filers that come in letter and legal size, hold up to six 3½-inch or 5¼-inch disks, and can be stored in a filing cabinet. Filers are color-coded and available in red, green, yellow, and blue. Optional clip-on tabs are available. Sold in packages of five. 1 to 4 packages $7.95 each; 5 to 19 packages $6.95 each; 20 or more packages $5.95 each. Eaton and Associates, 415/550-0325.

**Strip Switch**
Device that uses the power-on key found on all ADB keyboards to control the power to the Mac and peripherals. Plugs in to the wall outlet and enables the keyboard power-on key to turn on the Mac SE; lets user set a time delay between the time the external peripherals turn on and the time the Mac II turns on. $89.95. Practical Solutions, 602/322-6100.

**Tru-Grip**
Security device for computers, peripherals, and other office equipment.

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**ColorTrans**
Foil that makes color-engraving effects on laser-printed documents. Plastic film creates the same effects in laser printers or dry-toner copiers. Uses the heat and pressure of a laser printer or dry-toner copier to transfer color onto the printed page. Available in gold, silver, red, blue, green, violet, pink, and turquoise. 12 sheets of single color or 8 sheets of different colors $24.95. LTR, 408/441-9920.

**Mouse Lap Pad**
Device that attaches a mouse pad to user's leg to free up desk space. Consists of two elastic bands that attach to a plastic mouse-pad holder. $19.95. PrecisionLine, 612/475-3550.

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Designed to fit most flat-bottom or flat-sided office equipment to secure units to a desk or table. Helps to prevent theft, as well as damage during sudden movement such as that caused by an earthquake. $79.95. Jeff Fidler and Associates, 619/321-2125.

**Display PostScript Programming**

Book about Adobe's Display PostScript language. Written by David Holzgang, PostScript author. $24.95.

**The Gray Book: Designing in Black & White on Your Computer**

Book that discusses how to work with contrast and reverses, screens and solids, and 3-D designs and lighting effects while creating black-and-white images on the computer. Contains a section devoted to illustrations and logos created in black, white, and gray; designed to be used as an idea bank. $22.95. Ventana Press, 919/942-0220.

**Linotronic Imaging Handbook**


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 (and two copies of software) to New Products Editor, *Macworld*, 501 Second St., San Francisco, CA 94107.

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How To

Quick Tips

Multiple System Folders, Radio-Button and Check-Box Clicking, Surge Suppression, and More

By Lon Poole

Judging from this month's mail, a surprisingly large number of people know about and use Microsoft Word's formula-making commands. Philip Mahler of Carlisle, Massachusetts, and many, many others recommended using the formula commands to continuously underline subscripted and superscripted text. The advantage of this method over the one I described in last November's Quick Tips (using the Borders option of Word's Paragraph command) is that it works within a paragraph of nonunderlined text, making it unnecessary to create a separate paragraph for the text you want underlined.

To prepare for entering formula commands, choose Full Menus and Show 9 from Word's Edit menu. Then with the insertion point where you want the underlined text, press Command-V to insert a formula mark, which looks like a period closely followed by a backslash (\). Next type the letter X, again press Command-V, type the letters BO, and finally, in parentheses, type or paste the text you want underlined. To see the underlined text, choose Hide 9 from the Edit menu. "Continuous Underlines" shows this method in use.

Another underlining method, suggested by David S. Allan of Glenview, Illinois, and others, is to type the text you want underlined, select it, and press Command-D to copy it as a graphic. Then paste the graphic in place of the text you typed and apply Underline style to the graphic. To get spacing exactly as you want it, you may have to subscript or superscript the graphic and experiment with its cropping box. Note that you cannot edit a graphic. If you think you may want to change the text after making it an underlined graphic, format the original text as hidden text and paste the graphic next to it. Word doesn't normally print hidden text.

Scroll Speed

You don't need a Mac with a 68030 CPU to scroll long menus at two speeds as I claimed in an addendum to one of last November's tips. (To scroll slowly, place the tip of the pointer at the base of the arrow at the bottom of the menu. To scroll quickly, move the pointer to the tip of the arrow.) Mike Tilley of Greenbelt, Maryland, and other readers use this technique with the Apple menu on Mac Plus and Mac SE models as well. However, long menus in Microsoft Word, MacWrite II, and possibly some other programs scroll at only one speed on a Plus, SE, or Mac II.

Replacement Switch

Q The restart switches on my Mac SE and Mac II are broken. Why don't the local distributors (at least in Israel) stock spares? Where can I buy them?

David Darom
Jerusalem, Israel

A You need a System Folder on only one hard drive. But you can have one System Folder on each and use the Set Startup section of the Control Panel to select the drive whose System Folder the Mac will use during start-up. That one is called the start-up disk. Each System Folder can contain a different combination of fonts, desk accessories, Control Panel sections, and other system enhancements. Because of the potential for confusion, however, each hard drive should have only one System Folder.

To check for multiples, use the Find (continues)
File desk accessory in the Apple menu to search each drive for the word Finder (any folder that contains a Finder and a System file is considered a System Folder—regardless of its name). Before dragging extra System Folders to the trash, make sure they don’t contain any items you want to keep.

Normally the Mac sticks with the System Folder on the start-up disk. But if the start-up disk was a floppy and you open an application on another disk that contains a System Folder, the Mac automatically switches to that System Folder. You can force a switch by pressing the Option key while opening a program on a different disk or by pressing the Option and ~ keys while double-clicking the Finder icon on another disk. However, the Mac won’t switch System Folders at all if MultiFinder is active.

Can’t Quit MultiFinder

Switching from the Finder to MultiFinder is very easy using the utility ToMultiFinder. However, I have not found a way to conveniently switch back to the Finder without restarting.

David J. Vess
Rowland Heights, California

A

Unfortunately, there’s no way to turn off MultiFinder without restarting. To temporarily deactivate it, hold down the ~ key from the time the Welcome to Macintosh message appears until you see the Finder’s menu bar. If you want MultiFinder always inactive, use the Finder’s Set Startup command (Special menu) before restarting. Of course, you can also use ToMultiFinder to activate or deactivate MultiFinder at start-up time. ToMultiFinder is available from online information services (ToMultiFinder 4.0 in the Utilities section of America Online’s software library) and from user groups.

Surge Suppression

The electricity in my dorm room seems extremely sensitive to power surges precipitated by other devices in the building. For example, bands of snow frequently flash across my TV screen. Sometimes these glitches interrupt my entire TV screen for a fraction of a second. I’m about to get a Mac SE/30 and do not want to plug it directly into my dorm-room power outlet. I know there are a lot of surge protectors on the market, but what do I need to know about them in order to make an intelligent purchasing decision?

Karl Kracht
Ann Arbor, Michigan

A

Transient voltage variations can occur whenever electrical devices in the building are switched on or off, whether manually or automatically. The Macintosh power supply can handle small voltage variations but not variations of several hundred volts, which heavy-duty electrical devices—especially motor-driven devices such as refrigerators, air conditioners, furnaces, and fans—can cause. These surges can cause data loss or a system crash but do not usually result in a trip to the repair shop. However, lightning and other static discharge can generate spikes of over 1000 volts and can
Text Tiles

Tiled fills in Aldus FreeHand can be made up of text as well as graphics. The method, submitted by Giovanni Gatti of Dongo, Italy, is illustrated below.

Type the text (A). Surround the text with a rectangle (B). (The space between the text and the edges of the rectangle determines the spacing of the tiles in the filled area.) With the rectangle selected, choose None from the Fill and Line menu. With both the rectangle and the text selected, choose Group from the Element menu. Copy the group. Draw a shape to be filled (C). Choose Tiled from the Fill menu. In the dialog box that appears, enter the desired fill angle, click the Paste In button, and then click the OK button.

A surge-protected system may still be at risk if it's connected to an AppleTalk network using telephone cabling. PhoneNet modules made by Farallon Computing include surge protection, but Apple's LocalTalk modules do not. Therefore, you should not connect a Mac or any networked device directly to the phone jack using an Apple LocalTalk module and a LocalTalk-to-PhoneNet converter cable. It's OK to use an Apple module and a converter cable to connect one network device to another. Surge protection isn't needed on network wiring that uses only Apple modules and cabling (no phone cable at all) because the Apple cable is shielded.

In addition, your system is susceptible to radio-frequency interference (RFI) and electromagnetic interference (EMI). This may be what's bothering your TV. The better surge protectors also include filters to take care of RFI and EMI.

Delayed Mount

TIP: Normally, SCSI hard drives are recognized when you start up the Mac. If a hard disk platter isn't spinning at its full speed or the drive is turned off at start-up time, its icon won't appear on the desktop. You can mount the (continues)
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**Ward Barnett**

Minnetonka, Minnesota

**Hitting the Button**

**TIP:** I find that radio buttons and check boxes in dialog boxes seem to shrink in size as the day wears on. By the end of an overly hectic day, hitting those tiny targets seems too demanding a task. Give yourself a break, and aim at the larger target—the text that labels the button or box (see "Comfortable Clicking"). This method has a small but meaningful bonus: Clicking the text lets you see the status of the button or box without moving the pointer.

**David J. Vess**

Rowland Heights, California

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Rowland Heights, California

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Getting Started with Project Management

REACHING YOUR GOALS ISN'T ALWAYS EASY. PM SOFTWARE CAN HELP.

BY JIM HEID

Business life is full of goals, and each one breaks down into milestones that must be performed in sequence. Want to build a building? First you need to buy land, get permits, and draw plans. Introducing a new product? You need to build a manufacturing line, design packaging, and develop a marketing plan.

Each milestone in a project often breaks down into steps of its own. You can't buy land until you've met with real estate agents. You can't design packaging until you've hired a designer. Fleshing out all the steps involved in meeting a goal is like opening one box and finding another—and another, and another.

Project-management programs—or project managers—are designed to help you keep track of all those boxes, called tasks. Project managers can also help you allocate a project's resources such as the people who will perform the tasks. And most important, project managers let you superimpose this cast of characters on a calendar to help you make sure things happen when they're supposed to.

The promise of project-management software is appealing: type in lists of tasks, resources, and dates, and out come fancy charts that graphically depict a project's steps and schedule. Consequently, you can't help but meet a goal on time and within budget.

And if you believe that, there's a big bridge in Brooklyn I'm taking offers on. Project management is one area where the old computer maxim, "garbage in, garbage out" applies in spades. Charts and graphs won't help you meet a goal if the dates and data you supply are incomplete or unrealistic. What's more, project-management programs impose a kind of rigid order on projects that you might find too restrictive or just too much trouble. They're specialized programs: not for everyone, but priceless for some—and required by most government agencies and subcontractors.

How They Work

A project-management program is part database manager, part spreadsheet, and part graphics program. Like a data manager, a project-management program lets you store and retrieve data—the tasks that make up a project, the time they'll take, the names of the people or companies who will perform them, the costs of materials and labor.

Like a spreadsheet program, even the most basic project-management software lets you perform "what-if" analysis by plugging in different numbers to see their impact on the bottom line. After specifying relationships between the data you enter, you can then ask "what-if" questions by entering new values and examining their effect on the project's schedule. What if it takes (continues)
two weeks instead of one to get permits? What if we hire only five carpenters instead of eight? What if costs increase by 10 percent? These are questions many planners ask themselves frantically in the middle of the night, unlike a ceiling, a project manager can provide some answers. And if none of the scenarios you’ve set up seem to work, you can always revert to your saved project document to restore the original numbers.

Like a graphics program, a project manager can take all the numbers you supply and generate charts that depict a project’s schedule, cash flow, and resource allocation. You can see at a glance whether you’re on budget or whether you’ve assigned too much work or too little to a particular person or group.

Using a project manager involves specifying three kinds of information: a project’s tasks, the amount of time each task will take, and the resources required to perform them. You can then create, distribute, and study the resulting charts and graphs to make sure your assumptions are realistic and to make adjustments where needed. After the project is under way, you revise the data to accommodate unexpected delays or changes in the project or your resources.

A Juggler’s Assistant

A project-management program’s real strength isn’t generating pretty graphs and schedules; it’s showing the options for meeting your goals and helping you juggle the trade-offs that must often be made between a project’s tasks, your resources, and the time allotted to the project. To meet a goal, do you add resources (more employees, more money, longer work hours)? Do you delay the completion date or start earlier? Or do you simplify the project by scaling down your plans?

As the following scenarios show, the project itself often dictates which trade-off is the most viable.

- A business planning an exhibit at a trade show is dealing with a time-constrained project, since the show’s starting date can’t be changed. The manager in charge of the exhibit plugs in the starting date of the show, and then specifies the tasks behind the goal—designing, building, and shipping the booth; making travel and lodging arrangements; printing brochures; and setting up the booth. Resources in such a project include the company building the booth, the printing company, the brochure’s designers and copywriters, and the budget. After meeting with representatives of each group to determine how long its job will take, the manager uses the project-management program to work backward and determine the best date for starting the project, adjusting resources and/or the scope of the project (perhaps choosing a simpler booth design) as needed to ensure that everything is ready for opening day. In project-management parlance, this type of project presents a backward-scheduling challenge.

- A contractor is building a house and facing strict budget constraints—the buyers can afford only so much, and they’re approaching that figure fast. The contractor meets with them to determine which amenities they’re willing to forgo; he then removes the associated tasks from the project’s model until its cash-flow figures agree with the buyers’ budget. This is a cost-constrained project.

- An electronics manufacturer is planning to unveil a new gizmo at the next major trade show, but the date is looming and the product isn’t ready. The development team managers can’t scale down the project or delay the launch date, so they meet with the product’s engineers to find out which tasks are causing the delay. Then they use a project-management program to determine how many additional engineers will be required to complete the critical tasks on time.

There’s a common denominator in each of these scenarios: before turning to the project-management program, the project leader must first prioritize the project’s budget, timeline, and scope—by heading into the trenches to meet with the people who will be performing or paying for the work. A good project leader performs this vital step before the project is under way and then uses the project-management software to spot problems before they arise.

Managing the Jargon

The project-management world has its own jargon, most of which sounds like the rantings of a business school graduate who’s had a bit too much caffeine. Project management has indeed been embraced by many MBA types, but much of its terminology was created decades ago by that greatest of jargon generators, the government. Indeed, government, construction, and highly technical manufacturing industries are today’s largest users of project-management software.

Many project-management techniques were developed to manage shipbuilding efforts during World War I, when Henry Laurence Gantt devised a kind of bar chart that illustrates a project’s tasks and timelines. All popular project-management programs can create these Gantt charts (see “Tasks and Timelines”).

Tasks and Timelines

Gantt charts, such as this one created by Mainstay’s MacSchedule, display a project’s schedule as a bar chart. The shaded portion of each bar represents that task’s slack time, within which the task’s start date could slip without delaying the project’s completion date. Below the chart are the results of some of MacSchedule’s basic resource-analysis features.

In the 1950s, Du Pont and Remington Rand developed the critical path method, or CPM, project-management technique, which isolates the tasks that directly affect other tasks and ultimately the finish date of the entire project. In a construction job, for example, a delay in obtaining permits will delay the start of construction. The critical path is project management’s game of dominoes—delay one task on the path, and those that follow are delayed, too.

The U.S. Navy incorporated CPM into its program evaluation and re-
view technique, or PERT, created to manage the development of the Polaris nuclear submarine. PERT charts graphically display a project's steps by placing each task within a box and using lines to interconnect related tasks. The critical path is usually highlighted using bold lines (see “Treading the Critical Path”).

Some related tasks are known as dependent tasks, which means their completion is dependent on that of other tasks. For example, the task “eat dinner” is a dependent task of “cook dinner.” In most project-management programs, you indicate these dependency relationships by drawing lines between the task boxes. The entire arrangement of tasks and their interconnecting lines forms a dependency network. Since only a PERT chart can visibly display dependency relationships, that’s the format preferred by project managers.

Clock Watching
When specifying a task in project-management software, you supply several time-oriented pieces of information that the program uses to calculate schedules and workloads. One such tidbit is a duration value, which tells the program how long that task will take. It’s important to supply accurate duration values, since the program uses them to calculate many aspects of the project’s schedule. You might also specify lag times, which are delays between tasks. A contractor might specify a two-day lag time between the tasks “pour foundation” and “erect walls” in order to allow the concrete to set.

And you might specify an earliest start date, the earliest date on which work on that task can begin. Generally, you specify an earliest start date for the first task in a project and let the program calculate the earliest start dates for remaining tasks based on the duration and lag-time values you supply. You can, however, specify explicit earliest start dates for tasks that are midway through the project—if, for example, a given resource won’t be available until a specific date.

For these time calculations, you can specify durations, lag times, and the like in any time interval that’s appropriate for your project, from hours to days to weeks to months. To let you be even more specific, project-management programs also allow you to define resource calendars that describe when a particular resource is available. For example, certain engineers may be available only on Mondays, Wednesdays, and Fridays. Or your overseas team may work six (continues)
PROJECT-MANAGEMENT TIPS

Effective project management doesn’t come from Gantt and PERT charts, but from careful planning and experience. Here are some insights gleaned from Peggy J. Day’s book of tips called Getting Organized with MacProject II and from the excellent manual that accompanies MacProject II.

- Specify a goal Write a charter describing the project’s exact purpose. Don’t be ambiguous. For example, the goal “build a better mousetrap” might mean “build a trap that kills mice more effectively” or “build a trap that costs less to manufacture.” Distribute the resulting charter to team members so that everyone knows your objective. Revise the charter as needed when plans or goals change.

- Determine phases and tasks Break the project into phases—planning, design, implementation, and so on—and then break each phase into its tasks. Make each task as small and specific as possible; this enables you to provide more precise resource and duration information. Jot down the phases and tasks in outline form; to do this you could use KeyPlan’s outline view, Symmetry’s Acts desk accessory, or the outlining feature within a word processor.

- Use history when planning You know the old saw: Those who ignore history are doomed to repeat it. Consult company records from previous similar projects: problems that surfaced then may well surface again. Remember to adjust for inflation and any changes in company procedures.

- Allow time for the unexpected Build extra time into the schedule, and add slack time following tasks you don’t have direct control over, such as the delivery of a key part by an outside vendor. It’s easier to figure in slack time before a project begins than to make up for lost time later. Have contingency plans that you can invoke if the worst happens. Start with the critical path, since that’s where you’re most vulnerable.

- Update project records often When schedules, resources, or costs change, update the project model so it’s up-to-date. Too often, a project begins with a sharply defined schedule that dissolves into chaos as the project progresses and the real world intrudes. Keep the project model current, and you’ll increase your chances of staying on track and within budget. Be sure to distribute current versions to everyone involved.

- Meet early and often Before plugging in duration dates for tasks, meet with the people who will be performing the tasks and solicit their input. When the project is under way, schedule regular meetings to make sure that things are on track. Document unanswered or unresolved issues to create a list of action items that describes who’s responsible for resolving each item. If a task slips, inform the appropriate higher-ups before someone else beats you to it. Peggy J. Day says it best: communicate, communicate, communicate.

days a week while the local team works only five. Creating separate calendars for such resources makes the dates calculated by the project-management program more accurate.

To help you keep track of the demands made of a particular resource at a particular time, most project-management programs let you create resource histograms. These charts are useful when you’ve assigned a group of people many different tasks because they make it possible to see at a glance whether or not you’ve given them too much work to complete in a given amount of time. For example, if you’ve assigned a variety of tasks to a group of engineers, you could create a resource histogram that would show whether a number of engineers could perform those tasks within the timeframe allotted to them (see “Are We Overworked Yet?”).

When the histogram indicates that you’ve overloaded a particular resource, you might invoke the resource leveling options that you’ll find in Claris’s MacProject II, Scitor Project Scheduler 4, Welcom Software Technology’s Open Plan/Mac, and Micro Planning International’s Micro Planner series. A resource leveler first scans a project chronologically and locates over-allocated resources. An automatic resource leveler then reschedules tasks and juggles resources to resolve the over-allocation. An interactive resource leveler queries you along the way, allowing you to pick and choose which tasks and resources to juggle. Many project planners prefer interactive leveling because it leaves the decision making up to them, rather than the program. The aforementioned programs provide both leveling options.
A Project-Manager Sampler
Before personal computers became powerful enough to handle all the data and calculations involved in project management, project planners often calculated dates and costs by hand or with mainframe computers, and then hand-drew—and endlessly revised—blueprint-size charts. (Some masochists still work this way.) The Mac family has not only enough processing punch to handle the complex calculations required by project management, but the text and graphics skills needed to create all those charts and graphs as well as the detailed reports that more sophisticated programs can produce.

At the low end of the project-management spectrum, you find Gantt chart-generating programs such as Mainstay's MacSchedule and MacSchedule Plus, AEG Software's (formerly AEG Management Systems) FastTrack Schedule, and Varecon Systems' Great Gantt. These aren't project-management programs as such; they lack the ability to track dependencies and analyze relationships between tasks and resources. (MacSchedule Plus does provide several cash-flow analysis features.) They're most effective for someone who wants help in developing schedules and wants to create Gantt charts for presentations and reports, without getting mired in project-management jargon and concepts.

At the next level—a big step up from these programs—you'll find (in order of sophistication) Symmetry Software Corporation's KeyPlan, Claris's MacProject II, and Micro Planning's Micro Planner. KeyPlan provides such project-management essentials as PERT charts and multiple resource-calendars, and wraps them around an easy-to-use interface that features a text-oriented outline similar to Symmetry's Acta Advantage. It can also read outlines created with Acta and Symantec's More.

MacProject II, the most popular Mac project manager, has all these features plus resource leveling, a larger variety of reporting options, and support for subprojects. A subproject is a project within a project, stored as a separate document and opened when you double-click on the subproject's box. A complex project—the design of a new airplane, for example—is more easily managed when broken into a number of smaller subprojects.

MacProject II also has an excellent manual that teaches project-management basics as well as the program itself. Claris offers a $25 trial package, which includes a demonstration version of the software, a videotape tutorial, and a workbook. It's a great way for a beginner to sample the murky waters of project management. Claris also offers corporate training courses for MacProject II.

Micro Planner offers more features than MacProject II, including a larger variety of reporting and searching options that let you focus on specific resources and tasks. But Micro Planner's interface is a bit tricky to learn, and the program uses a somewhat confusing project-diagramming format, the activity on arrow method, in which task descriptions appear (continues)
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Insights on FileMaker Pro
TIPS TO HELP YOU TO BE A PRO

BY CHARLES SEITER

FileMaker is currently the best-selling Macintosh database, and it’s easy to see why this should be so. FileMaker is easy to learn, especially strong on designing forms for data entry and output, competent at a variety of relational tasks (although, strictly speaking, it’s a flat-file database), and unobtrusively networkable.

With FileMaker Pro, Claris attempts to introduce a new level of programmability, so that FileMaker developers can produce slick applications for vertical or business markets. For the nondeveloper, buttons help streamline the program’s operation; structuring databases has been made more flexible; and pop-up menus, radio buttons, and check boxes make data entry easier. If you use FileMaker, you owe it to yourself to try some of the fancy new features.

Thanks to Claris’s Dennis Marshall, FileMaker product manager, and Bill Marriott, FileMaker Pro technical lead, for advice and comments.

Safely Converting from II to Pro

Some people have problems converting old FileMaker II documents to FileMaker Pro. To convert a file safely, try the following procedure. It sounds roundabout, but it’s better than entering all that data again.

Use the Save a Copy command in FileMaker II to backup the database, being sure to select the Save as a Compressed File option. This not only makes a compressed version of the records, it also runs some checks for file damage and screens files for a variety of mystery bugs that never bothered FileMaker II but that cause Pro to crash unaccountably. If you have a problem, you’re better off finding out about it in FileMaker II before you make the conversion. If the file gives you any trouble, try cleaning it up with FileMaker II’s Recover command before converting. If you try to open a damaged file in FileMaker Pro, the program wrecks the old version and fails to produce a usable Pro file (a truly melancholic experience).

Now, open the compressed copy of the FileMaker II database from within FileMaker Pro using the Open dialog box. If you simply double-click on a FileMaker II file, the Finder goes looking for the II version of the program. (You can get around this if you use the utility HandOff II from HandOff Corporation). You can convert a batch of as many as 16 files by Shift-clicking on a set of II files and on the icon for Pro (all of these files must be in the same folder), then select Open from the Finder file menu. This method makes sense only if you have enough memory to accommodate all those files at once. One caveat: the conversion is one-way. You will never be able to run the converted files under FileMaker II, another good argument for making backup copies.

Here are a few conversion troubleshooting tips. If a file crashes during conversion, try opening it with (continues)
With all the benefits of fitness — stronger heart and lungs, reduced stress, increased energy — isn’t it time you started a regular exercise program with your children? The good fitness habits they develop now could give them a healthier, happier lifetime — a gift they’ll appreciate long after their toys and games are gone. Just find those physical fitness activities you all enjoy and exercise at least three times each week. For yourself and those you love, start today. Make fitness a family affair.

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SCROLLING YOUR OWN

There’s not much to defining buttons. This screen shows part of the scrolling list of commands available for automatic assignment to a button you define. It’s almost the simplest cognitive activity that can be classified as programming.

the Recover command in FileMaker II. (You may need to use a program like DiskTop to change the file type to FMKS.) If this fails, try using the Recover command in FileMaker Pro.

If the file opens in FileMaker Pro but still causes problems, try browsing the file and deleting damaged records that may be causing the problem. If the application crashes when paging to a certain record, create a new layout with no fields and make it the current layout. Switch to Browse, go to the problem record, and delete it. If the program crashes when you execute a particular script, delete that script. In severe cases, you may have to delete all scripts and reenter them in Pro.

If a Clone (empty file) crashes when you try to enter data, try exporting the information to a text file and then rebuilding the field definitions from scratch.

Invisible Buttons for Extra Space
Clarisa has added optional, customizable buttons to FileMaker Pro so that individual users can add the convenience features they want without burdening other users with them. For example, FileMaker Pro provides no Go to First and Go to Last buttons for navigating a database. But you can easily add your own. Create a button and define it to use the command Go to Record and enter 1 for the record ID, then check the option “without showing dialog” in the button-definition screen; create another button for the record 99,999 (or other suitably large number) to find the last one (see “Scrolling Your Own”). The buttons are now ready for use.

You may often want to include additional information about an item in a field (an explanation of the field’s content, for example), but aesthetics prevent you from cramming all this information in a single layout containing the item. The way around this is to make a field act as a button, using the invisible-button trick. To do this you define a button with two characteristics: first, make the action of the button switch to a different layout, one that you’ve designed with more fields containing information pertinent to the item of interest; second, make the button transparent by giving it the same color and border as the background of the field (usually white). To
make a button transparent, you define the button under Layout, then select the intertwined squares for both fill pattern and line pattern (see “Button Card”). Position the invisible button over a field or fields in the original layout (it is a good idea to place it over the field name rather than the text portion of the field). Then when you click on the field the button is activated and switches to the new layout—the field itself acts like a button—and displays the extra information. Although FileMaker Pro allows you to extend and customize the help system, you may find that simply providing an alternate layout full of text provides sufficient explanation of your records and fields.

You might want a consistent highlighting scheme for identifying fields containing invisible buttons. One way to do this is with pseudo 3-D highlighting. Simply draw white or light-colored lines on the bottom and right side of the field, and black or dark lines on the top and left (see “3-D Data”).

81 Colors and Counting

FileMaker Pro’s 81 colors are based on the standard system color look-up table, and the colors, even pastels, are solid, as opposed to being a percent of solid. If you want to achieve a wider range of tones, you can invoke patterns in conjunction with colors. Each of the 81 colors can be used to replace the black dots in a pattern, giving a larger variety of paler shades.

Seeing Fonts on the Menu

FileMaker normally presents fonts in the font menu in their native typeface. If you are using a variety of symbolic fonts (Zapf Dingbats are the common example) for marking fields, you may want to see the font names instead. Just hold down the Option key when you pick Font from the Format menu. This works unless you are using Suitcase II, which overrides this trick.

Defining Fields, Again

In FileMaker II, once you place a field in a layout, you’re basically stuck with the original field definition. FileMaker Pro gives you a second chance: pressing #-Option and double-clicking on a field in a layout brings up the field-list dialog box, which lets you redefine the field with an existing definition, without changing the field’s format. Another trick is to Option-click and drag on a field while moving it to another location in the layout; this maintains the field’s original formatting. Additional tip: #-clicking on a field gives it FileMaker Pro’s default font and style settings.

You can also introduce an orderly numbering scheme into appropriate fields with a few clicks. In a layout view, pick Define Fields from the Select menu, find your field in the dialog box, and double-click on it. Another dialog box for specifying regular increments in the field appears (see “Count Down—or Up”). This specification is quite sophisticated. For example, if you create the part number FA-990, you can designate that the numerical part be held to three digits; this means the part number rolls up to FB-000 rather than FA-1000 as new records are added.

Working with a Net

FileMaker Pro slows down considerably in multiuser mode, so it’s best to (continues)
remove any inactive guests who are logged on to the network. FileMaker Pro posts a dialog box from the host machine to any inactive guests warning that if they fail to respond within a predetermined amount of time they will be logged off. (Host users are advised to produce suitably arresting warnings, so as to shock somnolent guests into action, rather than simply terminating the guests’ sessions without warning.)

If you have a database file of your own but are operating on a network, you should know that the Exclusive flag in the File menu generally determines how fast your private database responds. If you forget to check Exclusive, the host runs through a host download/upload cycle every time you change a record. As you might expect, this is much slower than making the changes exclusively on your own Mac.

Printing Labels
To repeat a cliché from high school civics class, with freedom comes responsibility. The freedom to place graphic objects arbitrarily in a layout in FileMaker Pro (FileMaker II forced you to create objects left-to-right, top-to-bottom) means that you can, in exercising some cleverness, produce a layout that will give fits to the trusty ImageWriter you have consigned to a life of label printing. What happens is that the printer draws each object in the order it was created; if the objects weren’t entered in “natural printer order,” you get lots of rolling the platen back and forth, with attendant slipping and peeling-off of labels. If you have a layout with this problem, you can use the Arrange menu (Bring to Front, Bring Forward, Send to Back, Send Backwards) to override the creation order. Clicking on the Zoom box refreshes the screen and lets you see the results of your reorganization. If this sounds like lots of work (it is), remember that you can use FileMaker Pro’s default label layout instead of using an arbitrary layout.

Fine Arts
FileMaker Pro gives you the option of grouping several objects—say, fields of different sizes and graphics—to facilitate moving them around the layout; it’s also handy for moving text and colored backdrops. The grouping feature, however, has some limitations. When you resize a grouped object, the component objects do not move the way they would in a graphics program like MacDraw II. The actual results can be unexpected. In general, you will get reasonable scaling when fields are contained within the group, but sometimes purely graphic elements get distorted.

Key Clash
Occasionally, the keyboard shortcuts—such as for switching between Browse and Layout, defining text styles, or formatting field options—fail with FileMaker Pro. This means you are running low on available memory. Since FileMaker Pro is bigger than FileMaker II, you run into problems on a 1MB Mac if you have many start-up documents (INITs) and Control Panel devices (cedevs). Your choices are to remove some INITs or cedevs, buy some SIMMs, or give up on the shortcuts.

If/Then Fix-Its
Often you want to do a calculation that checks for the presence or absence of data in a field and then makes a decision based on that test. Typically this situation calls for an If statement, as in if(taxflag = "", "Dolt", "exempt"), which gives the value "Dolt" if the taxflag field is blank. The problem is that new records don’t trigger this calculation until something is actively done with the field that you want to examine. Here’s the quick fix to ensure that the calculation works the way you intend. Call up the Define Fields dialog box (under the Select menu) and click on the Options button to view the entry options for the field. Check the option to automatically enter data in the field, but use a space for the automatically entered value space. This forces FileMaker to enter a space in the field. Since FileMaker Pro interprets the insertion of a space as an action taken, the program executes the calculation correctly.

Sharing the Wealth
If you’ve found a tip or shortcut not mentioned here, spread the word to other Macworld readers by sending it to Quick Tips, Macworld, 501 Second St., San Francisco, CA 94107.

See Where to Buy for contact information.

Charles Seiter has been using FileMaker since the old FileMaker Plus days. He was a beta-site tester for FileMaker Pro.
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**PRODUCT UPDATES**

Here's our list of the current shipping versions of Mac software we have received announcements for at press time. We hope you find it useful—because these days, keeping track of the latest CPU can be tough enough. The first price is the upgrade cost for registered owners; the second is the current list price.

**Digital Darkroom version 2.0** does image, scanner, and printer calibration; performs real-time transformation to enable you to interactively scale, free rotate, stretch, distort, slant, and add perspective to selected areas; lets you accent gray-scale images with user-defined color overlays; and lets you paste, blend, feather, and dissolve selections into the documents. Silicon Beach Software, 619/695-6956. Contact vendor for update policy; $395 new.

**Great Gantt version 1.3** includes a Dollar Progress feature that displays how much money has been spent on a project relative to plan; has a feature that enables you to preview a chart and to copy each chart page into the Clipboard. Memory management has also been improved. Varcon Systems, 619/563-6700. Contact vendor for update policy; $195 new.

**StuffIt Classic version 1.6** runs with better data compression and is faster than the previous version. User can double-click on a folder to stuff or unstuff particular files. Virus-detection feature prevents users from uploading or downloading contaminated files. Sort ability enables archives to be instantly sorted by attributes such as name, date, or size. Compatible with StuffIt Deluxe and ShortCut. Aladdin Systems, 408/685-9175. Free; $25 new.

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**PRODUCT UPDATES**

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**Build** = First time the product is being listed.

**= minor update.

**Reg.** = min. RAM and system software required.

**Rev.** = Last time (past year) reviewed this or an earlier version.

**Price** = Cost for update to registered owners.

**= contact your dealer for update policy.

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**Build** = First time the product is being listed.

**= minor update.

**Reg.** = min. RAM and system software required.

**Rev.** = Last time (past year) reviewed this or an earlier version.

**Price** = Cost for update to registered owners.

**= contact your dealer for update policy.
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To have products listed in this section, send upgraded software, an outline of changes since the previous release indicates if it's a maintenance upgrade, upgrade price, minimum RAM and system software, suggested retail price, company name, mailing address, and phone number to Updates, Macworld, 551 Second St., San Francisco, CA 94107.
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The Nation's Largest & Fastest Growing TI microLaser Dealer!!!

TI microLaser PS35 $1695
MacUser #1 Personal Printer (4.5 Mice)

TI microLaser XL $3195
16 Pages per Minute, SCSI Port & ATM

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(microLaser prices limited to quantity on hand)

TI memory upgrades Call!
The best price in the USA!
We stock all TI microLaser add ons:
toner, envelope feeders, second paper drawers, legal and letter size paper trays

We will not be undersold on microLasers!

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PLI Infinity 40 $695
Syquest Cartridge (In Stock!!!) $72

Caere TYPIST
$465
Microtek 300ZS CALL!

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210 Int/Ext $875/$959
MacWren
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330 (Runner) Int/Ext $1495/$1695
600 (70M2) Int/Ext $1785/$1875
630 (76M6) Int/Ext $2049/$2129
1 Gig (1300M) Int/Ext $2999/$3195

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NEC MacSync $455
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Sigma L-View Multimode $1395
Sigma PageView Call!
SuperMac Call!

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DayStar 40 MHz PowerCache IICi $895
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CD-ROM
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NEC Portable $395
PLI (Sony) $795
Toshiba $745
Pioneer DRM-600 Call!

CIRCLE 189 ON READER SERVICE CARD
WHERE TO BUY
A Guide to Products Featured in This Issue

This listing provides companies and phone numbers for products mentioned in this issue. Allow several weeks for responses to reader service card inquiries. Asterisks indicate vendors who prefer to be contacted by phone.

Reader Service

601 911 Utilities Microcom; 919/490-4277; fax 919/490-6672.

602 AEC Information Manager AEC Management Systems; 703/450-1980, 800/346-9113; fax 703/450-9786.

603 After Dark Berkeley Systems; 415/540-5536, 800/877-5535; fax 415/540-5115.

604 AgentDA Team Building Technologies; 514/728-5010.

605 Andrew Tobias' Managing Your Money MECA Software; 203/225-2400; fax 203/225-2437.

606 AutoMac III Microsoft Corp.; 206/882-8080, 800/426-9100.

606 Balloon Stack BugByte; 302/994-1502, 800/284-9220.

610 Calendar Probyron Systems; 303/340-4260, 800/866-4260.

611 CDQ QL Tech; 305/446-2477; fax 305/447-0745.

612 CheckFree Checkfree Corp.; 614/898-6000, 800/882-5280.

613 CheckWriter II Aatrix Software; 701/7-46-6801, 800/842-0054.

614 Cheshire Abbots Systems; 914/474-4171, 800/552.

9157; fax 914/474-9115.

615 ClickArt EPS Animals & Nature TMaker Co.; 415/962-0195; fax 415/962-0201.

616 ClickArt EPS Sports & Games TMaker Co.; 415/962-0195; fax 415/962-0201.

617 ClickArt EPS Symbols & Industry Volume I TMaker Co.; 415/962-0195; fax 415/962-0201.

618 Color Convert BagByte; 302/994-3502, 800/284-9220.

620 DesignCAD 2/3D Macintosh DesignCAD; 918/825-4848; fax 918/825-6599.

621 DisKExpress II ALSoft; 713/353-1090; fax 713/353-9868.

622 DiskFit SuperMac Technology; 408/245-2202; fax 408/735-7250.

624 DiskTop CE Software; 515/224-1995; fax 515/224-5354.

625 Dollars and Sense Software Toolsworks; 415/983-5000.


629 FileMaker Pro Claris Corp.; 408/727-8227.

630 Financial Decisions GenMicronics; 813/345-8020.

631 For the Record Nolo Press; 415/549-1976, 800/992-6656; fax 415/548-5902.

632 Fractal Clip Art Koyun Software; 314/478-9125.

633 Gamblin' Times Bruce

Wilson Advertising; 818/791-6566.

634 GEM-CD Wayzata Technology; 612/447-7521, 800/735-7521.

635 Gefer Microlytics; 716/248-9150, 800/838-6293.

636 Great Gantt Varcon 001336-1233; fax 619/563-1986.

637 HandOff II HandOff Corp.; 214/727-2329.

638 The Heizer Catalog Heizer 8555, 800-885-9444; fax 615/542-7975.

639 HyperFax Tutor SoftStream Software; 415/543-7667, 800/888-7667.

640 IFS Explorer Koyun; 310/878-9125.

641 IWS Business Expense Reports SoftView; 805/385-5000, 800/622-6829; fax 805/385-5001.

642 IWS Personal Tax Analyst SoftView; 805/385-5000, 800/622-6829; fax 805/385-5001.

644 INIT Manager Baseline Publishing; 901/682-9676, 800/926-9676; fax 901/682-9691.

645 INITPicker Microsoft; 818/882-8635.

646 The Investor PSI Software; 605/662-3420.

647 KeyPlan Symmetry Software Corp.; 602/998-9106, 800/624-2485.

648 Larry Rosen Programs Larry Rosen Co.; 502/228-4343.

649 LaserMax 1000 LaserMax Corp.; 612/944-9606; fax 612/944-8509.

550 The Little Mac Book Peachpit Press; 415/527-

8555, 800/283-9444; fax 415/524-9775.


652 MacTax SoftView; 805/385-5000, 800/622-6829; fax 805/385-5001.

653 The Mac is Not a Typewriter Peachpit Press; 415/527-8555, 800/283-9444; fax 415/524-9775.

654 MacMoney Survivor Software; 213/410-9527; fax 213/388-1406.

657 MacSchedule Plus Mainstay; 818/991-6540; fax 818/991-4587.

658 MacTools Deluxe Central Point Software; 503/690-8090, 800/888-8199; 503/690-8085.

659 Market Manager Plus Dow Jones; 609/520-6000.

660 MasterJuggler ALSoft; 713/555-4090, 713/553-9808.

661 MasterStrokes Datadesk International; 818/998-4200, 800/826-5398.

662 Micro Planner Micro Planning International; 415/389-1420, 800/852-7526; fax 415/389-8046.

663 Micro Planner X-Port Micro Planning International; 415/389-1420, 800/852-7526; fax 415/389-8046.

664 MIDGE HARD DRIVES

665 Advanced Gravis Computer Technology; 604/343-7274, 800/665-8558.

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<td>SyQuest Cartridges</td>
<td>$65</td>
</tr>
<tr>
<td>SyQuest Removable Drive</td>
<td>$489</td>
</tr>
<tr>
<td>TI Microlaser PS 17</td>
<td>$1,599</td>
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<tr>
<td>TI Microlaser PS 35</td>
<td>$1,799</td>
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### ACCELERATORS

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
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<tbody>
<tr>
<td>DayStar Digital</td>
<td>$269</td>
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<tr>
<td>Radius Accelerator 16 for +, SE</td>
<td>$549</td>
</tr>
<tr>
<td>Radius Accelerator 25 for SE</td>
<td>$899</td>
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### FAX MODEMS

<table>
<thead>
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<th>Product</th>
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<tr>
<td>Abaton</td>
<td>$299</td>
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<tr>
<td>Dove 24/95 Fax Modem</td>
<td>$289</td>
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</table>

### HARD DISK DRIVES

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
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<tbody>
<tr>
<td>Impelns</td>
<td></td>
</tr>
<tr>
<td>MacWren 300</td>
<td>$1,299/$1,399</td>
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<tr>
<td>MacWren 300 Runner</td>
<td>$1,479/$1,579</td>
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<tr>
<td>MacWren 600</td>
<td>$1,749/$1,849</td>
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<tr>
<td>MacWren 12 Gilt.</td>
<td>$3,099/$3,199</td>
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</tbody>
</table>

### MONITORS

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnavox</td>
<td></td>
</tr>
<tr>
<td>TWO YEAR WARRANTY</td>
<td></td>
</tr>
<tr>
<td>14&quot; Color Monitor</td>
<td>$429</td>
</tr>
<tr>
<td>NEC</td>
<td></td>
</tr>
<tr>
<td>MacSync 14&quot; Color Monitor</td>
<td>$435</td>
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<tr>
<td>Seiko</td>
<td>$589</td>
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### MEMORY

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>Magnavox</td>
<td></td>
</tr>
<tr>
<td>14&quot; Color Monitor with 8 bit Video Interface Mac II family</td>
<td>$699</td>
</tr>
<tr>
<td>14&quot; Color Monitor with 24 bit Video Interface Mac II family</td>
<td>$799</td>
</tr>
<tr>
<td>14&quot; Color Monitor with 8 bit Video Interface Mac SE/30</td>
<td>$799</td>
</tr>
<tr>
<td>Nubus adapter</td>
<td>$95</td>
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### MONITOR SYSTEMS

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
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<tbody>
<tr>
<td>Magnavox</td>
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</tr>
<tr>
<td>14&quot; Color Monitor with 8 bit Video Interface Mac II family</td>
<td>$699</td>
</tr>
<tr>
<td>14&quot; Color Monitor with 24 bit Video Interface Mac II family</td>
<td>$799</td>
</tr>
<tr>
<td>14&quot; Color Monitor with 8 bit Video Interface Mac SE/30</td>
<td>$799</td>
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### SIMM SALE $45

<table>
<thead>
<tr>
<th>Product</th>
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</thead>
<tbody>
<tr>
<td>Magnavox</td>
<td></td>
</tr>
<tr>
<td>FREE Installation Manual Included!</td>
<td></td>
</tr>
</tbody>
</table>

### OPTICAL HARD DRIVES

<table>
<thead>
<tr>
<th>Product</th>
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<tbody>
<tr>
<td>Pinncle Micro, Inc.</td>
<td>$3,399</td>
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<tr>
<td>630 Mag Optical Drive with Interface</td>
<td>$2,999</td>
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### PRINTERS

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>Kodak Diconix 150</td>
<td>$489</td>
</tr>
<tr>
<td>Diconix 4 Printer</td>
<td>$1,169</td>
</tr>
<tr>
<td>QMS QMS-PS 410 PostScript*</td>
<td>$2,049</td>
</tr>
<tr>
<td>Qume Crystal Print Publisher I</td>
<td>$1,899</td>
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<tr>
<td>Crystal Print Publisher II</td>
<td>$2,395</td>
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<tr>
<td>Script TEN PostScript</td>
<td>$1,899</td>
</tr>
<tr>
<td>Seiko Smart Label Printer</td>
<td>$199</td>
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<tr>
<td>Texas instruments</td>
<td></td>
</tr>
<tr>
<td>PS17 Microlaser with interface</td>
<td>$1,899</td>
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<tr>
<td>PS35 Microlaser with interface</td>
<td>$1,799</td>
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### REMOVABLE DISK DRIVES

<table>
<thead>
<tr>
<th>Product</th>
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<tbody>
<tr>
<td>SyQuest 42 Removable</td>
<td>$449</td>
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<tr>
<td>cartridge not included</td>
<td></td>
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</tbody>
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### SCANNERS

<table>
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<tr>
<th>Product</th>
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<tr>
<td>Microtek 300GS</td>
<td>$1,249</td>
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<tr>
<td>Microtek 300ZS</td>
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### UPS

<table>
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<th>Product</th>
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<tr>
<td>Safe Power Systems</td>
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<tr>
<td>Safe 250</td>
<td>$189</td>
</tr>
<tr>
<td>Safe 400S</td>
<td>$369</td>
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</tbody>
</table>

*while supplies last, *this requires nubus adaptor.

---

1-800-888-8779

24 Hour Fax Line 602-897-1921

4747 East Elliot Road, #29-461 • Phoenix, AZ 85044

All prices subject to change without notice. All products subject to availability.

Circle 285 on reader service card
**Hardware**

**APPLE**

- Mac Systems - Lowest Pricing CALL ABATON
  - Interfax Fax modem 24/96 256 358
  - Color & Gray Scale Scanner 1699
  - PostScript Laser Printer 1995
  - Extended Carry Case for SE
  - Carry Case for Mac lcx / ImageWriter
  - ANIMAS
    - True Color Hand Scanner 562
  - CAER
    - Fine Typist 469
  - CAYMAN SYSTEMS
    - Gigabyte
    - 1690
  - COMPATIBLE SYSTEMS
    - Ether Route 1045
    - Ether Plus 399
    - Ether II 318

- ABCOM CARRYING CASES 76

**ICEMAN**

- Benoulli II Dual 44 Meg CALL
- Benoulli II Transportable 44 Meg CALL

- PROMETHEUS
  - 24/36 Fax/Modem 265
  - 24/36 Send/Receive Mini Modem 145
  - 24/36 Send/Receive Mini Modem 199

- PROTONICS
  - PR2500 Portable Scanner 199
  - PR2500 Portable Mini M 115

- RASTEROPS
  - FULL LINE AVAILABLE CALL
  - 24L System 19 Trinton CALL
  - Accelerator 16MB DRAM Exp Kit CALL
  - ClearVue/Grey Scanner 1699
  - ClearVue/SE Scanner 19 CALL

- SHARP
  - JX-450 Color Scanner & Int. 2395
  - JX-300 Color Scanner & Int. 5195

- SONY
  - 1304 Color Monitor 689

- WACOM
  - Digitizing Tablets CALL

**VISIONS**

- IOMEGA
  - 500 Meg 888

- SIMAC
  - MegSim 100, 60, 70 ns CALL

- SONY
  - 1304 Color Monitor 689

- SUPRA
  - 2400 Baud External Modem 109

- TOTAL SYSTEMS
  - Gemini 16MHz 2560 825

- UMAX
  - UC300 Scanner 1675

- WACOM
  - Digitalizing Tablets CALL

**KINETICS**

- Full Page 4 (now by Shiva) 1395

**RECORD HOLDER PLUS**

- The one non-relational data manager that makes full use of the Macintosh interface. It includes all the graphics capabilities and data management options you'll ever need, plus an easy-to-familiarize tutorials and over a hundred help screens.

**Policies**

- Visa, Mastercard & Amex accepted.
- Credit card is not charged until order is shipped.
- California residents add 6.75% sales tax.
- Hours: Mon - Fri 9:30 - 11 EST
- Sat 11:00 - 5 EST
- Call (818) 501-6581 FAX (818) 521-3760
- Compatibility Not guaranteed.
- All prices & policies subject to change without notice.

**Shipping**

- $3 Airborne Overnight Continental US. Hardware over 10 lbs will be shipped ground.
- Same Day shipping.

**Returns**

- Call for R.A. number before return.
- Restocking fee may apply.

**Money Back Guarantee**

- Mod products have a 30-day money back guarantee. Please inquire when you order.

**INTERNATIONAL RESSELLER PROGRAM**

- We ship regularly to 45 countries worldwide.
- Call about our special pricing.

**For the LOWEST mail order prices, call...**

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**FAX (818) 501-3760 or (818) 377-7865**

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- Call about our special pricing.
Contact the professionals at MacTel Technology. We handle only the best in Macintosh hardware, systems and peripherals. Names like Apple, Nikon, Radius, RasterOps, Daystar, PLI, Sharp and our own, top-quality Index brand.

We provide services such as international sales, service and banking; competitive system quotes; our own research and manufacturing facility; and qualified, reliable technical support (before and after the sale.) It's no wonder if the vast majority of our business is repeat business.
**INDEX Hard Drives**

**Economy series:** Bundled with formatting and testing software. All cables to plug-NGO.

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 Mb</td>
<td>12 ms</td>
<td>$279</td>
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<tr>
<td>52 Mb</td>
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<td>$299</td>
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<tr>
<td>60 Mb</td>
<td>12 ms</td>
<td>$319</td>
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<tr>
<td>105 Mb</td>
<td>12 ms</td>
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<tr>
<td>170 Mb</td>
<td>12 ms</td>
<td>$729</td>
</tr>
<tr>
<td>210 Mb</td>
<td>12 ms</td>
<td>$799</td>
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**Quantum**

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<th>Capacity</th>
<th>Internal</th>
<th>External</th>
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<tbody>
<tr>
<td>3.5&quot; ProDrive</td>
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<td></td>
</tr>
<tr>
<td>180 Mb</td>
<td>16 ms</td>
<td>$969</td>
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<tr>
<td>320 Mb</td>
<td>16 ms</td>
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<tr>
<td>330 Mb</td>
<td>16 ms</td>
<td>$1299</td>
</tr>
<tr>
<td>425 Mb</td>
<td>16 ms</td>
<td>$1599</td>
</tr>
<tr>
<td>600 Mb</td>
<td>16 ms</td>
<td>$1799</td>
</tr>
<tr>
<td>640 Mb</td>
<td>16 ms</td>
<td>$1899</td>
</tr>
<tr>
<td>128GB</td>
<td>16 ms</td>
<td>$2999</td>
</tr>
</tbody>
</table>

**Elite series:** Bundled with HD Chaffeur, Backmatic, and AutoDrive 8. Super caring and all cables to plug-NGO.

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Internal</th>
<th>External</th>
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<tbody>
<tr>
<td>3.5&quot; ProDrive HD</td>
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<tr>
<td>40 Mb</td>
<td>12 ms</td>
<td>$1399</td>
</tr>
<tr>
<td>52 Mb</td>
<td>12 ms</td>
<td>$1499</td>
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<tr>
<td>60 Mb</td>
<td>12 ms</td>
<td>$1599</td>
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<tr>
<td>105 Mb</td>
<td>12 ms</td>
<td>$1999</td>
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<td>170 Mb</td>
<td>12 ms</td>
<td>$2199</td>
</tr>
<tr>
<td>210 Mb</td>
<td>12 ms</td>
<td>$2399</td>
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</table>

**Imprimis-Wren (Segate)** 5.25" Professional Harddrives

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<tr>
<th>Capacity</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>160 Mb</td>
<td>16 ms</td>
<td>$1099</td>
</tr>
<tr>
<td>320 Mb</td>
<td>16 ms</td>
<td>$1199</td>
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<tr>
<td>330 Mb</td>
<td>16 ms</td>
<td>$1299</td>
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<tr>
<td>425 Mb</td>
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<td>$1599</td>
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<tr>
<td>600 Mb</td>
<td>16 ms</td>
<td>$1799</td>
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<tr>
<td>640 Mb</td>
<td>16 ms</td>
<td>$1899</td>
</tr>
<tr>
<td>128GB</td>
<td>16 ms</td>
<td>$2999</td>
</tr>
</tbody>
</table>

**Golden Triangle • "DISKTWIN" ..... $975.00**

Continuous data protection for Macintosh (IBM or ST/2). Up to date "HOT BACKUP" automatic change implementation, waiting for functioning drive. **A MUST FOR IMPORTANT SERVERS.**

**CHIEF CHAFFEUR**

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- [MasterCard](#)
- [American Express](#)
- [Discover](#)
- [Diner's Club](#)
- [Compaq](#)

**VisionPro Monitor Systems**

- **When purchasing systems, compare the options and features.**
- **VisionPro Graphic Cards** are manufactured under license for MacTec technology and support Macintosh graphic needs now and in the future.

**Video Graphic Systems**

- **A. 8 Bit Business System.** 8 Bit Video Card only. Includes Quantum 105Mb 12 ms $2695
- **B. 8 SystemPro 20"**
  - VisionPro Video Card.
  - 20" Wega Monitor (ICT20) $3325
  - 75 Hz

**24 Bit VisionPro Interface Upgrade Kit. . . . . . . . . . $600**

**Monitors**

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seiko14&quot; Trinitron CM 144S</td>
<td>Hitachi 14&quot; MX4 Super</td>
<td>$589</td>
</tr>
<tr>
<td>Vision ST Upgrade Kit (8 - 24 Bit)</td>
<td>VisionPro 8 - 24 Bit Upgrade Kit</td>
<td>$700</td>
</tr>
</tbody>
</table>

**Macintosh CPUs & Systems**

- **Max Basic** 4 Duos inst.
- **Max SL**
- **Max LC**
- **Max SI**
- **2MB Book** Mac Portable
- **BasicVideo II NT, NTX and Personal Jane/Me:**
  - Also fax for quote on complete Apple Macintosh product

**Ordering information**

- Fax/Call for systems quote and competitive pricing
- Government Universities Corporations (on approval) bids requested

**MacTel carries hundreds of professional Mac peripherals (not listed) and the entire Macintosh line • Call or Fax for a complete catalog. •**
### Scanners

<table>
<thead>
<tr>
<th>Scanner Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MagicScan 256 8-bit 300 DPI grayscale scanner with ImageStudio Software</td>
<td>$1099</td>
</tr>
<tr>
<td>Microsoft 300/85 300 DPI single pass color scanner with ColorStudio/Imagemaker</td>
<td>$1699</td>
</tr>
</tbody>
</table>

### RailGun '030' Accelerator

*With new accelerated SCSI access!*

We can give your original Mac new speed and performance with our Magic RailGun '030' Accelerator for the Plus, SE, & Classic.

### Magic 45 Removable

**Portable, fast, & affordable removable media.** Syquest mechanism. Mac & DOS compatible.

- 2 year warranty.
- 45 MB removable drive: $529
- Syquest cartridge: $39.99
- purchase of drive $69

### Video Solutions

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MagicView 19&quot; B&amp;W with card</td>
<td>$899</td>
</tr>
<tr>
<td>MagicView 19&quot; B&amp;W Plus version with card</td>
<td>$999</td>
</tr>
<tr>
<td>Magic 8-bit color card II/SE</td>
<td>$259/$329</td>
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<tr>
<td>RasterOps 264/264 24-bit color card</td>
<td>$999/$99</td>
</tr>
<tr>
<td>Magic 19&quot; 8-bit color card for II</td>
<td>$499</td>
</tr>
</tbody>
</table>

### System Specials

#### Mac Classic
- $849 36 month lease for $30
- $2749 36 month lease for $79
- $3399 36 month lease for $115
- $4199 36 month lease for $140
- $6299 36 month lease for $210

#### Mac Classic 2/40
- $849 36 month lease for $30
- $1299 36 month lease for $44
- $2749 36 month lease for $79
- $3399 36 month lease for $115
- $4199 36 month lease for $140
- $6299 36 month lease for $210

#### Mac LC
- $849 36 month lease for $30
- $1299 36 month lease for $44
- $2749 36 month lease for $79
- $3399 36 month lease for $115
- $4199 36 month lease for $140
- $6299 36 month lease for $210

#### Mac LC 2/40
- $1299 36 month lease for $44
- $2749 36 month lease for $92
- $3399 36 month lease for $140
- $6299 36 month lease for $210

### Connect/Network

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>Connect/Network Microtek scanner &amp; Colorstudio/Imagestudio</td>
<td>$1699</td>
</tr>
<tr>
<td>Connect/Network ImageStudio Software</td>
<td>$1099</td>
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</table>

### Productive Peripherals

#### Practical Peripherals

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>9600 Baud V.32/42 bis MNP-5</td>
<td>$499</td>
</tr>
</tbody>
</table>
Modems, Networking, Printers, Scanners, Video Solutions, and Much More...

**Backup Solutions**

Magic Tape Drives include Retrospect software. For faster archiving, Network support, archive control, and unattended backups:

<table>
<thead>
<tr>
<th>Magic Tape</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>$679</td>
</tr>
<tr>
<td>150</td>
<td>$899</td>
</tr>
<tr>
<td>525</td>
<td>$999</td>
</tr>
<tr>
<td>1.3 gig/2.4 gig</td>
<td>$1895/$2895</td>
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</tbody>
</table>

**Hard Drives**

AUX comp. Disk Manager Mac, 10Mb software, backup & 2 year warranty, surge protect, Ext SCSI

<table>
<thead>
<tr>
<th>Quantum</th>
<th>Internal</th>
<th>External</th>
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<tbody>
<tr>
<td>40 MB hard drive</td>
<td>$289</td>
<td>$409</td>
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<td>$499</td>
<td>$439</td>
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<tr>
<td>80 MB hard drive</td>
<td>$579</td>
<td>$579</td>
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<tr>
<td>105 MB hard drive</td>
<td>$599</td>
<td>$639</td>
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<tr>
<td>105 MB low profile HD</td>
<td>$619</td>
<td>$639</td>
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<tr>
<td>170 MB hard drive</td>
<td>$799</td>
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<td>210 MB hard drive</td>
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<tr>
<td>300 MB CIX hard drive</td>
<td>na</td>
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<tr>
<td>300 MB WinRunner</td>
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<tr>
<td>600 MB hard drive</td>
<td>na</td>
<td>$2390</td>
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<tr>
<td>1.2 gb hard drive</td>
<td>na</td>
<td>$2799</td>
</tr>
</tbody>
</table>

New advanced replacement hard drives: Internal $29

**Magic SIMMs**

1 MB SIMMs $44

70, 80 ns. lifetime guarantee
1 MB SIMMs $47
4 MB SIMMs $225
3 MB Portable RAM...$89
Portable RAM 1.8 MB call
4 MB Classic upgrade...$199

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Our Magic upgrades can give new life to your old Macs:

128k-512k Mac upgrades can update the ROMs and the floppy drive, add a SCU port, or expand your Mac's memory.

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128k-512k upgrade...$39
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512k-2 MB upgrade...$299
512k-4 MB upgrade...$199

*cash price

**Magic Fax Modems**

Two year warranty, 100% Hayes & Group 5 compatible

MagicNet 58

2400/1200/300 baud, Auto answer/dial...$599
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2400/1200/300 send and receive up to 9600 baud, L.AMP & MNP error correction, asynchronous operation, auto adaptive equalization. Two year warranty. $199

**Magic Modems**

Magic Modems include a two year warranty and are all 100% Hayes compatible.

2400/1200/300 baud, Auto answer/dial...$575

**TI Microlaser Printers**

<table>
<thead>
<tr>
<th>Printer Type</th>
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<tr>
<td>PS 17</td>
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<td>PS 35</td>
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**Software**

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<td>Backup</td>
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<td>Magic</td>
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**Hardware**

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<td>Printers</td>
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<tr>
<td>Scanners</td>
<td>$249</td>
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**How to Order**

Call 1-800-MAC-DISK

Circle 175 on reader service card

Apple & Macintosh trademark of Apple Computer.

1-800-MAC-DISK

Circle 175 on reader service card

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Laser Printer Sale

**ScripTEN PostScript® Laser Printer**

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- 10 Pages per minute
- 11 Font Families (35 typefaces)
- 3 megs of RAM
- Solid Blacks for graphics
- Letter, Legal and transparencies

**CrystalPrint Publisher I Laser Printer**

- **$1,899**
- 8 Pages per minute
- 11 Font Families (39 typefaces)
- 3 megs of RAM
- Solid Blacks for graphics
- Letter, Legal and transparencies

**CrystalPrint Publisher II Laser Printer**

- **$2,395**
- 8 Pages per minute
- 11 Font Families (39 typefaces)
- 3 megs of RAM
- Adobe type one support
- Solid Blacks for graphics
- Letter, Legal and transparencies

**PS17 Microlaser PostScript® Laser Printer**

- **$1,599**
- 1.5 Megabytes of RAM
- 6 pages per minute
- 17 typefaces
- Letter, Legal, and transparencies
  - AppleTalk Interface included!

**PS35 Microlaser PostScript® Laser Printer**

- **$1,799**
- 1.5 Megabytes of RAM
- 6 pages per minute
- 35 typefaces
- Letter, Legal, and transparencies
  - AppleTalk Interface included!

**QMS-PS® 410 PostScript Laser Printer**

- **$2,049**
- 2 Megabytes of RAM
- 4 pages per minute
- Auto switching between Macintosh and IBM.

---

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---

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Standard Air which is 1 to 2 day service. COD's Shipped by UPS 2 day air. Call for shipping costs. Products purchased in error are subject to a 20% restocking fee. All prices subject to change without notice. All products subject to availability.
<table>
<thead>
<tr>
<th><strong>Accelerators</strong></th>
<th><strong>Monitor Systems</strong></th>
<th><strong>Printers</strong></th>
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<tr>
<td><strong>Special</strong></td>
<td><strong>Special</strong></td>
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<tr>
<td>DayStar Digital</td>
<td>Magnavox</td>
<td>Kodak</td>
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<tr>
<td>Fast Cache II</td>
<td>TWO YEAR WARRANTY</td>
<td>Diconix 150</td>
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<td>Radius</td>
<td>14&quot; Color Monitor</td>
<td>Diconix Color 4 Printer</td>
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<td>Accelerator 16</td>
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<td>$1,169</td>
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<td>Accelerator 25</td>
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<td>for SE</td>
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<td>CD ROM</td>
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<td>NEC</td>
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**Fax Modems**

**Special**

| Abaton          | Interfax Modem 24/96 | $275 |
| Dove            | 24/96 Fax Modem     | $279 |
| Orchid          | 24/96 Fax Modem     | $419 |

**Hard Disk Drives**

**Special**

| Imprimis        | MacWren 300         | $1,349/$1,499 |
| MacWren 330     | $1,549/$1,649      |             |
| MacWren 600     | $1,849/$1,949      |             |
| MacWren 1.2 Gig | $3,199/$3,399      |             |
| Quantum         | TWO YEAR WARRANTY   |             |
| Quantum 40      | $329/$399          |             |
| Quantum 60      | $459/$539          |             |
| Quantum 105     | $499/$599          |             |
| Quantum 120     | $539/$699          |             |
| Quantum 170     | $699/$799          |             |
| Quantum 210     | $849/$959          |             |

**Memory**

**Special**

**SIMM SALE** $45

FREE Installation Manual Included!

**Monitors**

**Special**

| Magnavox        | TWO YEAR WARRANTY   | $275 |
| MacSync 14"    | $439                |       |
| Seiko           | $439                |       |
| Sony            | $589                |       |
| 1304 14"       | $689                |       |

**Optical Hard Drives**

**Special**

| Pinnacle Micro, | 650 Meg Optical Drive | $3,399 |
| with Interface  |                     |       |

**UPS**

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| Safe 250          |       |
| Safe 400S         | $369  |

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    - 120ms 17ms 120 719 719
    - 170ms 15ms 170 899 929
  - External:
    - 210ms 15ms 210 1069 1099

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  - 45DR (Dual Syquest) 1199
  - 60L (Teac w/Retrospect 599
  - 150L (Teac w/Retrospect 699
  - DAT drive™ 1.3GB WngDAT w/Retrospect 2049
  - OptiDisk 650™ (Sony) 170 170
  - 2.3GB 8mm Tape (Exabyte) 969 0

- **Seagate MacWren**
  - Internal:
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    - 330 16.5ms
    - 425 16ms 1/2 Ht.
    - 600 16.5ms
    - 650 15.5ms
    - 1000 15ms

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- **Combo Drives**
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- **Media**
  - Teac CT600H 17
  - Teac CT600N 24
  - Syquest SQ400 78
  - 4mm DAT Tape 19
  - Sony Opt. Cart. 225

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  **Third Wave** uses only the highest quality, fastest, most reliable fixed drive mechanisms on the market. With our competitors shipping untested, unformatted drives or ship inferior user manuals, Third Wave offers the most complete line of drives for the Mac. Premium enclosures offer virtually silent fans, easy terminator access, and high quality metal chassis construction. Other features include international power supplies, zero footprint design, and good looks. You get what you pay for when you buy a storage system from Third Wave Computing.

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  Included software and features: disk management software with partitioning, password protection, test features, bad block management, Mounter desk accessory, removable drive INIT, and more. The most complete formatting utility available for the Mac. Fontina™, the ultimate font management utility from Eastgate Systems ($69.95 value.) Other included software: complete Virus utilities. 12mb of public domain and shareware. 10mb slide show of 8/24 bit images created with StrataVision 3d, our own HyperDex, HyperCard utility, and much more. No one gives you more software than Third Wave.

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  - IIfx SIMMs (1,4mb) Call
  - NTX SIMMs Call
  - Portable 1, 2, 3mb Call

- **Sixth Wave**
  - Self-formatted memory modules for the Mac. Includes SIMMs (1, 4mb) Call

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  - DayStar Accelerators Call 68851 PMMU w/Virtual 189
  - We sell many performance products but don’t have room to list them all. Please call for more information.

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MacUser/LABS, May 1990

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Apple Prices that Aren’t Hard to Swallow.

### Affordable Macintosh Systems

<table>
<thead>
<tr>
<th>System Type</th>
<th>Details</th>
<th>You Pay</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Special on MAC IIsi</strong></td>
<td>Macintosh IIsi CPU, 5mb RAM, 105mb hard drive, 1.44mb FDHD, Apple Standard Keyboard, NEC 14&quot; MacSync HC.</td>
<td>$3,689</td>
</tr>
<tr>
<td><strong>MAC Classic System</strong></td>
<td>Macintosh Classic, 4mb RAM, 105mb hard drive, 1.44mb FDHD, Apple Classic Keyboard, Classic Monochrome built-in display.</td>
<td>$1,679</td>
</tr>
<tr>
<td><strong>Mac Ilfx System</strong></td>
<td>Macintosh Ilfx CPU, Apple 40 hard drive, 4mb RAM, MacPro Extended Keyboard, 8bit color, NEC 14&quot; MacSync HC.</td>
<td>$7,409</td>
</tr>
<tr>
<td><strong>Mac IIc System</strong></td>
<td>Macintosh IIc CPU, Apple 40 hard drive, 5mb RAM, MacPro Extended Keyboard, 8bit color, NEC 14&quot; MacSync HC.</td>
<td>$4,995</td>
</tr>
<tr>
<td><strong>Mac IIc System</strong></td>
<td>Macintosh LC, 2mb RAM, Apple 40 hard drive, Standard Keyboard, Apple 12&quot; Color Display. (Call for Availability)</td>
<td>$2,389</td>
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### Display Solutions

<table>
<thead>
<tr>
<th>Solution</th>
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<tbody>
<tr>
<td>RasterOps 264</td>
<td>$599</td>
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<tr>
<td>RasterOps 264/SE30</td>
<td>$359</td>
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<tr>
<td>RasterOps SL 19&quot; System</td>
<td>$412.5</td>
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<td>RasterOps 24L 19&quot; System</td>
<td>$545</td>
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<tr>
<td>Ikogami 20&quot; Trinitron</td>
<td>$2089</td>
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<tr>
<td>8 Bit card for Ikogami</td>
<td>$134</td>
</tr>
<tr>
<td>Seiko 14&quot; CM-1445 Color</td>
<td>$559</td>
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<tr>
<td>MacSync 14&quot; Color Monitor</td>
<td>$415</td>
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### Solutions that Make Sense...

<table>
<thead>
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<tr>
<td>RasterOps 264</td>
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<td>RasterOps 264/SE30</td>
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<tr>
<td>MacSync 14&quot; Color Monitor</td>
<td>$415</td>
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### PRICE BUSTERS

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<tr>
<td>Toshiba 520XT CD ROM</td>
<td>$499</td>
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<td>With Free 500mb Public Domain ROM</td>
<td>$107</td>
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<tr>
<td>8 bit 50mb Chip Cartridge</td>
<td>$77</td>
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<tr>
<td>MicroTek 300s</td>
<td>$1699*</td>
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<tr>
<td>Kensington TurboMouse</td>
<td>$107</td>
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<tr>
<td>Hayes Ultra9600</td>
<td>$829</td>
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<tr>
<td>E-Machines T1688bit</td>
<td>$2053</td>
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<tr>
<td>Kodak Color4 Printer</td>
<td>$1029</td>
</tr>
</tbody>
</table>

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The Top Ten Reasons To Buy From Bottom Line

1. MicroTek 300ZS 24-bit Color Scanner
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   300 DPI Inkjet Printer
   $669

5. NEC MacSync HC
   640 x 480 High Res Color Monitor
   $420

6. TI microLaser PS35
   300 DPI Postscript Laser Printer
   $1699

7. Abaton Interfax
   2400-3000 baud fax modem
   $299

8. Macromind Director 2.0
   The Multimedia Standard
   $333

9. Quark XPress 3.0
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questions asked.

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world-wide. So we can ship your
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from people that really know
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the phone.

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Permanent ink. Colors available.
$10.95

...And for Those Who
Need More Convinced,
Here's 155 More Reasons.
### DATA CARTRIDGES

<table>
<thead>
<tr>
<th>Type</th>
<th>Price</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>DC 2000</td>
<td>15.00</td>
<td>5.25&quot; High-Density</td>
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<tr>
<td>DC 2080</td>
<td>16.75</td>
<td>3.50&quot; OS (1 MB)</td>
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<td>DC 2120</td>
<td>19.25</td>
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<td>DC 3000 XLP</td>
<td>18.95</td>
<td>5.25&quot; OS</td>
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<td>DC 600A</td>
<td>21.00</td>
<td>5.25&quot; OS (1 MB)</td>
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<td>DC 6150</td>
<td>21.85</td>
<td>3.25&quot; HD (2 MB)</td>
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### TAPE BACKUP PRODUCTS

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<tr>
<td>Black Watch Tape</td>
<td>12.29</td>
<td>700-2400</td>
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<td>3480 Tape Cartridges</td>
<td>4.59</td>
<td>1251-4</td>
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<td>DEC TK-50</td>
<td>24.99</td>
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<td>DEC TK-70</td>
<td>37.50</td>
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### OPTICAL DISKS - CALL FOR PRICES

<table>
<thead>
<tr>
<th>Type</th>
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<tr>
<td>CS-500 HD</td>
<td>13.13</td>
<td>50 MB</td>
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<tr>
<td>CS-600 HD</td>
<td>15.25</td>
<td>60 MB</td>
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<tr>
<td>CS-600 X0</td>
<td>15.95</td>
<td>155 MB</td>
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### DISKETTE CONNECTION

- **Verbatim**
  - 5.25" Double Side (18188)...
  - 5.25" DS Double Side Plus (97006)...
  - 5.25" High Density (96206)...
  - 3.5" Double Side (90997)...
  - 3.5" DS IBM Format (90068)...
  - 3.5" High Density (96206)...
  - 3.5" HD IBM Format (87410)...

- **maxell®**
  - 5.25" D-Side / D-Density
  - 3.50" DS
  - 7.29

### DISKETTE CONNECTION

**NORTHEAST & CANADA**

<table>
<thead>
<tr>
<th>Phone</th>
<th>Address</th>
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<tbody>
<tr>
<td>(800) 451-1849</td>
<td>PO Box 10247, Wilmington, DE 19850</td>
</tr>
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**SOUTHEAST**

<table>
<thead>
<tr>
<th>Phone</th>
<th>Address</th>
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<tbody>
<tr>
<td>(800) 940-4600</td>
<td>PO Box 4106, Deerfield Beach, FL 33442</td>
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**MIDWEST**

<table>
<thead>
<tr>
<th>Phone</th>
<th>Address</th>
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<tbody>
<tr>
<td>(800) 654-4058</td>
<td>PO Box 1218, Minneapolis, MN 55440</td>
</tr>
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**WEST - HAWAII & ALASKA**

<table>
<thead>
<tr>
<th>Phone</th>
<th>Address</th>
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<tbody>
<tr>
<td>(800) 621-6221</td>
<td>PO Box 12396, Las Vegas, NV 89112</td>
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**FAX**

<table>
<thead>
<tr>
<th>Phone</th>
<th>Address</th>
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<tbody>
<tr>
<td>(405) 495-4938</td>
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**Minimum Order $20.00 - NO SUPPLEMENT ON VISA - MC COD orders add $3.50 Shipping charges determined by items and delivery method required by customer. Prices are subject to change without notice.**
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DTP Mac Iici System
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See Our Other Ad in This Issue For More Specials!
The Macworld Catalog

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The Macworld Catalog
Advertising Rates & Information

The Macworld Catalog section is a monthly link-up for advertisers and volume purchasers of Macintosh-related products and services. The Catalog offers advertisers a low-cost marketing opportunity and provides readers with a timely, easy-to-use menu for product buying.

Display ads are sold by column inches (2" minimum). Standard red is available as a second color. Text-only listings are available for a minimum of three issues at $520 per issue.

For more information on The Macworld Catalog, call 800/888-8622.

The Macworld Catalog
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Niki Stranz, Western Account Manager, 415/978-3105  
Carol Felde, Eastern Account Manager, 415/978-3152

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MAC SE/30 2/40 .......... 2949
MAC Classic 2/40 .............Call
MAC llfx 4/80 ............... 6499
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MAC Portrait Monitor ....... 769
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SuperMac 19" Trin Monitor •2350
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Laserwriter llNTX ........... 4069
Laserwriter llNT ............. 2999
Radius "Pivot Monitor+Card .. 1149
HP Appletalk Interface ...... 219
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MAC II c 4/80 ............... 4499
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MAC Portable 1/40........... 2999
MAC Portrait Monitor ..... 769
NEC MACSync HC Monitor. 429
Personal II SC/NT 1399/2299
Laserwriter IIINT ........... 2999
Laserwriter IIINTX ........ 4069
HP DeskWriter ............... 669
HP LaserJet Series IV ....... 1559
HP Appletalk Interface ...... 219
Radius Pivot Monitor+Card ...1149
Raster Ops 264 ............. 519
SuperMac 19" Trin Monitor . 2350

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MAC Classic 40/2mb....Scall
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Mac SE/30/4mb............$7095
Mac LC/30/4mb............$7995
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Mac II 170/5mb...........$4895
Mac IIfx 105/4mb........$6795
Mac SE/30/4mb............$7095
Mac LC/30/4mb............$7995
Apple monitors...........Scall
ImageWriter II.............$435
Personal Laser NT........$2295
Laserwriter IIINT .........$3100
Laserwriter IIINTX ........$4195
H.P. Deskwriter..........$725
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Tel 415-327-1200

CIRCLE 671 ON READER SERVICE CARD

MAC WORLD • MARCH 1991
255
Quantum 12 ms Access

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<th>Capacity</th>
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WREN Drives

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<td>1 Gig</td>
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<td>2999</td>
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Maxtor 200 mb | 859 | 959

All Drives carry a 30 day money back guarantee. Quantum, Maxtor and Syquest Drives carry a two year parts & labor disk-for-disk replacement warranty. WREN, Teac, WangDAT and Syquest Cartridges carry a one year parts & labor drive for 30 day disk replacement warranty. All Hard Drives include all brackets, cables and a manual for operation. All Hard Drives are pre-formatted with Apple's toast stable System software, 12 MB of Publicly Distributable software from the EM labs, and the ALLIANCE POWER TOOL SCSI Interface Package. If your drive fails to perform properly in the first 30 days and our technical support staff can't solve the problem over the phone, we'll ship you a replacement drive overnight and have your defective drive picked up at our expense. Onsite is subject to some limitations. Products being returned for credit and international orders do not apply. International customers are responsible for all shipping, handling, customs, and return transportation costs.

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AMEX ACCEPTED
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- Pro 40 $319 int $389 ext 12ms
- Pro 10 '70 S•O 12
- Pro 105 52s S9S 12
- Pro 120 635 705 10
- Pro 170 775 855 10
- Pro 210 115 955 10
- Pro 521ps 339 09 $12
- Pro 1051ps 545 615 12

**Imeg SIMMs,$42
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**TechnologywORkS**

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FAX# 512-794-8520

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405-632-6581 Fax 405-632-2245

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Freeword Excel
Ready Set Go Word

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DOS/IBM
Learn-Do Excel
WordStar dbase
Ventura Works
Multimate Lotus 123
WordPerfect Word
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8L 19" System $3995
54L 19" System $5119

E-Machin
Big Picture 22I SE $1695
Big Picture Zl 1Q $2300

Teccom
QT-Mac 1 $95
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Haves
V-Series smart modem $699
HP Plotters call
Call Now! 1-800-222-1648
Visa, MC, COD, Check

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Telephone: (714) 882-5822

CIRCLE 513 ON READER SERVICE CARD

CIRCLE 414 ON READER SERVICE CARD

Peripherals

For your ad to appear on The Macworld Catalog screen, call 800/888-8622.

CIRCLE 410 ON READER SERVICE CARD

258 MACWORLD • MARCH 1991
# The Macworld Catalog

## CD ROM DRIVES

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<th>External</th>
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<td>437MB Runner</td>
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<td>406MB F/H</td>
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<td>1.2GIG</td>
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<td>$3198</td>
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1 Year Warranty. 100,000 Hour MTBF**

Fujitsu 800K Floppy $99!

## Quantum Drives!

<table>
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<td>120MB</td>
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<td>170MB</td>
<td>$615</td>
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2 Year Warranty. 50,000 Hours MTBF**

**MTBF= Mean Time Between Failure, this equals the probable life span of the drive

## Fujitsu Drives!

<table>
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<tr>
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<th>Size</th>
<th>Price</th>
</tr>
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<tbody>
<tr>
<td>12</td>
<td>8x11/2</td>
<td>$5.70</td>
</tr>
<tr>
<td>72</td>
<td>12 Pads</td>
<td>$3.50</td>
</tr>
<tr>
<td>144</td>
<td>2.85</td>
<td>$3.00</td>
</tr>
<tr>
<td>450</td>
<td>3.25</td>
<td>$3.75</td>
</tr>
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<td>1000</td>
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PLASTIC: Blue, Platinum, Gray, Red & Black.

**Choose your color. Size 8 1/2 x 11**

Ask for samples. We specialize in private label. Great promo item.

**Satisfaction Guaranteed**

Macintosh was designed to be superior to both the mind and the eyes. Regular use has naturally seduced your Mac, with nudges, dusts, oils, and grime. MACLEAN for sharper aesthetics, smoother performance, and Macintosh pride.

Each MACLEAN Set includes:
- Pre-saturated eliminated room swabs for keys and noons, Wet screen wipes, Pre-moistened Mac plastic pad:
  - Chemically treated stat counter

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The Macworld Catalog

The Best Case Scenario
Airline Check-in or Local Use
Zero Halliburton Aluminum Mac Cases:
Lightweight, Durable, Distinctive Styling
CLASSIC/Plus/SE IIx/x & SE LC IIx/x Portable Attaches, Monitor & Printer Cases
from $299.95
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CIRCLE 403 ON READER SERVICE CARD

Dust Covers
for a Clean Machine

Protect your equip-
ment from dust,
spills, and accumu-
lation! Use Dust Covers
for your computer and per-
ipheral equipment!

100% Cotton
COTTON CANVAS

MAC, SE, II, & PRINTERS

Beige w/ Grey Trim
Breathable Static-Free!

NEW! Seal-Skins
For Keyboards

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Contemporary ComputerWear 1320-36th
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CIRCLE 507 ON READER SERVICE CARD

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### BUSINESS SOFTWARE

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**BUSINESS SOFTWARE**

- **Microsot Word** Microsoft Corporation
- **Microsoft Works** Microsoft Corporation
- **Microsoft Excel** Microsoft Corporation
- **Aldus PageMaker** Aldus Corporation
- **FileMaker II** Claris Corporation
- **Quicken** Intuit
- **QuarkXPress** Quark
- **MacWrite II** Claris Corporation
- **Adobe Illustrator** Adobe Systems
- **PrintShop** Broderbund Software

### MASS STORAGE*

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**MASS STORAGE**

- **MacStack SD40** CMS Enhancements
- **MacStack SD20** CMS Enhancements
- **Apple Hard Disk 40SC** Apple Computer
- **MacStack SD80** CMS Enhancements
- **MacStack SD30** CMS Enhancements

### ADD-IN BOARDS/MEMORY

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**ADD-IN BOARDS/MEMORY**

- **Pivot Radius**
- **Macintosh Display Card 8×24** Apple Computer
- **ColorBoard 264** RasterOps Corporation
- **Apple 1MB Memory Expansion Kit** Apple Computer
- **Radius TPD Interface** Radius

### EDUCATION SOFTWARE

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**EDUCATION SOFTWARE**

- **Where in the World Is Carmen Sandiego?** Broderbund Software
- **Reader Rabbit** The Learning Company
- **Where in Time Is Carmen Sandiego?** Broderbund Software
- **Where in the USA Is Carmen Sandiego?** Broderbund Software
- **Math Blaster** Davidson & Associates

### UTILITY SOFTWARE

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**UTILITY SOFTWARE**

- **SAM II** Symantec Corporation
- **SUM II** Symantec Corporation
- **Norton Utilities for the Macintosh** Symantec Corporation
- **Pyro** Fifth Generation Systems
- **Macintosh Tools Deluxe** Central Point Software

### ENTERTAINMENT SOFTWARE

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**ENTERTAINMENT SOFTWARE**

- **Tetris** Spectrum HoloByte
- **SimCity** Maxis Software
- **Widelris** Spectrum HoloByte
- **Beyond Dark Castle** Silicon Beach Software
- **MacGolf** XOR/PCAI

### NETWORK/DATA COMMUNICATIONS

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**NETWORK/DATA COMMUNICATIONS**

- **TOPS** Sitka Corporation
- **AppleShare** Apple Computer
- **Timbuktu** Farallon Computing
- **White Knight** FreeSoft
- **Netware for Macintosh** Novell

### PRODUCT WATCH

Recent or forthcoming products of particular interest.

- **Microsoft Mail 3.0** Microsoft Corporation
  An update of the popular electronic mail system
- **The Clipper** Jasmine Technologies
  A 2½-inch miniature drive
- **Aldus FreeHand 3.0** Aldus Corporation
  A new version of the illustration program providing greater accuracy and new features such as flicker-free drawing

Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order vendors. Covers sales during November 1990.

*Does not include hard drives installed at the factory.*
FOR THE FIRST TIME, THE PRODUCT JUDGED BEST IN JAPAN WASN'T MADE IN JAPAN.

For 33 consecutive years, the Japanese government has awarded the "G-Mark" Grand Prize to the best product sold in Japan. It's a formal recognition of extraordinary product design, function and quality.

And, for 33 consecutive years, products from innovative companies like Sony, Nissan, Honda and Canon have won. Now, for the first time, Japan has bestowed this honor upon a foreign product: The 1990 G-Mark Grand Prize has been awarded to the NeXT™ Computer System.

"Congratulations to NeXT Computer on being the first American company to win this prestigious award," said U.S. Secretary of Commerce, Robert Mosbacher. "In this achievement, NeXT has raised the bar for other U.S. manufacturers."

We sincerely thank Japan's Ministry of International Trade and Industry for selecting the NeXT computer from more than 1200 products from 391 companies. It's just the sort of encouragement every young company can use.

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Circle 299 on reader service card
You’re tripping over your keyboard. Your CPU needs its own desk. Your monitor is too low. That report you’re working on has vanished. Paper is everywhere.

But don’t give up. What you need is some help from Kensington. Increase valuable desk space with our new Keyboard Shelf for the compact Mac, or with Keyboard Slideaway® for the Mac II.

Both do more than just get your keyboard out of the way.

Keyboard Shelf’s recessed storage compartment is ideal for holding pens, disks and other desk items. And Keyboard Slideaway extends a narrow desktop into a wider workspace.

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For the compact Mac, there’s Maccessories® Tilt/Swivel. With it, you can rotate your Mac up to 100° and tilt up to 16° for just the right viewing position. And unlike other tilt/swivels, we’ve combined heavy duty plastic and high density polyethylene for an ultrasmooth movement.

What’s more, Kensington’s products fit right in with the design of your Mac. The styling is complementary. The colors identical. Even the same materials are used.

Kensington.

Because you can’t work efficiently if your space doesn’t work.

For a free brochure and the dealer nearest you, call 800-535-4242. Outside the U.S., call 212-475-5200.

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