THE BEST

MAC PRODUCTS

Readers choose the winners
of our 4th annual World-Class Awards Contest
Some think there's no all Microsoft applications. The same thing about

Nobell Chem Revenue Potential
Product Portfolio Breakout

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>High Growth Markets</td>
<td>15</td>
<td>25</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>Medical Applications</td>
<td>30</td>
<td>39</td>
<td>46</td>
<td>51</td>
</tr>
<tr>
<td>Industrial Applications</td>
<td>45</td>
<td>64</td>
<td>86</td>
<td>111</td>
</tr>
<tr>
<td>Total Revenue</td>
<td>81</td>
<td>102</td>
<td>126</td>
<td>151</td>
</tr>
<tr>
<td>% of Total</td>
<td>45%</td>
<td>37%</td>
<td>32%</td>
<td>29%</td>
</tr>
</tbody>
</table>

During the past twelve months, the Nobell Chem Corporation pulled far ahead of the competition, through the diverse and strategic marketing of its Nitro Glycerin compound.

Nitro (Nitro) Glycerin was discovered in 1847 by Ascanio Sobrero and commercially developed by Pierre Dumas. It has long been used in the manufacturing process of dynamite.

As a result of this development, Nobell Chem is now expanding their distribution channels.

Explosive Growth Potential

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</tr>
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<tbody>
<tr>
<td>Industrial Applications</td>
<td>15</td>
<td>25</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>Medical Applications</td>
<td>30</td>
<td>39</td>
<td>46</td>
<td>51</td>
</tr>
<tr>
<td>Total Sales</td>
<td>81</td>
<td>102</td>
<td>126</td>
<td>153</td>
</tr>
</tbody>
</table>
If you own a Mac® you may already know what a phenomenally powerful piece of software Microsoft® Word is.

And, most likely, you're also aware of how powerful Microsoft Excel is. Well here's something you probably don't know:

When Word and Microsoft Excel are combined, they're even more powerful. In fact, they're nothing short of explosive. Pun intended.

Because together Word and Microsoft Excel allow you to exploit the Macintosh's operating system in a way that has never been possible before.

We call this unprecedented feature "warm links." But you'll be more inclined to call it the best thing for revising documents since white out.

Here's how warm links works. Imagine it's the end of the day and tomorrow's the BIG presentation. You've been working with the sales manager to incorporate his Microsoft Excel projections into your report. You're finally done. But wait. Suddenly Microsoft's Mac applications mean We can get the most out of the Mac since the beginning. Which means what the Macintosh have an unusually close relationship. We've been involved with the Mac since the beginning. Which depends on these and the rest of the Microsoft line of business applications, that are always designed to get a powerful reaction from each other. And your Macintosh.

For a free brochure that describes how you can improve productivity by using Microsoft's Mac applications together, call (800) 541-1261, Dept. K29. Ask about The Microsoft Office—four of Microsoft's best-selling business applications at a great price.
And the winners are ... Once again, Macworld readers have cast their votes for their favorite Macintosh products. See page 162 for this year's recipients of our annual World-Class awards. (Photo by David Bishop.)
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EPSS Teacher's Assistant 1.1,
Grade Machine 3.0, and MakeTest 1.1.1.
All video display terminals (VDTs) emit electromagnetic radiation (EMR) through the screen. The photo on the left is a visualization of EMR in red from the screen. The photo on the right shows that the NoRad Shield™ virtually eliminates screen-emitted E-Field EMR and better than half of magnetic EMR*

**NoRad Radiation Shield**

No One Comes Close

**SHEILDING TECHNOLOGY COMPARISON TO 1 GHz**

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- **Glass/Acrylic**
- **NoRad Shield**

Figures are based on independent lab tests conducted to Military Specification MIL-STD 285 of the NoRad Shield™ and other commercially available radiation-blocking screens.

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- And, the NoRad Shield™ discharges the static field while eliminating glare and reflections.

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Circle 468 on reader service card.

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*Greater than 90% E-field attenuation above 30 KHz.

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FastPath, the original LocalTalk to Ethernet gateway, is now part of the Shiva family of breakthrough multi-vendor networking products. We've agreed with Novell to assume exclusive manufacturing, marketing and support of all FastPath products. Which means FastPath users can count on the same great technical, upgrade and warranty support Shiva customers have been getting for years. Plus exciting new FastPath products and capabilities in the future.

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by Shiva
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155 Second St., Cambridge, MA 02141

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Once again, Radius turns display technology on its ear. Introducing Pivot™, the first display that goes from portrait to landscape with only a gentle push. The new Pivot is the first display that changes orientation, in real time, to match the format of your project. For example, when you’re writing a manuscript, you can see a full page in portrait position. And when you switch to spreadsheets, you can rotate Pivot to view all twelve months.
levels of gray are furnished, with upgrades to

16 levels for near-photographic quality images.

Ideal for graphic design and desktop pub-

lishing. • Pivot is compatible with virtually
every Macintosh application and may be used

with either the SE/30 or Macintosh II family.

• To find your nearby Radius reseller,

phone 1-800-227-2795. Then, before you buy

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amazing way to look at things from Radius.
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Logs software & hardware activities
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Prevents launching of unauthorized programs
Multiple levels of Users with individual/group access controls
Specific Desk Accessory Control
Multiple encryption/password options

A.M.E. is an integrated security program. Whether your concerns are managing a confidential government project, maintaining order on a Mac™ used by many people, or just preventing your child from destroying financial records, A.M.E. has a solution for you. It runs quietly in the background and is always there to protect you. The easy-to-use interface lets you set up the Mac with just the kind of security you require.
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Introducing Correct Grammar for the Macintosh—the powerful word processing add-on that checks each sentence, highlights mistakes, suggests corrections... and helps you add clarity to all your writing.

System Requirements: Macintosh with 1MB of RAM and hard disk; System 4.2 or higher; Compatible with Microsoft Word 3, 4; MacWrite; MacWrite II; WordPerfect; WriteNow 2.0; Microsoft Works; Microsoft Writer; Quick-Letter; Acta Advantage; and any text-only document.

Take advantage of this limited-time offer before November 30, 1990 by calling 1-800-543-3873 and ask for Operator 711. Or see your local software dealer.

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The Vest-Pocket Writer's Guide—based on The American Heritage Dictionary. A handy 250-page guide to more effective writing for business, home or school. Fits in your pocket!

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- [ ] No, thanks.

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- [ ] Check enclosed
- [ ] Charge to my: [ ] Visa [ ] MasterCard

SIGNATURE

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COMPANY/INSTITUTION (IF APPLICABLE)

ADDRESS (HOME/BUSINESS)

CITY

STATE & ZIP

PHONE NUMBER

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Think of it as the office Mac you can take home with you. Or the Mac for the home that’s capable enough to use at the office. Either way, this is the Macintosh that gives you the freedom to work where you can get the most work done. The Macintosh Portable.

The Portable is, first and foremost, a full-fledged, completely compatible Macintosh. It’s got the standard Mac keyboard, and comes with a page-width screen. It’ll run all the same programs you’re currently using, at twice the speed of our best-selling Macintosh SE. And, just as important, it plugs into any Mac peripheral.

There’s also the added benefit that since you’ll always be using the same computer, your desktop and programs will always be set up just the way you like them. Complete with the most current version of all your work.

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The only table built around the Macintosh.

A special pocket fits your Macintosh SE or Plus like a glove. Other configurations support Mac IIx.

MacTable assembles in minutes.

Roll-away cabinet (in front of table)...

MacTable's four surfaces are interchangeable, and meet Macintosh modular design specifications.

Each rock-solid surface can be level, or tilted to a slight angle for maximum comfort.

The sturdy crossbeam features a cable track to keep cords and wires safe and untangled.

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Each rock-solid surface can be level, or tilted to a slight angle for maximum comfort.

The sturdy crossbeam features a cable track to keep cords and wires safe and untangled.

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The MacTable can be ordered from any Mac store or mail-order source.

MacTable is available in two sizes:
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- 46" MacTable...

A MacTable assembled in minutes.
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Introducing Symantec AntiVirus for Macintosh (SAM™), Version 2.0.

The original version of SAM just locked up the 1989 Eddy as “The Best AntiViral Program” you can buy. Now with added protection and security, new SAM 2.0 is even more effective.

And more essential. Because, when your business is at stake, no amount of protection is too much.

SAM finds and destroys all known viruses and clones. It also protects you from new, unnamed viruses by constantly scanning for suspicious virus-like activity. And only SAM 2.0 protects you with instant virus updates from our exclusive 24-hour Virus Newsline.

To keep viruses from ever becoming a problem, SAM keeps them out. SAM prevents any infected application from launching and spreading a virus, and detects “Trojan Horse” attempts to damage a disk. It checks every floppy or removable you insert, and just touch a hot-key to check files downloaded from networks or by modem.

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That's right. For the third year running, the readers of Macworld magazine have voted the Kensington Turbo Mouse® "Best Input Device" for Macintosh® computers. Who were the contenders? Every other trackball and mouse on the market. (Not to mention joysticks, keyboards and graphics tablets.) The winning secret? Simple.

Turbo Mouse is quicker, quieter, and easier to use. It delivers the winning combination of speed, precision, two buttons with extra features, and a comfortable, space-saving design—all for just $169.95.

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Booth 5312
Why pivot when you can click?

The 19" L-View® Multi-Mode™ display system lets you move your mouse, not your monitor, to select the perfect display mode for every job in your company.

Gimmicks aside, what you really need is a display system that gives you the best possible view for each of the applications you use. And that's what you get with the L-View Multi-Mode from Sigma Designs. Whether you work with spreadsheets or CAD, graphics or text, desktop publishing or word processing, L-View Multi-Mode lets you choose the best ways to display them...for the way you want to work.

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There's more. Pop-up menus, Multiple cursor and menu bar sizes. A screen saver. And a screen capture utility.

L-View Multi-Mode's 19" landscape monitor maximizes your display area, incorporating state-of-the-art technology for the highest image quality. Refresh rates of up to 92 Hz assure you of solid, flicker free images.

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So get what you want, when you want it for the Macintosh Ixxx family of computers.

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135,000-WORD SPELLING CHECKER
WriteNow also has the largest—and fastest—spelling checker of any Macintosh word processor.
WriteNow 2.2—still the word processor of choice!

Quick Comparison of Leading Word Processors

<table>
<thead>
<tr>
<th></th>
<th>WriteNow 2.2</th>
<th>MacWrite II</th>
<th>Works 2.0</th>
<th>Word 4.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk space needed: (3) 20MB</td>
<td>Hard disk</td>
<td>Hard disk</td>
<td>Hard disk</td>
<td></td>
</tr>
<tr>
<td>Thesaurus (size in words): 1.4 million</td>
<td>200,000</td>
<td>No</td>
<td>200,000</td>
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</tr>
<tr>
<td>Spell Checker (size in words): 135,000</td>
<td>100,000</td>
<td>60,000</td>
<td>130,000</td>
<td></td>
</tr>
<tr>
<td>Mail Merge: Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Fonnat Accelerators: Yes</td>
<td>Limited</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>Multiple Header/Footer: Yes</td>
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<td>No</td>
<td>Yes</td>
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<tr>
<td>Extensive Undo: Yes</td>
<td>No</td>
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</tr>
<tr>
<td>Retail Price: $199</td>
<td>$240</td>
<td>$295</td>
<td>$395</td>
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</tr>
</tbody>
</table>

Quick Comparison Charts (in seconds)

<table>
<thead>
<tr>
<th></th>
<th>Search</th>
<th>Copy &amp; Paste</th>
<th>Reformat &amp; Undo</th>
<th>Spell Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>WriteNow 2.2</td>
<td>3 sec 30 sec</td>
<td>10 sec 15 sec</td>
<td>10 sec 15 sec</td>
<td>10 sec 15 sec</td>
</tr>
<tr>
<td>MacWrite II</td>
<td>5 sec 45 sec</td>
<td>20 sec 30 sec</td>
<td>20 sec 30 sec</td>
<td>20 sec 30 sec</td>
</tr>
<tr>
<td>Works 2.0</td>
<td>5 sec 45 sec</td>
<td>20 sec 30 sec</td>
<td>20 sec 30 sec</td>
<td>20 sec 30 sec</td>
</tr>
<tr>
<td>Word 4.0</td>
<td>5 sec 45 sec</td>
<td>20 sec 30 sec</td>
<td>20 sec 30 sec</td>
<td>20 sec 30 sec</td>
</tr>
</tbody>
</table>

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Circle 332 on reader service card
Watching the Macs at Work

Two utilities for tracking and controlling how Macs are used have gone through changes recently. With Quota (formerly the shareware utility DoppleMaker), a network manager can limit how many copies of an application are launched (to avoid exceeding license agreements), prevent users from making unauthorized copies of applications, and compile usage reports. Pricing depends on network size. For more information, call Proteus Technology at 408/426-6794. SoftView's MacInUse records everything a Macintosh user does, and can monitor an entire network without users knowing. Version 3.0 adds the ability to record the names of data files used and to track several applications running under MultiFinder. It lists for $99. For more information, contact SoftView at 805/385-5000.

MacNXI Talks UNIX with Macs

UniPress Software's MacNXI puts a Mac interface on access to E-mail and files on UNIX servers. Icons represent standard UNIX file types, binary files can be transferred both ways, and folder relationships are maintained in the UNIX directories. MacNXI provides print spooling and can run in its own partition under MultiFinder. MacNXI also provides terminal emulation and supports most Mac-to-UNIX server hardware, including Kinetics' FastPath and Cayman Systems' GatorBox. For more information, contact UniPress at 201/985-8000.

New Entry-Level Stat Package

FloStat, a new $99 package named in honor of Florence Nightingale for her use of statistics to promote health care a century ago, combines mapping and graphics with statistical analyses, including one-way ANOVA, t-test, correlations, simple regressions, and others. Its Maplink feature lets you link data with maps in PICT format (it comes with a collection of maps), and it generates a variety of standard tables and graphics. For more information, contact Population and Society Research Center Software at Bowling Green University, 419/372-8648.

Touch Talks

Touch Communications and Infonet have announced products for accessing the emerging worldwide E-mail system based on the X.400 standard. Touch's Worldtalk, which requires a UNIX server somewhere on an organization's wide area network, is a collection of gateways connecting QuickMail, Microsoft Mail, and InBox Plus on the Mac; cc:Mail and Action Technologies' MHS under DOS; and SMTP and UUCP in the UNIX world. Infonet is developing a gateway to link Worldtalk with Infonet's Notice 400, an E-mail, fax, and telex system available in most countries. Infonet is also developing gateways from Notice 400 to MCI Mail and Atlas 400. For more information, contact Touch Communications at 408/574-2500 and Infonet at 213/335-2600.

Capture Upgrade Planned

Mainstay Software's screen-dump utility Capture is being upgraded to version 3.0. Users can set it to automatically scale a captured image by setting a percentage in the Capture Control Panel window, with a new option that can capture the cursor. The new version is being written for compatibility with Apple's future hardware and system software. Capture lists for $79.95. For more information, contact Mainstay at 818/991-6540.

Fresh-Squeezed Images

Kodak is shipping ColorSqueeze, an application that compresses hard-disk-hogging 24-bit color images. ColorSqueeze's compression algorithm deletes redundant pixels and frequencies invisible to the eye, reducing 24-bit PICT and TIFF files to anywhere from 1/2 to 1/40 of their normal size with almost no visible degradation of image quality, according to Kodak. It takes about 40 seconds to compress a 768K file on a Mac IIx, and a thumbnail representation of the original file accompanies each compressed file. ColorSqueeze lists for $179. For more information, contact Kodak at 716/726-3437.

What's new in Motion Control?

The Virtual Instrument Library for Motion Control from nuLogic is a set of programs for monitoring and controlling motion of test equipment, materials handlers, robots, and similar devices in three dimensions. The $195 Library consists of more than 120 virtual instruments (software-only data-acquisition and control devices). The Library requires National Instruments' LabView 2 instrumentation program and nuLogic's $1795 nuControl Board, a three-axis, servomotor controller board that operates devices. The nuControl Board is designed for Mac IIs-series machines and works with other appli-
Service Bureau Group to Form

The National Association of Desktop Publishing Professionals is planning to hold its first meeting in the Sheraton Towers' Commonwealth Room on Friday evening, August 10, from 7 p.m. to 10 p.m., during the Macworld Expo in Boston. The organizers hope the association will give the country's estimated 800 to 1000 service bureaus some clout with desktop publishing software companies and high-end hardware companies. They plan to address such issues as the industry-standard 90-day warranty on imagesetters and the lack of diagnostic tools for imagesetter owners. For more information, call Van Tanner at 919/855-0400 or Bill Crider at 602/398-3200.

Cloud Over the 68030 Clearing Up

In late June a federal judge granted a temporary stay that allows Motorola to continue selling the 68030 microprocessor, which is the central processor for the Macintosh SE/30, IIx, IICx, IIGP, and IItx. Previously, another federal judge had ordered Motorola, based in Schaumburg, Illinois, to stop selling the 68030 because it infringed on patents held by Japan's Hitachi. A spokesman for Motorola said the two companies had asked for the stay jointly as part of a "framework of an agreement," between Motorola and Hitachi. The spokesman would not comment on the terms of the pending agreement.

Apple Talks It Up

In a move likely to promote AppleTalk as a computer-industry standard, in June Apple Computer announced plans to license the source code to developers. The licensing will allow non-Mac vendors to take advantage of AppleTalk as an existing low-end networking standard. The fee for the object code is $10,000; for the source code, $40,000; for the source code with the right to sublicense, $40,000, plus $20,000 for each sublicensing. Apple will charge a $500 annual maintenance fee for upgrades. For more information, contact Apple Software Licensing at 408/974-4667.

HP Cuts DeskWriter Price

Hewlett-Packard announced in July that it cut the price of its HP DeskWriter ink-jet printer by $200 to a list price of $995. The DeskWriter, which started shipping in July 1989, is a 300-dpi resolution, QuickDraw-compatible printer. For more information, contact Hewlett-Packard at 800/752-0900.

Apple Comings and Goings

Apple Computer announced in late June the appointment of Robert Puette as president of Apple's USA division, and the departure of Donald P. Casey, vice president of networking and engineering. Puette, who started his presidency in July, was general manager of Hewlett-Packard's PC Group from 1981 to 1990. Casey, who had been with Apple since 1984, left to become vice president of Lotus Development Corporation's new spreadsheet division.

Claris: To Apple Forever

Apple has apparently decided to keep a tight grip on software development for the Macintosh. In 1987 mounting pressure from other software vendors convinced the hardware company to stop selling Apple-labeled software and to create Claris as a subsidiary with an eye to spinning it off as a separate company. Apple now plans to keep Claris, which is believed to be the second largest Mac software vendor after Microsoft. (As a subsidiary of Apple, Claris does not release its own sales figures.) Apple CEO John Sculley said Claris will continue to develop applications and will begin to develop "extensions" to Apple system software and tools for multiplatform connectivity. Claris may license the latter to third-party developers. Bill Campbell, who was with Apple before Claris was formed, will continue as Claris CEO.

Lotus Wins Interface Suit

Lotus Development has won its look-and-feel copyright infringement suit against Paperback Software International. In the late June decision, U.S. District Court Judge Robert E. Keeton stated that copyright protection applies to the graphics, menus, and commands of a software product, not just to actual program code. Wrote Keeton: "The user interface of 1-2-3 is its most unique element, and is the aspect that has made 1-2-3 so popular. That defendants went to such trouble to copy that element is a testament to its substantiality." Lotus's victory is likely to have a major impact on Apple's pending suit against Microsoft for alleged infringement of the Mac interface by Microsoft Windows. The week after the judgment, Lotus initiated similar lawsuits against Borland, which markets the DOS spreadsheet Quattro, and the Santa Cruz Operation, which markets the UNIX spreadsheet SCO Professional.
MegaMac™ Makes It Affordable.

These days it seems like Apple is introducing computers quicker than you can say 'Macintosh.' Trouble is, most of the new Mac models sport some pretty lofty price tags. And that, of course, only puts 'the power to be your best' further out of reach of most Mac enthusiasts. At least until now...

Introducing the MegaMac™ Solution.

Here's good news for aspiring Macintosh power users everywhere. Connect a NewCo Technology 50MHz MegaMac™ to your existing Mac SE/SE 30 or any Mac II and you may never again have to bow your head in reverence to a faster and more expensive Mac.

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Apple Should Have Invented This.

If you're thinking the MegaMac is just another 'accelerator' board, think again. The MegaMac is a totally self-contained CPU Performance Extender — with its own memory, microprocessor and power supply. There's even an internal, 'fx' style Processor Direct/NuBus expansion slot and dual compartments for installation of up to 400 megabytes of high performance disk storage.

Unlike some old-fashioned accelerator boards that require tricky Macintosh circuit modifications, the MegaMac connects to your Mac via a snap-in NuBus accessory card. There's no soldering, no voiding your Apple warranty and no complicated software to install. Just plug it in, switch on your system and enter a whole new world of 'power' computing.

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“Go to a dealer and try it.”

What It's Like to Buy a Mac Product

WHY SO MANY PEOPLE SWITCH TO MAIL ORDER

BY JERRY BORRELL

In the spring a young man's thoughts turn to . . . software. That probably says something more about me (not so young) than it does about amour. For months now, I have been looking for an opportunity to visit computer stores and see what is happening there. Too frequently press types forget what it's like for the average person who has to buy computer products. I wanted to remember.

So on one of San Francisco's all-too-infrequent bright mornings I set out to explore the world of Macintosh as seen through the eyes of people who visit computer stores. I started off for the dealer nearest my home, the Egghead Discount Software store on Lombard Street. That's the street that leads to the Golden Gate Bridge. I've always thought of that end of town, near the bridge, as the end of the earth, or at least where you begin the journey to the state of mind known as Marin County. I wasn't expecting much as I pulled out of the traffic rushing to the bridge and parked next to the store. I pulled on the store door and . . . it was locked. Good grief, they don't open till 10 a.m., I thought. What in the devil am I going to do till they open?

I avoided the magazine store nearby, where I knew I could lose the entire morning, and instead bought some coffee and walked for a while.

By the time I returned two others were waiting. Together we paced. An auspicious start, I thought, people waiting at the door for the store to open. One store window contained huge posters for Windows 3.0 and some Microsoft cartons. Another was empty, forlorn looking (waiting for Windows applications, I guess).

By the time the store actually opened there were four of us waiting to get in and do something involving computers. Franchise, I thought as soon as I was inside. Everything had a place. Every square inch was planned.

It was like a video-rental chain—my expectations went down a notch further. Egghead stores, apparently, are divided into accessory areas at the front of the store, IBM software in the second third, and Apple/Mac in the back. Under a card labeled Apple/Business was education software for the Apple II. Under a Mac business label was Mac music software. Never mind, I had found my section. Software at Egghead is organized by subject area. It's not indicated by any label, but there is a logic to it. Microsoft and Claris labels dominated the shelves, but there were other products to be found. In word processing Microsoft Word, MacWrite II, and WordPerfect were visible. WriteNow and Nisus were missing.

As I perused the shelves, two other customers found their way to the Mac shelves as well—and immediately picked up Coda Music Software's Finale. Chatting away in a Scandinavian language, the couple turned the box over several times. Then a young man arrived, a store employee. "Is this version 2.0?" they inquired. The staffer responded politely that it could be determined by opening the package and looking at Get Info under the File (continues)
COMMENTARY

A Factory Tour

I set off for downtown San Francisco. In the heart of the city's financial district, opposite the Pacific Stock Exchange. Tall buildings. No parking. Cold wind blowing down concrete and glass canyons. Across from the exchange is a Computer Factory store. Inside was a cavernous space broken up occasionally by a desk where busy people sat on the phone, typing, talking to one another. No customers at all—but there was obviously business being done. In the back was a wall of shelves covered with software. On closer investigation the wall looked like a Soviet department store—lots of the same products in different places. Maybe 15 different software packages perched on the shelves. Microsoft and Claris dominated the space. And Ashton-Tate's FullWrite, with a prominent yellow tag announcing the special price of $395.

That reminded me of a computer store in Cupertino, on De Anza Boulevard, in view of the Apple skyscrapers (tall buildings are a relative thing in Cupertino), that seems to take pride in stocking products from defunct developers. I'm always curious at the thought of people buying a product for which there will be no technical or customer support.

I walked around the Computer Factory's kiosks like area that housed Mac products. An SE, a Radius monitor, Apple scanner, HP printer, Apple CD player, and a Mac IIx (not turned on). Also some promotional materials for Microsoft. No one asked if I needed help. No one seemed to notice me. Cartons of computer products on hand trucks were shuttled by. It was nice to be able to browse around, but it wasn't the same feeling as walking around in a bookstore where you enjoy being left alone—rather, I felt ignored. I could tell that things were happening in the store. I could see an area where training takes place. I imagine the store provides wonderful sup-

(continues)

had advice, and sent out in a state of confusion—my own experience in the past. The day was still young, but I left the store hopeful. Polite, knowledgeable, helpful staff selling lots of current Mac products.

ComputerWare sells only Mac-related products.

menu, which he did. At this point I edged closer to the conversation. "Version 1.2," said the male half of the couple. "Do you know where we can find 2.0?" And to my surprise, the Egghead staffer responded, "There's a music software store down on Mission; they'll probably have it. I'll call down there and check for you."

That pretty much won me over—this guy was passing over a sale of a few hundred dollars. Another customer found his way to the Mac software. "Hey. Do you have a spell-checker for the Mac?" he asked. A quiz followed, the salesman inquiring what word processor he used (MacWrite 4.0) and what he needed to do. "Thunder will do it. It's a DA that will run with MacWrite."

That told me a lot. The salesman didn't give a pitch for MacWrite II, which has a powerful spelling checker. He focused on solving the customer's problem. I was still impressed. The phone rang—it was someone wanting to know how to print a page on a 3 by 5 card from a Mac DTP program. That stumped the salesman, who asked the manager, and they both got on the phone to suggest a solution.

At that point I had to ask myself why they bothered to stock IBM products at all since they were only doing business on the Mac. The answer of course is that Egghead is a franchise. They have stores all over and lots of PC users, so there would be periods when all the customers wanted PC software. I was surprised to see that PageMaker was not being shown, so I asked. "Oh, they announced 4.0 so we pulled all of the 3.0 off the shelf and sent it back to them," the salesman said. "We'll get 4.0 in a few weeks."

This kind of approach is not what I had anticipated. I expected a kind of Gothic horror story in which people walked into stores, were abused, given...
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COMMENTSARY

Egghead Redux
Then I went to another Egghead store—one I had always wanted to visit because of a celebration lunch I’d had with Victor Alhadef, one of the founders of the chain, the day it opened. The store was really jammed with accessories up front. Lots of suits on customers. This store was different from the first. It had computers for sale as well. Back in the Mac section, two women stood conversing over a PC clone of some sort. The saleswoman was explaining to the customer that because IBM computers were cheaper you could get more computer power for your money. And the interface that made the Mac so useful was now available on the PC. I peeked over her shoulder at the Windows screen—at the muddy icons and folders. The saleswoman went on to tell the customer about all five of the applications available under Windows 3.0 and to say that more would be available in September. The customer asked something again about a Mac and received another answer about the PC. Nearby sat a Mac II, not even turned on.

In another aisle a man in a business suit was asking about OCR software for the Mac. The salesman’s reply was “Do you have access to a PC?” “No, I want to read documents for my Mac.” “Well, we have this scanner,” the salesman pulled out one of the new hand-held scanners, “but it’s really for pictures.” “Do you mean that there is no software that allows me to do OCR on the Mac?” I gently interrupted and offered the names of several Mac products that allowed for OCR input and suggested that a flatbed scanner would be needed, then disengaged myself from the conversation.

More Visits
Next door to this Egghead is a Tek Computer store. Dark, a little gloomy. There were PC clones on tables. A few printers. And Macintosh boxes. Old MacPaint boxes were on the shelves. Real old. Boxes that proclaimed that the product could be used on a Plus, a Mac XL, and a 512K Mac. And Mac-
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COMMENTARY

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Paint in Claris boxes as well. Version 3.0 of PageMaker with its label proclaiming NEW. A hodgepodge of Apple II, PC, and Mac software. I overheard training going on upstairs and questions being asked that made me want to go up and offer answers. I left in a hurry. The day was getting old.

Elsewhere in town I found the Computer Selection Business Center, an Apple authorized dealer. I asked if they sold PCs and was told that the store sold only Macs. The software selection was better than that of the Computer Factory, but still a little sparse. They had Datacopy’s OCR software, which would have helped the fellow at Egghead. Business Class from Mediagenic was still on the shelf, even though it was withdrawn from the market last year. There was no PageMaker on the shelf—I hoped this was a sign that they, too, were awaiting the new version.

The store had kiosks divided up into work areas: networking, engineering, page makeup, business. Most of the work areas were empty, with no equipment available to match the labels. The two salesmen were bantering and, after trying to help me, went off to a kiosk to play MacGolf. I took that as a good sign. There was a training room for DTP, and a product demonstration was in progress. I and the trainee were the only customers during my visit. I had the feeling that I could find help here, but that resources beyond major products and CPUs were limited.

Next I was off to ComputerCraft, the chain store where in 1984 I had surrendered a check for $4000, all of my savings, to buy a PC so that I could finish a novel. I made one of the largest purchases of my life in 20 minutes. The store salespeople there were quick, fast, efficient. This ComputerCraft was big-time. Really business oriented. Three little island-kiosks displayed the different families of computers that were sold—NEC and other clones, Compaq, Next, and Apple. They had an SE/30 with an 80MB hard disk for $479, an IIfx with 4MB of RAM and one floppy drive for $8969. A Iici with 4MB of RAM and a 160MB hard disk went for $10,969. Basically, the store had Claris and Mi-
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If you'd rather forget your driver's license than your Day Runner, meet Dynodex.

Dynodex doesn't replace your organizer — it enhances it. Dynodex manages your names then prints them directly onto your organizer's size paper (included). Just insert and go.

Print out special lists like, “All Prospective Clients in California.” Or, “Everyone except the ones I can't imagine ever calling again.” And remember, if heaven forbid, you should ever misplace your organizer, your master list will still be in your Mac.

If you’re convinced that your organizer and Mac should meet at last, call (800) SAY-DYNO for a personal introduction.

Because you gotta go...now. Dynodex

A few more reasons to move over to Dynodex 2.0:

- Dial any number directly from your Dynodex desk accessory without leaving your work.
- Print single- or double-sided pages.
- Print out labels, envelopes, and Rolodex® cards.
- Import names from any text file. Dynodex even comes with a special stack to retrieve Focal Point® or HyperCard® Address names. There's no need to reorder your info.
- Export names to any application. Joe Dynodex as a mailing list with form letters.
- Dynodex is compatible with nearly all personal organizers, including Filefax, Day Runner, and Day-Timer®.
- All registered owners receive $25 off selected Filefax products.

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You know what it's like. If you're in graphic arts, you know there's a lot of grunt-work. Like rubbing-down type. And tracing and filling letters to comp-up headlines. Trying to get true colors from a junkyard of dried-out markers. Inking and re-inking rules and borders because of clogged pens. T-squaring elements to be sure they're aligned and square. Counting characters. Spinning proportion wheels. Tracing off the Lucy. Wouldn't it be nice to spend more time exercising your brain instead of your wrist? Exploring concepts? Refining layouts? Trying "What if" design options? Or experimenting with color combinations?

That's exactly what you can do using today's advanced layout, design, and illustration programs, the Macintosh II™ family of computers and a CalComp DrawingCard™ display system.

CalComp large screen displays help you get the most from your Macintosh. For one thing, they never let you lose sight of the big picture. DrawingCard is the first 21" system to give you two full pages of color side-by-side at actual size. That's critical when you're designing double-truck ads, brochure spreads or creating a large horizontal illustration.

DrawingCard's flat screen eliminates distortion and with its excellent resolution and contrast you can see the effect of small changes in the colors right on the screen. Or evaluate the visual effect of half-point variations in type size and leading. You can even see the precise amount of letter overlap when you set your headlines "tight and touching."

And with DrawingCard displays, what you see on the screen is what you get on your printer because screen resolution is true 72 dpi.

See Us at MacWorld Expo Boston, Booth #1022 Bayside
There are three DrawingCard systems to choose from. Our 8-bit GrayVision display system with 256 shades of gray is ideal for desktop publishing and design projects using line art and black-and-white halftones.

Our 8-bit ChromaVision system with 256 colors is the perfect match for the great majority of desktop publishing, design and illustration projects where 4-color reproduction is needed.

And our 24-bit ChromaVision Plus system (shown above) with 16.7 million colors is the ultimate display where color accuracy is especially critical such as color retouching.

DrawingCard display systems are just one way CalComp, a worldwide graphics leader, supports the arts on Macintosh. There's also WIZ, a new mouse system that combines the features of a traditional mouse with the power of a graphics pad. Plus a complete line of high-performance printers.

So stop using those antique hand tools today. After all, the graphic arts should be full of inspiration, not perspiration. For more information about DrawingCard displays, call:

1-800-CalComp.
In Canada, call: (416) 635-9010

Circle 122 on reader service card

We draw on your imagination.
COMMENTARY

upstart in the South of Market area of San Francisco called Macadam. There, in one of the old brick warehouses that line the sides of the street, is the computer-dealer equivalent of the old concept of cafe-bookstore. The kind of place where you could go and order some coffee, maybe even a sandwich, and sit and read the books. The kind of place where steaming coffee in a thick white mug and rich color plates in travel books beckon you to sit and spend the morning thinking about where you might like to go for your next vacation. The kind of place where the proprietor knows the title and location of a book that a person like you or I would probably want to read.

Tom Santos, four colleagues, and his two dogs preside over just such an emporium, stocked with the Macintoshes that he has collected over the last six years. Little alcoves are set up with equipment and software. Each alcove features some different subject area: music, DTP, engineering. Real people come into the store and sit and work at computers that they cannot afford to buy. There is a lot of current software on the shelves in the center of the store. Copies of back issues of Macintosh magazines line the walls. I carried a soft drink into the store and wandered around while waiting for Tom. The huge wooden rafters of the high ceiling and the industrial carpet give the place a quiet, slightly worn feeling. Printers from various manufacturers hum away in odd corners. Designer cases for Macs and hard drives sit on shelves. It’s the sort of place people come into on weekends to argue the merits of the latest version of popular software.

So?
The truth of the matter is that there are many good stores out there, but few people know how to find them, or have the time, or are patient enough to wade through all the bad stores to find a good one.

And so mail-order purchase, at least for software, thrives. Just as it did in the PC marketplace. And most people will never have the joy of sitting down with a coffee and Tom Santos as he waxes technical over the latest version of some product.
How Does Our High Density Drive Stack Up Against Apple’s?

<table>
<thead>
<tr>
<th>Drive Manufacturer</th>
<th>APPLE</th>
<th>AE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDHD (read/write MS-DOS, ProDOS)</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Sony mechanism</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Manual and auto eject</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>FCC certified design</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Apple-standard footprint</td>
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<td>yes</td>
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<tr>
<td>ABS plastic case</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Apple-standard platinum color</td>
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</tr>
<tr>
<td>2-color read/write indicator</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Full daisy-chain compatibility</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Custom molded DB-19 cable</td>
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<td>yes</td>
</tr>
<tr>
<td>800K capacity</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>1.44 MEG SuperDrive capacity</td>
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<td>yes</td>
</tr>
<tr>
<td>One year warranty</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Worldwide dealer sales &amp; support (over 2000)</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>800K MSRP</strong></td>
<td>$429</td>
<td>$289</td>
</tr>
<tr>
<td><strong>SuperDrive MSRP</strong></td>
<td>$629</td>
<td>$339</td>
</tr>
</tbody>
</table>

**Everyone wants** a second SuperDrive, but not everyone wants to pay the hefty price. Now there’s an alternative. Applied Engineering’s new 35” high density drive looks, feels, runs, reads, writes just like Apple’s. It even smells like Apple’s. But it costs a lot less. And with our exclusive 2-color read/write indicator you can actually tell what your drive is doing at any given moment. We even make a Mac II external drive adapter ($19), so you can add a second high density drive to your Mac II, IIx or IIfx. How’s our drive stack up against theirs? That’s the bottom line.

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Dvorak, The Doors Or A Database.

CD's can hold a lot of data in an easy to handle, durable form. They're useful for much more than music. Each CD holds about 600 megabytes of data. That's roughly 250,000 pages of text! With quick and easy access that makes it a snap for you to find what you're looking for, whether your favorite passage of music or information from a large database.

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The End of Literacy

I agree completely with your fears of where multimedia will take us [The Iconoclast, June 1990]. It appears that the end of literacy is indeed upon us. I had some hope that video-text communication would force a higher level of literacy, since people will be communicating by written word to a greater extent. However, this basic literacy is not the same as that required to appreciate good literature.

It reminds me of the statement in Victor Hugo's Notre Dame de Paris that books will kill architecture. In the Dark Ages, frescoes and murals in cathedrals were used to communicate about life. The invention of the printing press spelled doom for architecture as it was known.

Well, multimedia will most likely destroy literature and our ability to appreciate it. I had previously regarded personal computer users as entirely beneficial. Thank you for exposing this dark side.

Kevin Garrett
via America Online

The Value of Visual Media

As a longtime reader of Macworld and your columns, I'm amazed and challenged by Steven Levy's column on multimedia. While your column raised many legitimate and troubling issues, it also unfairly slighted a promising new communication medium.

Yes, I readily admit that most of what will result from multimedia technology will be junk. But if I, as a developer of interactive video and educational programs, must accept responsibility for MTV's Robert Pittman, then will you (as print's champion) accept responsibility for Rupert Murdoch, the National Enquirer, and People magazine? Why should I have to answer for all the meaningless uses of multimedia technology, any more than you should have to answer for all the trivial and mind-numbing uses of print?

I agree entirely that Apple's helocar campaign portrayed multimedia technology at its worst. But if multimedia gives powerful tools to bozos like the two guys in the helocar commercial, the same tools give educators powerful new ways to present real information, including complex audiovisual information like the medical diagnostic images my multimedia work deals with. Perhaps you've been talking to too many marketing people and just haven't seen enough real folks applying multimedia to real, nontrivial problems.

I detect in your thesis a strong antivisual prejudice, one that I see all too frequently since I became an artist. Computer and multimedia technology may yet help to redress a serious imbalance in our communication media in favor of text alone. Look at Edward Tufte's book Envisioning Information (Graphics Press, Cheshire, Connecticut, 1990) for an eloquent explanation of the power of visual communications.

You must expect our first steps into multimedia to be halting and uncertain. It is also true that most of the attention will be on the dog-and-pony shows put on by Marc Canter and his ilk in order to sell more copies of MacroMind Director. We don't expect to see great literature from the authors of Microsoft Word; why set up Canter as the last word on the direction of multimedia?

Patrick J. Lynch
Yale University
New Haven, Connecticut

Corrections

The retail price for the grayscale version of DrawingCard Display Systems (New Products, July 1990) is $3195, the 8-bit color version is $6935, and the 24-bit color version is $8595.

IntuSoft's bSpice for Macintosh (New Products, June 1990) is by IntuSoft, not Intuit.

The NoRad radiation glare shield can be grounded to the anchoring screw of a Mac's D-connector whether or not the port is in use (Letters, June 1990).

The Playroom, educational software for preschoolers by Broderbund Software, retails for $49.95 (Reviews, July 1990).
TV Is Not the Culprit

Most of Steven Levy's complaints about the intellectual inadequacies of the TV generation have an element of truth. But he points the finger at TV as the culprit, when in fact the culprit is the education system in this country. The real reason most people can't reason well or think critically is that the schools fail to teach these skills. The simple act of watching TV does not destroy the ability to think clearly. Video does not stifle rational thought simply because it combines pictures with sound, as Levy claims.

Steven Levy has fallen into the intellectual trap of believing that written language is the only acceptable medium for rational discourse. What he forgets is that great minds somehow have managed to express their thoughts in other media—for thousands of years. Written language is not the sole medium of the human intellect. Is Shakespeare, who worked in the multimedia idiom of the theater, less worthy than Dickens, who wrote monomedia novels? Did Stravinsky and Balanchine miss the boat by expressing themselves through collaborations in music and choreography instead of the written word? Would Levy prefer to read a novel by Stravinsky or perhaps a corporate annual report by Balanchine?

True enough, the bulk of TV programming is guilty of the crimes Levy describes—but so are all other media, including the written word. The problem is not which medium we use but how we use any particular medium or combination of them. If Levy wants to stop the growing trend toward shallow, superficial thinking in our society, he should support the teaching of the vocabulary, grammar, and syntax of as many media as possible, from the written word to music, dance, architecture, graphic arts, and even video. By denying that responsibility and wishing that other media didn't exist, we will perpetuate the problem, not cure it.

I love the written word, but I recognize that it is only one of the many acceptable media through which human beings communicate.
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A drive that keeps its cool also keeps its reliability. The Protege is a really cool machine because it maximizes air flow across its drive assembly and its isolated power supply—efficiently cutting the danger of heat-related failure from the two most important parts of your drive.

**Attention to Details**
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**Loaded with Smart Software**
Your Protege will arrive pre-formatted and ready for work, loaded with easy-to-use, custom-designed utilities. The Protege's Disk Management Software allows you to partition for more efficient drive operation and password protect each partition. The software even allows for disk spanning and creation of ProDOS and UNIX partitions.

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<th>Quantum</th>
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municate thoughts. In fact, many kinds of thoughts actually require other media for full expression. Commenting on people who insist they don’t need to listen to a musical performance because they can “hear” it in their minds by reading the sheet music, the English composer Ralph Vaughan Williams asked what the effect on Ulysses would have been if, instead of singing to him, the Sirens had simply handed him a copy of the score.

Steven T. Birchall
Merrimack, New Hampshire

Online Monopoly

Wow! What a wonderful idea Steven Levy has in a monopoly online service [The Iconoclast, May 1990]. All we have to do is look at other monopoly services run by corporations and the government to see what wonderful things we can look forward to with Levy’s proposed OneNet:

No more problems with confusing innovation. Whatever interface gets chosen first will be the interface we’ll all come to know and love for decades on end, or until the Consumer Interface Committee can come to an agreement on upgrades.

No more superquick signing up, which can lead people to getting too much service before they have time to stop and think about it. New customers can be asked to keep their computers idling and their modems set to autoanswer continuously from 8 a.m. to 5 p.m. so that the service rep can make the connection at OneNet’s convenience.

Since OneNet will be a public utility, it will provide employment opportunities for lawyers and accountants every time the service wants to raise its rates or change its service structure, subject to approval by the consumer governing board.

Oh, and we just know the regulatory agency will be supercompetent and incorruptible, based on the wonderful track record of agencies regulating all our other wonderful monopolies like the U.S. Postal Service, local phone and utility companies, and the insurance cartel.

Howard Winther
President, Liberty Systems

We originally classed the Liberty as a good, but not great value. After considering the points you’ve raised and taking an informal survey of Macworld staffers, we’ve since decided it qualifies as a winner. It truly is noticeably smaller and lighter than the other drives.—Ed.
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DesignStudio's Greatest Strength

DesignStudio has the most powerful—and flexible—style sheets of any page-layout program. Because your reviewer ["Picking a Publishing Program," May 1990] hadn't figured out that a style sheet need not specify every attribute, he labeled as DesignStudio's greatest weakness what is possibly its greatest strength.

I seldom specify a type style in a style sheet so that I can change formatting, such as italics or boldfacing, without removing the style sheet, which answers the author's biggest gripe. Or I'll sometimes specify just one attribute—to turn off indents on opening paragraphs, for example, since one style sheet will override another without having to remove the first.

DesignStudio's style sheets are superior because you can apply them to single words instead of entire paragraphs. For instance, when I use Times I like to tighten up the bold but not the plain type. So I create a separate style sheet just for the bold—applying it is as simple as selecting bold to begin with—and once it's applied I can tighten or loosen all the bold type in the document through a single dialog box. Or you can create a style sheet that puts footnote numbers in a smaller size and shifts them up, all with a keystroke. And with the program's powerful search-and-replace function, you can even apply a style sheet to all bold type in a document after the fact.

Jon Marken
Hampton-Sydney, Virginia

Maximum Exposure

I want to point out that this is a serious letter; I am not attempting to be amusing.

I have been using computers for several years now. After spending hours on end in front of computers, I began to notice that my nylon/rayon underwear would get holes in the crotch and eventually fall apart. It was almost as if they had been clipped in acid.

At first I did not associate this with my computer but assumed that the quality of underwear was deteriorating. A year or so after my underwear began to look like Swiss cheese, I mentioned it to my brother-in-law, a computer programmer. He said this was a common problem for men working a lot with computers. It had evidently happened to him and to his associates.

I realize that people do not usually talk to others about the state of their underwear, but have you ever heard of this happening? If computers can do this to nylon/rayon underwear, what are they doing to the human body? I would be grateful for any information on this subject.

By the way, I haven't seen a single hole since I switched to cotton!

Hal Bonillas
Anderson, California

How about it, readers? Has anyone experienced a similar problem? This is the first we've heard of it.—Ed.

Invisible Upgrades

Over the last few months, your magazine has published many articles and announcements. What do you get when you cross a comb binding system with a 3-hole punch?

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*Prices apply to shipments within the Continental U.S.
nouncements about new software versions. And it's a good thing, too, since this is one of the few ways registered users get the news.

I own about 300 programs—all registered—from about 125 software companies, and I can count on one hand the number that regularly inform their registered users of upgrades. I've spent my whole career in sales, and I learned a long time ago that 60 percent of your sales come from installed base.

During the past year, I have ordered at least one software update from each upgrade document I have received. Need I say more?

Alan Applegate
Lakewood, Colorado

Star Trek Lives!

Here is a clever message hidden on Macworld's June cover, which indicates that Cathy Abes and Jerry Borrell are either brilliant Federation agents or unwitting dupes of Drew Huffman (or that Motorola has a great sense of humor). If you look closely at the chips in the illustration, you can see a not-so-subtle reference to the famed line of starships (made famous by the TV show "Star Trek") known as Enterprise—whose registry has always been NCC-1701.

Given the prevalence of Trekkies in the Mac community, I imagine you have received a number of comments like mine. I'm curious, though; was this intentional, or just a happy coincidence?

Matthew C. Britsch
Owings Mills, Maryland

It was no coincidence, but Huffman, who created the model, was not the culprit. Eliot Smyrl of Pixar added that bit of Trek lore when he redrew the image.—Ed.

Praise for Compilelt

Thanks to Bruce Webster for the excellent look at Mac software development (State of the Mac, June 1990), which provided an insightful perspective of the programming environments as well as future trends. But I would like to have seen mention of Tom Pittman's Compilelt (Heizer Software), which can add power to HyperCard or SuperCard.

In addition to compiling HyperCard scripts into an often faster XCMD/XFCN, Compilelt provides access to all the 800+ ROM Toolbox calls, all the documented constants, most of the data structures in Inside Macintosh, and not a few of the "Not in ROM" calls. It also knows about all the SuperCard callbacks.

The manual provides enough information for the fairly competent HyperCard scriptwriter to compile scripts into successful externals, and familiarity with Inside Macintosh opens the door to accessing the Toolbox.

Brian Benson
Glendale, California

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<tr>
<td>Super3D 2.1</td>
<td>$315.</td>
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<tr>
<td>SoftView</td>
<td>$169.</td>
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<tr>
<td>Solutions, Inc. ... 60 day MBG</td>
<td>$71.</td>
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<tr>
<td>The Curator 1.05</td>
<td>$71.</td>
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New Version!

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<tr>
<th>Custom Application</th>
<th>Price</th>
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<tbody>
<tr>
<td>Freedom of Press 2.4-1969 MacUser Editors’ Choice Awards for Software Product of the Year and Best Graphics/Publishing Utility, Brings PostScript printing capabilities to non-PostScript output devices</td>
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By changing the

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<td>Abbott Systems ... 30 day MBG</td>
<td>$63.</td>
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<td>CanOpener 1.1</td>
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<td>Affinity Microsystems ... 60 day MBG</td>
<td>$93.</td>
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<td>Tempo II 1.02</td>
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<td>Aladdin Systems ... 30 day MBG</td>
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<td>StuffIt Deluxe 1.0</td>
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<td>Programmer’s Assistant 1.0</td>
<td>$57.</td>
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<td>ASD Software ... 30 day MBG</td>
<td>$74.</td>
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<td>FileGuard Extended 2.5 (1 user)</td>
<td>$145.</td>
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<td>FileGuard Extended 2.5 (5 users)</td>
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<td>FileGuard Extended 2.5 (10 users)</td>
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<td>Berkeley Systems ... 30 day MBG</td>
<td>$49.</td>
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<td>After Dark 2.0</td>
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<Image of MapMaker>
way that we pack.

T/Maker ... 30 day MBG
3639 WriteNow 2.2—With your purchase of the Eddy award winning word processor, WriteNow 2.2, receive a FREE copy of ClickArt Publications to jazz up your memos, papers, and presentations ........ $117.

Borland

1511 Turbo Pascal 1.1 ........ 68.
5404 SPAMM 1.1 ........ 48.
1726 QuickDex 1.4D ........ 31.
7443 A.M.E. 1.0 ........ 31.
7444 A.M.E. 1.0 (5 user) ... 509.

*CE Software ... 60 day MBG

4689 MockPackage Plus Utilities 4.4 ... 31.
1727 CalendarMaker 3.0 ... 31.
6278 DiskTop 4.0 ... 63.
1729 QuickKeys 1.2 ... 63.
7518 Alerting Events 1.0 ... 85.

*Central Point ... 30 day MBG

5040 Copy II Mac 7.2 ... 23.
5041 Mac Tools Deluxe 1.1 ... 75.

Boing Inc.

5040 Copy II Mac 7.2 ... 23.
5041 Mac Tools Deluxe 1.1 ... 75.

MacConnection, 14 Mill Street, Marlow, NH 03456 1-800/334-4444 603/446-7711 FAX 603/446-7791

2000 MacConnection

Connectix ... 30 day MBG
6123 Virtus 2.03 (for SE/30, lcx, ilx, & iic) $115.
6122 Virtus 2.03 (for Mac II, incl. FMU) ... 189.

*Danitz Development ... 30 day MBG
5255 Retrospect 1.1 ... 148.

*Digital ... 60 day MBG
5166 SmallTalk/V Mac 1.1 ... 124.

Duli-Click Software

1824 Calculator Construction Set 2.05 ... 45.

*Fifth Generation ... 30 day MBG
4287 ProACH (sooner saver) ... 25.
3955 Suitcase II 1.26 ... 49.
FastBack II 1.2 or DiskLock 1.0.2 ... 118.

*Foundation Publishing ... 60 day MBG
6701 HyperSpeller 1.0 ... 29.

*HJC/Microcom ... 30 day MBG
4803 Vires 2.7 ... 56.
5085 Vries (1.0) ... 239.

Hyperpress Publishing

4233 Icon Factory 1.0 ... 45.

ICOM Simulations

4064 On Cue 1.3 ... 35.
5681 HyperTMON 1.0 ... 58.
4093 TMN 2.8.4 ... 87.

Irritual Software

4719 101 Scripts & Buttons HyperCard 1.2 ... 35.
6171 MacPrint 1.3 ... 94.

*Jam Software ... 30 day MBG
6089 Smart Alarms w/ Appt. Diary 3.0.1 ... 49.
6088 Smart Alarms 3.0 (1-4 users) ... 99.

*Kent Marsh Ltd. ... 30 day MBG
5457 QuickLock 1.0 ... 34.
2591 The NightWatch 1.03 ... 85.
6134 MacSafe II ... 107.

*Kiwi Software ... 60 day MBG
6267 KiwiEnvelopePlus 3.0 ... 34.
7445 KiwiFinder Enhancer 1.0 ... 65.

*Leister Productions ... 30 day MBG
7126 RightWriter Mac 3.1 ... 89.

*Loop Software ... 30 day MBG
5442 PictureBook 3.2 ... 39.

Magic Software

7267 AutoSave II 1.1 ... 28.
7268 POWERIcons 1.0 ... 39.
7270 Beckmatic 1.1 ... 50.

*Microcom ... 30 day MBG
7459 CarbonCopy Mac (Single, 2 req.) ... 117.
7465 CarbonCopy Mac (Twin Pack) ... 169.

*Microlytics ... 60 day MBG
2732 GOfer 2.0 ... 45.

*Microseeds Pub. ... 60 day MBG
7068 INT/Picker 2.0 ... 35.
2913 Redux 1.62 ... 49.
7116 Rapid 1.1 ... 49.

*Microsoft ... 30 day MBG
4471 QuickBasic 1.0 ... 64.

*Millenium Software ... 30 day MBG
6105 HyperX 3.0 ... 65.

*Now Software ... 30 day MBG
6924 ScreenLock 1.0 ... 45.
6925 Now Utilities 1.0 ... 89.
6739 Prototype 2.1 ... 184.

Softview

7499 if:X Forms Designer 1.0—This program does for forms creation what word processing did for typing. With "Graphics Intelligence" your form layout can be done right—the first time! ..... $169.

Olduvai

4503 MultiClip 2.0 ... 49.

ON Technology ... 1 year MBG
6385 On Location 1.0 ... 75.

Peter Norton ... 30 day MBG
6748 Norton Utilities for the Mac 1.0 ... 84.

Salient Software ... 30 day MBG
7404 Disk Doubler 2.0 ... 45.
7403 Partner 1.01 ... 56.

Silicon Beach ... 60 day MBG
5100 SuperCard 1.5 ... 189.

Softstream INT'L, Inc. ... 30 day MBG
5440 HyperHIT 2.2 ... 125.
7450 HyperHIT Relational ... 269.

Software Innovations ... 30 day MBG
5869 HandOff 1.1 ... 31.
6847 HandOff II ... 52.

RightSoft

7482 RightWriter Mac 3.1—A sophisticated system that will generate a marked-up copy of your documents with comments pointing out errors in grammar, style, word usage and punctuation $54.
Just paper and boxes.

**Solutions, Inc. ... 60 day MBG**
3448 SmartScrap & The Clipper 2.1 ... $45.
3449 SuperGlue II 2.01 ... 61.
**Somak Software ... 30 day MBG**
5897 ScriptEdit 1.1 ... $49.
7430 SharpEnd Up 1.0 ... 62.
**Spinaker ... 30 day MBG**
6692 PLUS 2.0 ... 115.
**SuperMac Tech. ... 60 day MBG**
3378 SuperlaserSpool 5-Pack 2.02 ... 289.
3377 DiskFit 1.5 ... $58.
3376 Network DiskFit 1.5 ... 225.
**Symantec ... 30 day MBG**
4644 Just Enough Pascal 1.0 ... 52.
5176 Symantec AntiVirus for Mac (S.A.M.) ... 67.
5724 Symantec Utilities for Mac (S.U.M.) ... 59.
3421 THINK Pascal 3.0 ... 165.
3420 THINK C 4.0 ... 165.
**Symmetry ... 30 day MBG**
3318 HyperOA 1.2 ... 45.
**Synex ... 30 day MBG**
7147 MacEnvelope Plus 5.0 ... 57.
6666 MacEnvelope Plus 2.0 ... 57.
**TGS Systems ... 30 day MBG**
6667 Prograph 2.0 ... 249.

Adobe Systems
1157 Illustrator 3.0—New text-handling tool allows for direct, on-screen entering and manipulation of text. Also, control every aspect of the characters, including kerning, text on a curve and access to typeface outlines ... $349.

**TML Systems ... 30 day MBG**
3549 TML Pascal II 3.1 (w/MPW 3.1) ... 109.
3587 True BASIC 2.02 ... 55.
**Williams & Macias ... 30 day MBG**
6926 DiskLabeler III 3.0 ... 49.
4976 StickyBusiness 1.2 ... 89.
6927 StickyBusiness Plus 1.2 (bar codes) ... 149.
**Zedicor ... 60 day MBG**
3985 ZBasic 5.0 ... 88.

**LEARN & PLAY**

Access Software
4655 World Class Leader Board Golf ... 25.
4486 Manhole ...
5127 Manhole (CD-ROM) ... 34.
5517 Cosmic Osmo ... 40.
**Ars Nova ... 30 day MBG**
1215 Practica Musica 2.2 ... 69.

SuperMac Tech. ... 60 day MBG
3377 DiskFit 1.5—Copy and backup the contents of your hard drive quickly and automatically onto floppy, cartridges, or other hard drives. Multifinder compatibility allows you to keep working while you backup ... $58.

**Beacon Technology ... 30 day MBG**
6426 Gerns of The Word 1.0 (King James) ... 25.
7442 Gerns of The Word 1.0 (New Int'l) ... 25.
4967 HyperBible 1.0 (King James) ... 145.
4968 HyperBible 1.0 (New International) ... 175.
**Bogas Productions ... 60 day MBG**
6135 Super Studio Session w/Music Library 99.
Bright Star Technology
3961 Talking Ties 1.0 ... 26.
1402 Alphabet Blocks 1.0 ...
Broderbund Software
4314 TypeX 1.0 ...
5886 Star Wars (CP) ...
4540 Ancient Art of War at Sea (CP) ...
6516 The Playroom (CP) ...
4229 Whereis The World Carmine Sanchego7 (CP) ...
5755 Whereis Europe Carmine Sanchego7 (CP) ...
5233 Whereis USA Carmine Sanchego7 (CP) ...
4966 SimCity 1.2 ...
5871 SimCity Supreme 1.2C ...
4571 Geometry 1.2 (CP), Physics 1.2 (CP), Calculus 1.2 (CP) ...
5237 Whole Earth Catalog (CD-ROM) ...
**Bull City Software ... 30 day MBG**
5841 Moriaxty's Revenge (CP) ...

**First Byte ... 30 day MBG**
5294 Puzzle Storybook 1.0 (ages 3-6) ...
5293 Dinosaur Discovery Kit 1.0 (ages 3-6) ...
**Great Wave ... 30 day MBG**
2276 Kids'Time 1.2 (ages 3-6) ...
5542 KidsMath 1.1 (ages 3-6) ...
4334 NumericMaze 1.1 (ages 5-12) ...
2270 American Discovery 2.3 (ages 9+) ...
2273 ConcertWear + 4.0 ...
2271 ConcertWear + MIDI 5.1 ...
**HyperGlot ... 30 day MBG**
Word Torture - Beginner to Advanced (Span, Fre, Germ, Ital. & Rus.) @ ea.
29.
Pronunciation Tutor - Beginner (Spanish, French, German) @ ea. 35.
Verb Tutor - Intermediate (Spanish, French, German) @ ea. 42.
**HJC/Microcom ... 30 day MBG**
4903 Virex 2.7 with the Virex INIT—Both detects and repairs files infected by all known Mac viruses. The Virex INIT continuously monitors the computer to prevent infection ... $56.
5885 Virex 10 Pack ...

**Bullseye**
1545 Focker Triplane 2.02 (CP) ...
1544 Ferrari Grand Prix (CP) ...
4074 P51 Mustang Flight Simulator (CP) ...
**Carina Software**
5726 Voyager 1.2 ...
**Casydly & Greene ... 60 day MBG**
2258 Crystal Quest 2.2X ...
4119 Crystal Quest w/Cripter Editor 2.2X ...
7495 Mission Starlight ...
7498 Sky Shadow ...
**Coda Music Systems**
5854 MusicProse 1.01 ...
5604 Finale 2.0 ...
549. Davidsson & Associates
1734 Math Blaster 1.0 (CP) ...
6128 Math Blaster Mystery (CP) ...
**Electronic Arts ... 30 day MBG**
6716 Pipe Dreams ...
6297 Hall of Montezuma ...
6663 Sands of Fire ...
4064 Chuck Yeager Flight Simulator ...
6594 Starlight ...
1846 Deluxe Music Construction Set 2.5 ...

**Timeworks ... 30 day MBG**
Publish it! Publish it! Easy—The first desktop publishing programs to fully integrate as many text, graphic and page layout features as in stand-alone programs.
7115 Publish it! Easy 1.1 ...
5908 Publish it! 1.2 ...
222.

**Virex**
6604 Verbal Aspect - Intermediate (Japanese) ...

**Vixen**
2268 Crystal Quest ...
7495 Mission Starlight ...
7498 Sky Shadow ...
**Word - Beginner to Advanced**
(Sp, Fre, Germ, Ital., Rus.) ea. 29.
**Pronunciation Tutor - Beginner**
(Span, Fre, Germ, Ger.) ea. 35.
**Verb Tutor - Intermediate**
(Span, Fre, Ger.) ea. 42.
6604 Verbal Aspect - Inter. (Russian) ...
7472 Russian Noun Tutor (w/sound) ...
6297 Hall of Montezuma ...
7473 Russian Noun Tutor (text) ...
175.
**Individual Software**
7425 Training for Microsoft Word 4.0 ...
4990 Training for PageMaker 3.0 ...
26.
Nothing obnoxious.

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7473 Learn To Speak French (CD-ROM)—Parlez! A complete French course with 35 interactive lessons on two CD-ROMs. Four native speakers reading dialogues based on the Foreign Service Institute curriculum. Perfect learning tool $175.

Inline Design ... 30 day MBG
5870 Bomber 1.3 (includes headphones) 32.
3710 Interactive Physics ........ 169.
Learning Company ... 30 day MBG
2670 Reader Rabbit 2.2 (CP) (ages 4-7) 30.
5453 Talking Math Rabbit 1.0 (ages 4-7) 30.
MicroProse
4697 Pirates! (CP) ........ 35.
4670 Flight Simulator (CP) 32.
Miles Computing
5253 The Puzzle Gallery 28.
2765 Fool's Errand 32.
Mindscape
4083 Balance of Power 1990 (CP) 29.
3987 Colony (CP) 29.

Salient ... 30 day MBG
7404 Disk Doubler 2.0—Expand your disk drive capacity. Fast, easy and safe, Disk Doubler dramatically increases the storage capacity of any Mac drive. "Performance is outstanding" evaluates MacUser 7950, 04% Mice rating $45.

MacConnection, 14 Mill Street, Marlboro, NH 03456 1-800/334-4444 603/446-7711 FAX 603/446-7791

Now Software ... 30 day MBG
6925 Now Utilities 4.0—A collection of 12 system enhancement utilities. Flash appointment reminders, display pictures on your Mac, pop-up the menu bar anywhere, make Font menus WYSIWYG and much more! $89.

NETWORKS & COMMUNICATIONS

Abaton ... 30 day MBG
6266 InterFAX 24/86 Modem ........ 419.
CE Software ... 60 day MBG
5638 InOut (10 users) ........ 187.
5174 QuickMail 2.2 (5 users) 215.
5173 QuickMail 2.2 (10 users) 315.

POSTCRAFT
7395 Citadel Secrets 9.
6466 Citadel 26.
Premier Technology
5773 Strategic Conquest Plus 2.0 34.
5774 NetTrek! The Real Version 2.3 34.
Star On Time 7.
3766 Thexder 21.
3397 Leisure Suit Larry (CP) 23.
5894 Manhunter: San Francisco (CP) 28.
3396 King's Quest III (CP) 28.
7367 Space Quest III (CP) 39.
5302 Beyond Dark Castle 32.
5053 Dark Castle 1.1 32.
Softstream Int'l., Inc ... 30 day MBG
4071 MacMan 32.
6258 MacRummy 32.
4073 Colour Billiards 38.
SoftTone Technologies ... 30 day MBG
4945 The Hunt for Red October 1.1 20.
1842 Chuckerball 2100 1.1 32.
4619 Mavis Beacon Typing 1.3 (CP) 32.
4596 Life & Death (CP) 38.
6110 Cribbage King-Gin King 39.
Spectrum Holobyte ... 30 day MBG
4001 Software Classics 1.9.
3484 Tetris 1.1 19.
6112 Welltris 19.
3459 Falcon 2.2 30.
Spinaker ... 30 day MBG
2328 Sargon IV (CP) 28.
2329 SAT Score Improvement 1.0 (CP) 57.
True BASIC Tools ... 30 day MBG
3571 Algebra 3.02 (with workbook) 45.
Wayzata Tech ... 60 day MBG
7374 Sport News Baseball Stats (CD-ROM) 139.
XOR ... 30 day MBG
6152 TaskMaker (CP) 27.
6040 MacGolf Classic (CP) 52.

A Now Utilities 4.0—A collection of 12 system enhancement utilities. Flash appointment reminders, display pictures on your Mac, pop-up the menu bar anywhere, make Font menus WYSIWYG and much more! $89.

Networks
3464 Tetriss 1.1 19.
6266 InterFAX 24/86 Modem 419.
CE Software ... 60 day MBG
5638 InOut (10 users) 187.
5174 QuickMail 2.2 (5 users) 215.
5173 QuickMail 2.2 (10 users) 315.

ASD Software ... 30 day MBG
5834 Connect 1.5 for the Macintosh 63.
DataViz ... 60 day MBG
1823 MacLink Plus/PC 4.5 119.
4842 MacLink Plus/Translators 4.5 99.
Dove Computer ... 60 day MBG
6758 Disk Doubler 3.0 279.
FastNet III, SE 30 each 375.
Dow Jones ... 30 day MBG
5215 Now Utilities 4.0 A collection of 12 system enhancement utilities. Flash appointment reminders, display pictures on your Mac, pop-up the menu bar anywhere, make Font menus WYSIWYG and much more! $89.

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It is not clear how the 'obnoxiousness' of the software is quantified. However, it is possible that the software is evaluated based on its performance, usability, and any obnoxious aspects that may affect the user experience.

Dove Computer ... 60 day MBG
6758 Disk Doubler 3.0 279.
FastNet III, SE 30 each 375.
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Now Software ... 30 day MBG
6925 Now Utilities 4.0—A collection of 12 system enhancement utilities. Flash appointment reminders, display pictures on your Mac, pop-up the menu bar anywhere, make Font menus WYSIWYG and much more! $89.
Dear Customer,

Living in rural New Hampshire, we always felt that we had an appreciation for nature. But recently we, like many others, have started taking a long hard look at the impact of our activities on the environment. So we've stopped using foam peanuts to pack our shipments. Instead, we are using tighter-fitting boxes and, when necessary, newsprint as a packing material. We are also working on other ways to clean up our act. Over the last few months we've found ways to recycle and re-use over 75% of what used to go in our dumpster. And this is definitely the last styrofoam peanut you'll ever see from us.

Pat Gallup, President
MacConnection

"The last foam peanut you'll ever see from us."
<table>
<thead>
<tr>
<th>Item Description</th>
<th>Price</th>
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<tr>
<td>Apple Computer</td>
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<td>LaserWriter Plus Toner Cartridge</td>
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<td>LaserWriter II Toner Cartridge</td>
<td>$105</td>
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<td>60 day MBG</td>
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<tr>
<td>2792 3½&quot; DS/DD Disks (10)</td>
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<td>2793 3½&quot; HD Disks 1.44 Meg (10)</td>
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<td>3943 DC2000 40 MB Data Cartridge</td>
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<td>60 day MBG</td>
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<tr>
<td>6592 44 Meg. Removable Cartridge</td>
<td>$85.00</td>
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<td>ACCESSORIES</td>
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<tr>
<td>Apple Computer</td>
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<tr>
<td>LaserWriter Plus Toner Cartridge</td>
<td>$99</td>
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<td>3M</td>
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<td>3943 DC2000 40 MB Data Cartridge</td>
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<td>MacConnection</td>
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<td>6592 44 Meg. Removable Cartridge</td>
<td>$85.00</td>
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<td>Nutmeg Systems</td>
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<td>30 day MBG</td>
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<td>Nutmeg 49-Monochrome two-page display</td>
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<td>for your Mac SE, SE/30, or II.</td>
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<td>ACrisp dpi 72 dpi and 72 hz refresh</td>
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<td>rate make it ideal for DTP.</td>
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<td>Platinum classic and anti-glare screen</td>
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<tr>
<td>coating.</td>
<td>$995.00</td>
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<td>Farallon Computing</td>
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<td>30 day MBG</td>
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<td>5707 Timetab 3.1-Features a multiple</td>
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<td>window capability which allows a Mac</td>
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<tr>
<td>to view and control other Macs on a</td>
<td></td>
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<tr>
<td>network simultaneously. A great</td>
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<tr>
<td>brainstorming tool. Ideal for</td>
<td></td>
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<tr>
<td>business and teaching environments.</td>
<td>$95.</td>
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<tr>
<td>Computer Coverup</td>
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<tr>
<td>60 day MBG</td>
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<tr>
<td>1723 ImageWriter II Cover</td>
<td>$8.00</td>
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<tr>
<td>1725 Mac SE Ext. Keyboard Cover set</td>
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<td>Curtis Manufacturing</td>
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<tr>
<td>6735 GPP-3 (Glass Filter Plus-Mac Plus, SE)</td>
<td>$65.00</td>
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<td>*Goldstein &amp; Bloor</td>
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<tr>
<td>30 day MBG</td>
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<tr>
<td>2267 The Macintosh Bible (3rd Edition)</td>
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<td>19.00</td>
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<td>2370 MacLuggage Imageware II</td>
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<tr>
<td>2376 MacLuggage Macineware Plus</td>
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<tr>
<td>2381 MacLuggage Macineware SE</td>
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<tr>
<td>6120 The Ultimate SE/Ext. Carrying Case</td>
<td>$79.00</td>
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<tr>
<td>Neon Ultimate SE/Ext. (available in</td>
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<tr>
<td>pink, green, or yellow)</td>
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<tr>
<td>89.00</td>
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<tr>
<td>Kensington</td>
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<tr>
<td>4643 Mac II Stand and Cable Kit</td>
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<tr>
<td>2573 Tilt/Swivel (platinum)</td>
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<tr>
<td>4973 Power Tree</td>
<td>$27.00</td>
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<tr>
<td>2559 Apple Security Kit</td>
<td>$33.00</td>
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<tr>
<td>2566 System Saver Mac (platinum)</td>
<td>$63.00</td>
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<tr>
<td>2567 System Saver Mac (decent)</td>
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<td>Practical Peripherals</td>
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<td>30 day MBG</td>
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<tr>
<td>3089 Mac Communications Pack 1,5-External</td>
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<tr>
<td>2400SA Modern, cable, and top-selling</td>
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<tr>
<td>communications software. Hayes</td>
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<td>compatible.</td>
<td>$225</td>
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<tr>
<td>OUR POLICY</td>
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<tr>
<td>• We accept VISA and MASTERCARD.</td>
<td></td>
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<tr>
<td>• No surcharge added for credit card</td>
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<td>orders.</td>
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<td>• Your card is not charged until we</td>
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<td>ship.</td>
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<tr>
<td>• If we must ship a partial order, we</td>
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<td>never charge freight on the shipment(s)</td>
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<td>that complete the order (in the U.S.).</td>
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<tr>
<td>• No sales tax.</td>
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<td>• All U.S. shipments insured; no</td>
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<tr>
<td>additional charge.</td>
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<tr>
<td>• APO/FPO orders shipped First Class Mail.</td>
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<tr>
<td>• International orders U.S. $250 minimum.</td>
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<tr>
<td>• Upon receipt and approval, personal and company checks clear same day for immediate shipment of your order.</td>
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<tr>
<td>• Corporate PO's are subject to credit approval.</td>
<td></td>
</tr>
<tr>
<td>• COD max. $1000, Cash or certified check.</td>
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</tr>
<tr>
<td>• 120 day limited warranty on all products. Defective software replaced immediately. Defective hardware repaired or replaced at our discretion. All items subject to availability, prices and promotions subject to change without notice.</td>
<td></td>
</tr>
<tr>
<td>• To order, call us anytime Monday through Friday 8:00 AM to 5:00 PM EST, or Saturday 9:00 AM to 5:00 PM EST. You can call our business offices at 603/446-7711 Monday through Friday 9:00 AM to 5:00 PM EST.</td>
<td></td>
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<tr>
<td>SHIPPPING</td>
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<tr>
<td>Continental U.S.: Barring massive computer failures and other natural or unnatural catastrophes, all credit card orders phoned into MacConnection weekdays by 8 PM EST will ship airborne Express the same night for delivery the next business day, except for those within UPS Ground Zone 1 (which is also an overnight service). Saturday delivery available to many areas upon request. Some areas require an additional day delivery. The total freight charge on any order placed with MacConnection is only $3.</td>
<td></td>
</tr>
<tr>
<td>Hawaii, Alaska, Canada, Puerto Rico and U.S. Virgin Islands: Call 800/334-4444 for information on shipping and charges. All other areas: Call 603/446-7711 or FAX 603/446-7791 for information.</td>
<td></td>
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## Olduvai Software

<table>
<thead>
<tr>
<th>Product</th>
<th>MBG Period</th>
<th>Price</th>
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<tbody>
<tr>
<td>Read-It! OCR 2.1</td>
<td>30 day MBG</td>
<td>$245</td>
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<tr>
<td>Orange Micro</td>
<td>30 day MBG</td>
<td>$78</td>
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## Pacific Data Products

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<thead>
<tr>
<th>Product</th>
<th>MBG Period</th>
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<tbody>
<tr>
<td>MacPage PE</td>
<td></td>
<td>$459</td>
</tr>
<tr>
<td>MacPage</td>
<td></td>
<td>$425</td>
</tr>
<tr>
<td>ColorBoard 208</td>
<td></td>
<td>$395</td>
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<tr>
<td>ColorBoard 264 for Mac II</td>
<td></td>
<td>$595</td>
</tr>
<tr>
<td>ColorBoard 264 for SE/30</td>
<td></td>
<td>$795</td>
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<tr>
<td>Video ColorBoard 384</td>
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<td>$1695</td>
</tr>
<tr>
<td>ClearVue/GE System for Mac II</td>
<td>30 day MBG</td>
<td>$1795</td>
</tr>
<tr>
<td>ColorBoard 708 + 16&quot; Monitor</td>
<td></td>
<td>$3595</td>
</tr>
<tr>
<td>RasterOps 8L</td>
<td></td>
<td>$795</td>
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<tr>
<td>RasterOps 24L</td>
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<td>$3195</td>
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## SAFE Power Systems

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<tr>
<th>Product</th>
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<tr>
<td>SAFE 250 Watt Backup</td>
<td></td>
<td>$199</td>
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<tr>
<td>SAFE 400S Watt Backup</td>
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## Kraft Systems

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<th>Product</th>
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<tr>
<td>KM30 ADB Joystick</td>
<td>60 day MBG</td>
<td>$49</td>
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<tr>
<td>ADB Trackball (with foot pedal)</td>
<td>79.</td>
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## Logitech

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<tr>
<th>Product</th>
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<tr>
<td>ScanMan Mac Model 32</td>
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## Magnavox

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<td>9CM080 14&quot; Color Monitor</td>
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<td>$529</td>
</tr>
<tr>
<td>14&quot; Color Monitor with Micron Xceed for SE/30 (640 x 480)</td>
<td>30 day MBG</td>
<td>$849</td>
</tr>
<tr>
<td>14&quot; Color Monitor with Micron Xceed for Mac II (640 x 480)</td>
<td>30 day MBG</td>
<td>$849</td>
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## RasterOps

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<tbody>
<tr>
<td>SL</td>
<td>30 day MBG</td>
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## SAFE

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<tr>
<th>Product</th>
<th>MBG Period</th>
<th>Price</th>
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<tbody>
<tr>
<td>SAFE 400S Watt Backup</td>
<td></td>
<td>$409</td>
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</table>

## MacPrint

- **The Complete PC**
  - 6104 Half-Page Scanner/400: $295
  - 6103 Full-Page Scanner (w/OmniPage SE): $758
- **Thunderware**
  - 3648 ThunderScan Plus: $199
  - 4994 LightningScan: $385

## DataViz

- **DataViz**
  - 6421 Dataframe XP 60 Hard Drive: $799
  - 5447 Dataframe XP 30 Hard Drive: $599
  - 6749 Dataframe XP 200 Hard Drive: $1399

## Memory & Drives

- **1 Meg SIMMs**
  - 1107 1 Meg SIMMs (80ns): $69
  - 7902 1 Meg SIMMs for Mac IIx (80ns): $95
  - 7497 4 Meg SIMMs for Mac IIx (80ns): $95
  - 3990 30 Meg Hard Drive: $379
  - 3991 45 Meg Hard Drive: $435
  - 5275 60 Meg Hard Drive: $469
  - 5276 80 Meg Hard Drive: $529

## Storage Media

<table>
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<tr>
<th>Product</th>
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<tr>
<td>Toshiba XM 3201 CD-ROM Drive</td>
<td>$899</td>
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## NEC

- **Battery Pack**
  - 7352 CDR35 CD-ROM Portable Drive: $399
  - 6743 Mac Drive Kit: $64

## Sony

- **30 day MBG**
  - 3287 3 1/2" DD/DD Disks (10): $13
  - 6148 3 1/2" DD/DD Disks 3 Pak (30): $30
  - 3288 3 1/2" HD Disks 1.44 Meg (10): $22
  - 6375 3 1/2" HD Disks 3 Pak (30): $56
  - 6659 QD2000 40 MB Data Cartridge: $19

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**Insight Development**: 30 day MBG

- 6749 Xceed SE/30 - 128 Cache Card: $589
- 6746 Xceed SE/30 - 128 Cache Card: $589

**MicroSpeed**: 30 day MBG

- 6740 Xceed SE/30 - 128 Cache Card: $589
- 6746 Xceed SE/30 - 128 Cache Card: $589

**Mouse Systems**: 30 day MBG

- 6740 Xceed SE/30 - 128 Cache Card: $589
- 6746 Xceed SE/30 - 128 Cache Card: $589

**MaraThon Systems**: 30 day MBG

- 6740 Xceed SE/30 - 128 Cache Card: $589
- 6746 Xceed SE/30 - 128 Cache Card: $589

**Ricom**

- **Ricom**
  - 3072 1/2" HD Disks: $13
  - 3073 2 1/2" HD Disks: $56

**SMART**

- **SMART**
  - 3072 1/2" HD Disks: $13
  - 3073 2 1/2" HD Disks: $56

---

**Dataframe**: 30 day MBG

- 5447 Dataframe XP 30 Hard Drive: $599
- 5448 Dataframe XP 60 Hard Drive: $799
- 5449 Dataframe XP 100 Hard Drive: $1049
- 7451 Dataframe XP 200 Hard Drive: $1399
- 5451 Dataframe XP 330 Hard Drive: $2369

**Toshiba**: Xceed SE/30 - 128 Cache Card: $589

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**Storage Media**

- **Sony**
  - 30 day MBG
    - 3287 3 1/2" DD/DD Disks (10): $13
    - 6148 3 1/2" DD/DD Disks 3 Pak (30): $30
    - 3288 3 1/2" HD Disks 1.44 Meg (10): $22
    - 6375 3 1/2" HD Disks 3 Pak (30): $56
    - 6659 QD2000 40 MB Data Cartridge: $19
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Unlike any other drawing program, MiniCad+ provides an integrated worksheet—literally, a spreadsheet and database in one—that’s hot-linked to your drawings. Attach records such as type, cost, P.O. number or size and display at will. As you change an object’s attributes, the worksheet will automatically be updated. Compute area calculations, compile parts schedules and develop cost estimates. No longer will you tediously count objects in your drawing manually—the worksheet will count it for you.

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Don’t be confined by your CAD program. Extend the capability of MiniCad+ by developing your own palettes with our macro language. You can create your own Facilities Management palette, for instance. We’ve included a wide variety of special-topic palettes with MiniCad+; others are available from third-party vendors.

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Packed with features, the only thing small about MiniCad+ is the price. There’s not another high-precision, professional package with such a low price tag.

MiniCad+ is the price/performance leader in Macintosh CAD, so don’t throw your money in the Trash. You owe it to your crowded desktop to ask your favorite distributor for MiniCad+, or call us for more information.

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ART BEAT

by Cathy Abes

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

Artist: A silk-screen artist from upstate New York, Scott Baldwin began using the Mac when he started doing illustrations for Macworld four years ago. Because the silk-screening process of creating a separate screen for each color is similar to the way Macworld illustrations were done before the advent of the color Mac II, Baldwin was able to make an easy transition from traditional illustration methods to Mac-generated art.

Tools: Mac IICx with 8MB of RAM and a 105MB Cirrus hard disk, a 12-by-12-inch Kurta graphics tablet, SuperMac ColorCard/24, SuperPaint 2.0, PixelPaint Professional.

How It Was Done: For the illustration that opens our feature about navigating online services, Baldwin created a simple but appealing drawing with a textured background that evokes the feel of a woodcut. He began in SuperPaint by drawing a square the size of the finished illustration and filling it with black. Then with the 2-pixel-square brush, he drew (in white) the thin lines that define the various images in the illustration.

Once he had a finished black-and-white image, it was time to add color. So after saving the drawing in SuperPaint's PICT format, Baldwin opened the file in PixelPaint Professional. He chose two colors for each object or part of the drawing—such as the door, the background, and the man in the bathrobe. For example, for the man's face, he wanted a darker flesh (continues)

This is how the original black-and-white SuperPaint illustration looked after Baldwin imported it into PixelPaint Pro (left). Before pouring colors, he cut connecting lines to contain these colors in particular sections (right).

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After he cut the lines connecting the man's face to his hair, and his neck to his bathrobe, Baldwin poured in the dark Hesh tone for the face (top left); next he poured the colors for the hair, the bathrobe, and the lines in the background (top right); and then the lighter flesh tone for the rest of the face (bottom left). This is how the man looks in the finished illustration (bottom right).

tone in the areas that had been black in the original drawing and a lighter flesh tone in all the white areas—the lines he had carved out with the brush in SuperPaint.

But because he didn't want to fill up the entire black area with the darker flesh tone, Baldwin had to first cut any lines that were connected to other lines or areas that were black, such as the man's hair. For this process, he used PixelPaint Pro's 2-pixel-square brush and the 1-pixel-wide pencil (for the smaller areas) with the dark flesh tone. Consequently, those unconnected areas remained unchanged when he later poured the dark flesh tone into the face. He repeated the line-cutting process with each part of the drawing. Finally, after making all the cuts, he poured the colors one by one for each object, first pouring the darker color, then the lighter one.

Baldwin found the SuperMac 24-bit color board especially useful for the laborious line-cutting process. Because it creates a virtual screen of the entire screen, he could instantly zoom in to 200 percent. And by moving the mouse to the edge of the screen, Baldwin said, he could quickly pan the entire image at that same percentage. "It was like looking at the whole illustration through a magnifying glass."

Of the approximately ten hours Baldwin spent on the illustration, six to eight hours were devoted to the drawing in SuperPaint and the rest was spent on the colorization process.
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THE ICONOCLAST

Code and Dagger

HAVE YOU FORGOTTEN ABOUT THE nuPROMETHEUS LEAGUE? THE FBI HASN'T.

BY STEVEN LEVY

ne afternoon not too long ago, I was sitting in my office, at peace with the world, feeling like a solid citizen, when I received the first of two rather unsettling phone calls from Agent Joe Fallon of the Queens, New York, field office of the Federal Bureau of Investigation. Agent Fallon began by insisting that he had spoken to me six months previously and that I had referred him to my lawyer. Now this is the sort of thing one tends to remember. But hey, I figured, maybe it was one of those amnesia things. So I asked him for my lawyer's name, hoping that might jog my memory.

Agent Fallon suddenly retreated from his assertion that we had previously spoken. Maybe, he offered, it was some other Steven Levy. But, by the way, could I tell him if I had any knowledge of the nuPrometheus group? Or was I in possession of any material stolen from Apple Computer? Or did I know of anyone who was?

Now of course I knew about nuPrometheus. After all, it's part of my job to keep track of the bizarre things that happen around Apple Computer, a place that would keep Ripley supplied with items for a month of Sundays. This particular outrage had occurred in spring, 1989. Unmarked computer disks were sent to various publications, including MacWeek, Computer Currents, and InfoWorld, as well as to software entrepreneur Mitch Kapor and a scientist at MIT's Artificial Intelligence Lab. They were accompanied by a letter signed by "The nuPrometheus League (Software Artists for Information Dissemination)." The letter contained some blather about the league's intention of "seeing the genius of a few Apple employees benefit the entire world, not just dissipated by Apple Corporate through litigation and ill will." When these recipients opened the disk and saw that it indeed appeared to be Macintosh source code (it turned out to be Apple's Color Quick-Draw routines), they called Apple and sent the disks in. The theft quite understandably bent some minds in the boardrooms of Cupertino, since Apple's apparent corporate function is to jealously guard and shamelessly cash in on the innovations it made in the early eighties, most of them embodied in Mac source code.

Not that I knew anything about who did it. I explained to Agent Fallon that I was merely a journalist and even spelled out the name of this magazine for him. (It seemed news to him that there were magazines for this sort of thing.) All I knew of the hard facts of nuPrometheus were things I read in the papers. His response was to repeat his questions to me, almost as if reading off a list. I wondered if this was a failure of (continues)
communication, I repeated my non-involvement, and I thought that was the end of it.

A scant two weeks later, however, Agent Fallon was back on the phone, wanting to know if I was ready to share further information. Maybe he thought I had cracked in the interim. In any case, I had no news. But I did have some questions for him. Like why he was calling me. “Somehow your name came up,” he said, not fully satisfying my curiosity on that matter. Well then, why was the FBI so active now in pursuing the case, a year after the theft? According to Agent Fallon, this was a significant case of ITSP—Interstate Transportation of Stolen Property—and the FBI was extremely interested.

“I can equate this with a national secret,” he said with some urgency. If a spy were to come by this code, Fallon explained, he might use it to break into the Apple Macintosh computer and steal the secrets within it. Well, I countered humbly, it doesn’t exactly work that way. And I proceeded to explain a few things about how personal computers worked.

By this time I thought Agent Fallon and I were getting to be buddies. Unhappily, this camaraderie was cut short when he asked if I would supply him with my date of birth—I had the feeling that it wasn’t to send me a greeting card. It was, he explained, to see if I had a criminal record.

Like I say, these were unsettling phone calls.

Did Efrem Zimbalist, Jr., Start This Way?

In days to come I learned that I was far from the only unlikely source contacted by the bureau. It seems that around the country many others had had similar experiences. Among these was Mitch Kapor, one of the recipients of the code. He was interviewed a year ago. At that time, he was shown a list of names and asked if any of them were hackers. The session “had a surrealistic quality and was profoundly disturbing,” Kapor recalls. “It seemed obvious to me they didn’t have a clear sense of the technology—there was such a lack of understanding that the effort to investigate wouldn’t bear fruit. They were lost in cyberspace.”

(continues)
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More recently, around the time I was interviewed, John Perry Barlow, who writes about technology when he is not writing lyrics for the Grateful Dead, received a visit at his Pinevalley, Wyoming, home from one Special Agent Baxter. "Agent Baxter didn't know a ROM chip from a Vise-grip when he arrived," wrote Barlow in an account he posted on the online service called the WELL, "so much of that time was spent trying to educate him on the nature of the thing which had been stolen. Or whether stolen was the right term for what had happened to it. After I showed him some actual source code, gave a demonstration of E-mail in action, and downloaded a file from the WELL, he took to rubbing his face with both hands, peering up over his fingertips and saying, 'It sure is something, isn't it? My eight-year-old knows more about these things than I do.'"

Barlow also reports that Agent Baxter told him some startling information—rather, misinformation—about the Hacker's Conference, a yearly meeting of wizard-level computer programmers instituted after the publication of my book Hackers in 1984. The FBI seemed convinced that this annual conclave provided a key to computer terrorism. It was not merely a spirited gathering of technology creators exchanging new ideas, as we thought, but, as Barlow quoted Baxter, a "gathering of computer outlaws with likely connections to, and almost certainly sympathy with, the nuPrometheus League." (Barlow also notes that Baxter consistently referred to the group as the New Prothesis League.) In addition, the agent alleged that known hacker conference attendee John Draper (a notorious former phone phreaker known as Captain Crunch) was the CEO of the computer firm and Star Wars contractor Autodesk. (This would be news to Autodesk's John Walker, whose firm specializes in CAD software and not deadly laser beams. However, Walker, along with other potential shady characters like Nolan Bushnell, Stephen Wolfram, and science fiction writer Vernor Vinge, was at the most recent Hacker's Conference.)

It gets wilder: A former Apple programmer named Grady Ward says he was told that the stolen code was now filtering back to Communist enemies of America through the Toshiba electronics company and also through John Draper. (For the record, there has been no evidence released linking this company or that man to the crime.) "It was an incredible story," says Ward. "It wouldn't even make a good novel. They said Draper was going to release the code and tip the international balance of power."

The Nature of the Crime

Though Apple spokesperson Chris Escher says that the company is cooperating with the FBI (and that literally all we will say about the case), apparently the cooperation does not extend to educating the FBI on the nature of what was stolen or even clueing the poor floundering agents in on the most rudimentary facts about personal computers.

Part of the problem seems to lie in the FBI's attitude toward the case. Agent Steven Cook, while refusing to comment directly on the progress of the case, put it succinctly: "This isn't a technology investigation—it's interstate theft."

That may be the legal charge, but the theft of source code involved in nuPrometheus is quite a different matter from hijacking a truck or robbing a bank. Software is a much trickier object than swag or money—it can move in elusive ways, and therefore access to protected software is a technologically complicated matter. And the problem of the criminal's motive requires an even deeper understanding. In order to understand and ultimately apprehend the perpetrator, one must realize that this particular crime seems motivated not by greed or maliciousness, but by a peculiar attitude toward technology in general and the role of Apple Computer in particular. For instance, anyone familiar with the history of John Draper would realize that the nuPrometheus crime has nothing in common with Captain Crunch's phone phreaking. One has to feel some sympathy for the agents here—it's a terrible burden to have to solve this rather bizarre ideological crime without being steeped in the lore of Silicon Valley.

(continues)
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J’Accuse

Unfortunately, if the investigation is poorly handled, innocent people may suffer. So far the FBI has directly accused, though filed no charges against, at least three men. There seems to be no hard evidence against any of them. One was Chuck Farnham, the kind of guy Claude Rains might consider one of the “usual suspects.” Farnham is a gadfly who admittedly has handled confidential Apple information on occasion; he has even been known to inhabit garbage dumpsters in search of forbidden knowledge. “Someone in Los Angeles gave the FBI the names of three possible suspects,” Farnham told me, “and I was two of them.” But Farnham claims that he was not involved in nufPrometheus and further claims that at times during the previous year he acted as an unofficial consultant to the company on security matters. (No one at Apple would confirm this.)

**The Ward File**

The second potential suspect, who also denies involvement, was the aforementioned former Apple employee Grady Ward. According to Ward’s account, one morning FBI agent Steven Cook visited the 39-year-old engineer and said, “We know you did it.” The agent had a subpoena for Ward’s fingerprints.

Why did they consider Ward a suspect? Because, they told him, he was judged the likeliest of five people at Apple who had requested access to the ROM code in the specific release that fell into nufPrometheus hands. The criteria for narrowing it to him? He had since left Apple, he had attended a progressive liberal-arts college, and he once formed an intellectual society called Cincinnatus, thus betraying the same fondness for antiquity shown by the name nufPrometheus.

Did he in fact sign out the source code? “It was true,” he says. “I checked the code out and shared it with our group. That was part of our job—anyone in [my manager’s] organization had access and didn’t need permission to see it.” How many people were in his group? “Hundreds,” he says. “The source code would go [throughout Apple] on the Internet network. (continues)
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People could browse through it. You could collect pieces, like trading stamps, and eventually get the entire operating system.”

Another former Apple employee concurs that it was no trick for any Apple engineer to copy the so-called crown jewels. And why not? Only by knowing what the code was could people improve upon it. “It’s like love,” says Grady Ward. “The more you copy it the more you have.” (Precisely the sort of tricky technological fact that the FBI is unlikely to grasp.)

In any case, Ward provided the fingerprints as required by law, and he hasn’t heard from the FBI since.

Member of the Party
The third person directly accused was Walter Horat, a programmer who says he was contracted to do a job at Apple soon after the nuPrometheus mailing. “Anyway, I had no access to engineering documents,” he says, denying any involvement in the crime. This past April the FBI came to his cubicle at Apple to interview him (he was out sick) and then to his house two days later. They told him there was a witness who overheard him boasting at a party that he was involved in the case. Asked to take a polygraph test, Horat consulted a lawyer and declined the offer. Subsequently, he was fired from Apple “with no reason given,” he says. Only afterward, reconstructing his conversations with others at the party, did he recall discussing the nuPrometheus case—but, he insists, only speculating about it, just as thousands of people do in gossip-driven Silicon Valley.

Sorcerer’s Apprentices
Questions persist in this case, and almost all of them are more perplexing than the identity of the criminal. First is the question of why the FBI has decided that chasing down this particular lawbreaker is more important than, say, using its resources to pursue the estimated thousands of white-collar thieves who sacked the savings-and-loan institutes and wound up costing taxpayers perhaps a trillion dollars. After all, Apple has managed to stay in business after the theft of the code and, despite the league’s
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promise to the contrary, no further
nuPrometheus releases have ap­
peared. Quite probably whoever per­
petrated the stunt was intimidated by
the unexpected zeal of the investiga­
tion and wisely decided to stuff the
whole enterprise.

Most Silicon Valley observers be­
lieve that Apple, perhaps through its
outside security firm Kroll Associates
(which reportedly employs a num­
ber of former G-men), has pressured the
FBI into pursuing the case. As put to
me by former Apple security head Ken
Moore, “Part of the function of a [cor­
porate] security department is to en­
list the aid of law enforcement. That’s
not easy to do. It’s not just a matter of
picking up the phone.”

In any case, by encouraging the
FBI to go all out on this matter, Apple
seems to have unleashed a sorcerer’s
apprentice on the Macintosh com­
nunity. The suspect count is rising. Com­
puter writer Stephen Satchell told me
during his interrogatory with the
FBI in Reno, Nevada, he managed a
peek at an agent’s list of potential in­
terviewees and counted about 60, in
39 states; Agent Cook’s noncommittal
comment on this was “maybe even
more.” Cook quite properly notes that
it is a logical standard procedure to
can­duct a thorough investigation,
“looking wherever we can get in­
formation.” This extends, I guess, to
interviewing people just because they
attended the Hacker’s Conference or,
as other speculation has it, because
they participated in discussion on the
WELL conferencing system.

But at what point does the investi­
gation snowball all out of propor­
tion to the crime, which, after all, seemed
less a greedy or malicious act than a
futile, ultimately silly ideological burst
of electronic terrorism? Perhaps the
line is crossed when people have to
be careful about what they say at par­
ties—because federal agents or their
informants might be listening.

Which leads us to a final ques­
tion: when does an investigation become a
witch-hunt? 

Steven Levy is a Macworld columnist
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*The power to be your best.
Surveying the Shakeout
IS ANOTHER JASMINE IN THE WORKS?

BY DEBORAH BRANSCUM

Like a pudgy guy in a too-tight suit, hard disk companies are pretending that everything is normal at the same time that they're being squeezed from all sides. Profit margins are down. Competition is up. And the overall market for third-party drives is getting smaller as the percentage of drives installed at Mac factories increases. As a result, marginal companies are at risk now more than ever. And consumers who make the wrong choice may lose big.

When John Fambrough bought a hard drive from Crate Technology last year, all he wanted was a decent product at a decent price. But when Fambrough's dealer sent the drive back for repairs they discovered Crate's price apparently didn't cover service. The drive sat at Crate for months. Then the company went belly-up and filed for Chapter 7. At this writing Fambrough has been without his drive for nearly seven months.

Crate was an early casualty this year, but it probably won't be the last. "It's safe to predict that half of the companies that supply disk drives will be out of business in three years," says SuperMac Technology president Mike McConnell. "And you'd better figure out which ones."

Why the shakeout? Insiders cite two basic reasons. First, it's been fairly easy to go into the business, with manufacturers and magazines offering supplies and advertising on credit to start-ups. Some companies do well early on but then go under when times get tough, because of their executives' poor business skills.

"These people confuse cash flow with profitability," says Kevin Curran, president of GCC Technologies. "They think that because a lot of cash is coming in they must be making money, when in fact they're building up debts that are unpaid. And since they don't have good financial controls, these guys don't even know they're going in the hole."

The second reason for the shakeout is lower profit margins. Last spring at least six companies, including Apple, cut prices on their hard drives. And new players, such as distributor MacAmerica, are joining the fray. Such cutthroat competition keeps prices down. But lower margins make it difficult "to provide the higher level of service that we want to provide and still make money at it," says Robert Jagitsch, president of Third Wave Computing, a small Apple value-added reseller in Austin, Texas. "There are a lot of competitors who make it hard to compete by cutting margins to the bone, offering inferior software, and offering what we consider to be poor levels of support. Unfortunately, the only way to prove to the customer that you provide good service is after you've made the sale."

According to SuperMac's McConnell, "It has become a commodity (continues)
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Circle 313 on reader service card
market in which customers are saying, with their checkbooks, I would prefer to pay a little less and get a little less. And they get away with it, usually, until their disk crashes and is in the shop for a month."

Many companies that sell drives are running scared these days, although they won't admit it. And the chief bogeyman who has them worried is Michael Ehman, president of Ehman. Ehman sells one line of drives direct and another, called Cutting Edge, through dealers. The company's glossy, attractive ads and low-cost drives have pulled in customers and bred dismay among competitors, who are careful not to mention Ehman by name when they discuss low-end companies.

Their line of reasoning goes something like this: we know how much it costs to build a drive and service and support it. There is no way companies like Ehman can make any money selling a 20MB external drive for $299; at least there's no way they can build organizations with strong service and support at those margins. Such companies may not be in financial trouble now, according to this argument, but they're shakeout candidates for the future.

Michael Ehman gets angry when he hears such talk and denies that his company can't live on its margins. "Our cost of goods is lower than our competitors,' we believe, because we have economics of scale; because we have been at this for five years and are more efficient; and because we operate in Wyoming where we have a dramatic advantage in overhead," he says. Ehman owns his own factory and has employees who do much of the work other companies contract out. That's partly why he can charge lower prices, says Ehman. "My company really tries to make good stuff for as little money as we can and give it to the consumer for as little as we can and make a fair return. But it's not a Macintosh [market] return." Most Macintosh companies want a 40 percent return, Ehman says; his company and his employees are willing to settle for smaller profits and lower paychecks.

The stability of a company is important when buying a product expected to last several years, but it isn't the only issue. Consumers must also weigh issues of quality, service and support, and price.

Quality Unless you're an expert, it's hard to judge the best drive. That's what Macworld tries to do in articles such as June's feature on midrange hard disk drives, which ranked drives based on our testing. So magazines are a good place to start, as are bulletin boards and user groups, to get a feel for the reputation of both the company and its drives.

Manufacturers Quantum and Conner get high marks for their mechanisms and so do high-end drives from Imprimis, which is now owned by Seagate. But the mechanism a drive uses is only one part of the equation.
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Circle 424 on reader service card
Even those drives that use the same mechanisms can vary because of the type of software used, the quality of other drive components (such as the power supplies), and because the most demanding companies get the best drives. "If you were to divide our customer base into tiers, there are people in the top tier who place much different demands on us than do other tiers of customers," says David Brown, president of drive manufacturer Quantum Corporation. In practice that means disks rejected by companies with rigorous testing procedures are bought by someone else—and sold to consumers. Last year GCC found it needed to buy more drives than it had on order from Quantum, so the company turned to electronics distributors to make up the gap. "They were unusable as sold to us by the distributor," says GCC's Curran. The outdated products GCC bought had to be returned. Some of these drives are just fine. Some of them are junk. "There's an enormous amount of crap on the street in terms of hardware," says Brown. "It's dumped there—very low prices, older technology. And regardless of how you think of disk drives, it's amazing technology. It's got more technology than the computer has."

Outdated drives are not the only problem. One exec told me a new product his company has not yet introduced is being advertised and sold by some mail-order companies, even though it doesn't yet have the ability to remap bad sectors correctly.

So ask a company about its testing procedures. How long is a unit burned in? What kind of testing is done? Some companies like GCC and Supercare test all their incoming drives and reject those that don't meet their standards. Ehman, which used to rely primarily on the manufacturer to test its drives, is now testing all its products in-house as well. Microtech International, on the other hand, tests only a random sample of 25 percent of its drives, unless a problem is found.

You can ask companies what percentage of drives they send back to the manufacturer and what the mean time between failure (MTBF) rates are for the drives themselves, but those figures are really only useful for comparison. Although vendors have been willing to tell me about past fiascos, I've never yet had one tell me its current failure rate for drives is more than 3 percent. And insiders confirm that MTBF rates can be pretty meaningless. "If someone puts out a flyer that says 200,000 hours of MTBF, it doesn't mean anything," says Brown. "When? At the 2 millionth unit? In ongoing reliability testing? Or in field testing, which is much more forgiving?"

Service and Support Because virtually every manufacturer has a bad run now and then, how a company responds to bad hard disks is even more important than how they prevent them. A lot of companies say they offer fast turnaround if a hard disk needs repair. Call up customer service and see if the representative echi-
oes the sales department or has a different notion about repair times. Is there a backlog now? For how long? Is there a difference between service under warranty and service after warranty? (One Macworld reader is steamed because a company assured him that if his drive was under warranty it would be repaired in 48 hours. Trouble is, the drive is more than two years old, so the company is dragging its feet in fixing it.)

More questions to ask: Does the company have dealers trained to repair the drives themselves, or do all drives get shipped back to the manufacturer for repair? How expensive are repairs after the warranty period is over? Is there a loaner program if something goes wrong? Who pays for shipping, and how is the hard disk shipped? Try calling the tech-support department. How fast do you get through? Another issue is product availability. Will the company let you know if shipment is delayed?

“We tell people 7 to 14 days. And we're usually right on,” says Joel Kamerman, president of La Cie. But if that estimate is wrong, La Cie doesn't normally call customers to offer an updated shipping schedule. And if the calls I get from readers are a fair indication, neither do other companies.

The age and size of a company may help you get a feel for its condition, but they offer no guarantee. Plenty of old and large companies have failed. If you're buying direct, does the company encourage you to send in a cashier's or a personal check? Steer clear of companies that don't accept credit cards, and never pay with a check. Will the card be charged when you order, or when the hard disk is shipped?

I asked several industry executives to tell me what hard disk they would buy if their companies didn't exist. Cliff Wildes, president of Microtech International, recommends Everex Systems because of the company's technical support. SuperMac's McConnell says, “Probably the safest internal drive is Apple's because it's installed on the factory floor. Not the best choice, but the safest choice.” Quantum's Brown agrees. “I would only buy one from Apple or companies that have rigorous testing and sampling procedures. If you had a Mercedes, would you go down to Grand Auto to put a generator in it?” GCC's Curran said he would look at Everex and Storage Dimensions, which was also mentioned by another executive. Another insider said he likes drives from GCC and Microtech. And SuperMac was mentioned by still another source.

There are probably scores of companies in the storage business, so narrow your choices before you start calling for answers. Or find a good dealer who will do much of that work for you, suggests Ken Krich, vice president of operations at ComputerWare, a Macintosh-only chain in northern California. “ComputerWare, for example, was a major Jasmine dealer, but ended its relationship with Jasmine (continues)

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Think of the price of today's Macintosh software. It isn't cheap! A good example is the new PageMaker 4.0 which sells for nearly $800. If you've purchased at least one of the leading word processing, database, spreadsheet, graphics, desktop publishing, and communication software packages you've invested thousands of dollars. Not to mention the cost of your computer(s), printers, hard drives, etc. Is this money wasted? Only if your Macintosh is half used, if your programs have been stuck on the shelf, or if the user is not 100% trained on the computer and your business programs.

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Right now thousands of individuals and companies are thinking about upgrading their hardware. They're going to invest in faster, more powerful, and more expensive machinery. They're also planning on spending thousands more on software upgrades and new software purchases. Ironically, few are budgeting equal amounts of money for training. The simple truth is that **training** is the best investment you can make. New equipment can increase productivity by micro-seconds. **Training** can increase productivity by days and weeks. **Training Options**

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CONSPICUOUS CONSUMER SERVICE HERO

Keith Howells of Louisville, Kentucky, writes in praise of Paul Mandel, co-owner of Alliance Peripheral Systems. After Howells bought an Alliance 105MB hard disk, he had problems with reformatting. One Friday night at 7 p.m., he left a message for Mandel on CompuServe. By 9 p.m., Mandel had responded with several suggestions and a phone number. Still having problems, Howells called a couple of times on Saturday and was taken through a series of steps until the glitch was found and resolved. "I'd say that his fast response via E-mail and his willingness to support his product over the weekend are certainly worthy of mention," writes Howells.

nine months before Jasmine filed for bankruptcy because of problems with the company."

Krich says his company checks for speed, quality of construction, and features when deciding what drives to carry. The features he looks for include software quality and, for external drives, external SCSI connection, external termination, autoswitching power supplies (so you can plug it into either 110- or 220-volt power), and an LED light.

"Not every drive has all these features, but these are the things we look for," Krich says. ComputerWare also visits the company that makes the drives, talks to the tech-support people, and examines their testing procedures. "And we also try to review, as best we can, the financial status of the company. Because many of the companies in the hard drive business are very small and undercapitalized and we don't want to take a risk that a company we deal with won't be around to fulfill its warranty."

But what if you don't want to go through a dealer? "There are good drives available through direct distribution. We sell two of them—(continues)
Microtech and GCC,” Krich says. “The problem for the buyer is identifying which companies in the direct channel are good solid companies.”

La Cie sells drives both direct and through dealers. While insisting that La Cie offers good service (such as replacing bad drives with larger capacity ones to speed repairs), Kamerman says that local support and long-distance support are not the same. “Users think they should get the same service from mail order as from dealers,” he says. “They don’t understand there’s a difference.”

Kamerman’s honesty may lose him a few fans, but it shouldn’t be surprising that local service and support may differ from what you get when buying direct. Some people are willing to pay for the difference; others argue that there is no difference. The difficult task for consumers is balancing price, quality, and support issues to choose the hard disk that’s right for them.

**Jasmine, Crate, Heart Data News**

As of this writing, Jasmine expects the bankruptcy court to approve its reorganization, which gives French company Chess SA 70 percent ownership of Jasmine, with creditors owning the remaining 30 percent. Jasmine says the Chess investment will speed repair turnaround and product fulfillment for customers forced to wait for months while the company got its financial affairs in order.

Meanwhile, Microtech International has expanded its offer on Jasmine drive warranties. The company will honor warranties on hard disks with mechanisms from Quantum, Micropolis, and Toshiba. (Remember, opening a drive voids the warranty, so use SCSI Probe Software, available from many user groups, to pinpoint the drive’s manufacturer.) Call 800/ 626-1276 for details on the program.

Racer, which manufactured many of Jasmine’s high-end DirectOptical disc drives, DirectTape drives, and multiple-drive subsystems, announced that it will honor warranties on those products. Call 714/579-1725 for info.

Crate Technology president Chris Lemoine says that investors have formed Data Storage Development to buy the assets of the old Crate Technology and relaunch the business with the same name. Crate’s telephone number, 818/766-4001, is back in service and Lemoine says the new company will honor the old warranties.

Heart Data Corporation closed its doors in mid-June, according to Data Enhancements of Westlake Village, California. Data Enhancements president David Burton said his company is manufacturing Heart Data’s hard disk drive products and honoring its warranties. You can reach Data Enhancements at 818/879-2700.

**CONSPICUOUS CONSUMER**

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**Paying the Piper**

**SYSTEM 7.0 PROMISES BETTER COMMUNICATIONS BETWEEN APPLICATIONS—BUT AT A PRICE**

BY BRUCE F. WEBSTER

With the release of System 7.0 (probably early in 1991), Apple will offer its first major advance in interapplication communications (IAC) in seven years. The advance is long overdue, especially in light of competing developments from Microsoft, Hewlett-Packard, and Next. In theory, the benefits will be great: applications will be able to send requests to one another, return status information, and, perhaps most importantly, exchange data.

But there is a catch. Support for publish and subscribe, AppleEvents, and other IAC features will not magically appear in applications running under System 7.0—they will have to be added. All this is not to fault Apple for the introduction of IAC in System 7.0. But to implement IAC capabilities, software companies must develop new versions of their applications, new versions compatible with other applications. This also means that to take advantage of IAC, Macintosh users will need to upgrade all of their applications.

No one knows how long it will take until all the applications and utilities we use will be available with support for IAC. And we don’t know how well they will work together. Or how much we’ll end up paying for all those upgrades. Moreover, it’s not even clear exactly what additional features System 7.0 will have, because Apple is still working on it.

Apple gave more details about System 7.0 at its Worldwide Developers’ Conference in May. As it stands now, the proposed IAC facilities in System 7.0 will work on three levels:

- **dynamic data interchange (the publish-and-subscribe concept controlled by the Edition Manager)**;
- **high-level events (such as AppleEvents)**; and
- **low-level communications (data transfer via virtual ports)**.

Let’s look at how each major IAC function works and what issues might arise in implementing them.

**The Edition Manager**

System 7.0 will introduce a so-called live version of copy and paste. The new functions are called publish and subscribe, respectively, and they will be controlled by a new portion of the operating system known as the Edition Manager.

The basic idea is simple: you open a document within an application; select the data (text, and so forth) that you want to publish, and then choose Publish from the Edit menu. A dialog box will appear, allowing you to save the published selection with a given name and in a given location; the file created will be called an edition. A border will appear around the published selection, to indicate that it’s a publisher.

To use that edition in another document (which may be created using another application), you will choose the insertion point—just as if you were going to paste—then select the Subscribe command from the Edit menu. Again, a dialog box will appear, allowing you to locate the desired edition. Then the data in the edition will be inserted in your text with a border around it, marking it as a subscriber.

From that point, each time you save the original document, the application will write to disk any changes made to the publisher in the corresponding edition file. Likewise, each time an application opens a document subscribing to that edition, the application will read in the updated edition. Also, you will have the option to disable automatic updates for a given publisher or subscriber. A given edition will be able to have multiple subscribers (or publishers).

For example, with this facility you could—in theory—create a diagram in MacDraw II, publish it, then subscribe to that edition from within documents created by Word and Persuasion. In theory is the key phrase here. That's because Claris, Microsoft, and Aldus will first have to write (and release) new versions of these applications designed to work with the Edition Manager (and System 7.0), and you’ll have to upgrade to those new versions.

(continues)
Generally speaking, all the applications involved must implement publish-and-subscribe functions for this process to work. Still, you will be able to subscribe to noneditation files, which means that sometimes you'll be able to get by with the publish-and-subscribe functions in your destination application only.

The publish-and-subscribe mechanism will work over AppleTalk, so that if you're on a network you'll be able to publish editions on your system and another person on the network will be able to subscribe to them (and vice versa). This is an advance in workgroup publishing over AppleTalk, ideally allowing several individuals to work easily on different portions of the same single document. Each contributor could publish the elements (text, figures, graphs) that he or she is responsible for; the group coordinator would lay out the document and subscribe to all the required editions.

Some issues remain unclear. For example, what will happen if you have a publish-and-subscribe chain with multiple links? Case in point: You have numbers in a spreadsheet that you publish to an edition (which we'll call Sales). You have a charting program that subscribes to Sales, using those numbers to create a bar graph, which it then publishes to the edition SalesGraph. Finally, you have a word processing document that subscribes to SalesGraph. So far, so good. Now, you go back into your spreadsheet and modify some of the published cells, which your application then copies to Sales. Finally, you open your word processing document—which still has the SalesGraph chart based on the old spreadsheet values. According to current documentation, that chart (and SalesGraph itself) will remain outdated until and unless you open the chart document, which will then import the updated version of Sales and export a corresponding version of SalesGraph.

It was that issue, among others, that led AGIUS (maker of 4th Dimension) to implement its own hot link manager (HLM). AGIUS says the company's HLM kernel keeps track of all dependencies and can handle multi-link chains automatically, updating all editions along a chain. However well-intentioned such efforts are, though, they are limited to related application... (continues)

How Publish and Subscribe Works

The publish-and-subscribe functions of System 7.0 will let you open a document within an application, select the data that you want to publish, and then choose the Publish command from the Edit menu. The file created will be called an edition.

A spreadsheet could be a publisher, for example, with manufacturing data subscribed to by both an inventory report that is a word processing document and a marketing report in a page-layout program. As numbers in the spreadsheet changed, the inventory report figures would change too, once the document was opened. The marketing report would also be updated once it was opened.
What Created

All the Macintosh® applications above were developed in THINK C® or THINK Pascal®. Could it be coincidence? Think.
tions—a dead end when compared with Apple’s approach (assuming everyone jumps on the IAC bandwagon).

**AppleEvents**

From the start, Mac programs have been event driven, that is, they respond to events (mouse clicks, key presses, and so on) generated by the user or by the operating system. System 7.0 will introduce a new category of events called AppleEvents. This category will allow applications to send events to one another, typically to request services, respond to a request, or notify of a condition. But with the new events will come new headaches and concerns for developers.

Apple proposes three classes of AppleEvents. The first class, standard AppleEvents, will represent messages from the operating system. For example, the Edition Manager will send an AppleEvent to an application to inform it that an edition to which it subscribes has been updated; the application will then be responsible for reaching in the new edition. (Note: an application must detect and respond to all standard AppleEvents to comply with System 7.0 standards.)

The second class, registered AppleEvents, represents standard AppleEvents specific to a given application or class of applications. This is where the headaches come in. The idea is that Apple will register and publish these events, much like the file-creator and file-type IDs, so that other applications can be modified to respond to (or to send) them. For example, Microsoft might register an AppleEvent for Word that tells Word to save the current document as a text-only file. That way, another application faced with importing (and converting) a Word document could instead ask Word to launch itself (a standard AppleEvent), open the indicated document (another standard AppleEvent), and then perform the desired conversion (our hypothetical registered AppleEvent).

The third class, private AppleEvents, represents nonregistered events used between coordinating applications. For example, Claris might devise a set of private AppleEvents to communicate requests and information between its various applications, such as FileMaker, MacDraw II, and Claris CAD. (In fact, Claris has used its own technology to coordinate efforts between FileMaker and Claris CAD to demonstrate the concepts of IAC.)

Apple’s dream: smaller, modular programs that perform a given task very well and that interact with each other. These concepts are good, but much work remains to be done for Apple’s dream to become reality. At the Worldwide Developers’ Conference, developers raised two major questions. The first was, Who decides what the registered AppleEvents are and how they’re defined? Many developers expressed concern that the process would be dominated by a few major players (Microsoft, Claris, etc.).
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Circle 190 on reader service card
Aldus), with little representation for smaller firms. Simultaneously, the attendees recognized that a truly representative (and thus very large) committee wasn't going to get much accomplished.

The second major question was, Just how does one go about writing a modular program? Initial developer complaints centered on a lack of sample programs, but beyond that there are a few chicken-and-egg issues. Modular programs will only be competitive when there is a large installed base of other modular programs (and System 7.0) for them to interact with. And the AppleEvents required won't be defined until people start writing modular programs and find out what they actually need (and want).

Virtual Ports
In some cases it may be useful for two applications to have closer links and more immediate communications than those provided by the Edition Manager and AppleEvents. For example, a graphing application may be linked with a data-acquisition utility that will chart data as fast as it comes in. To support such needs, System 7.0 will provide the Program-to-Program Communications (PPC) Toolbox.

The PPC Toolbox introduces the concept of a port, a virtual (nonphysical) device through which applications can communicate. Through a connection to a common port, two applications can use low-level PPC I/O functions to pass data back and forth quickly. As with the other IAC facilities, PPC ports will connect applications over AppleTalk, allowing programs running on different Macs to share data readily.

Still, that capability may turn out to be something of a liability. If several applications on various machines are communicating via ports over AppleTalk, network performance may take a real hit. This is not to argue against AppleTalk functionality, but to point out that use of the proposed IAC functions may have some unanticipated effects on system and network performance.

Is It Worth It?
Four questions remain. Will Apple's IAC proposals be fully implemented? When will IAC functionality become a reality? How much will you have to pay for it? Will it all be worth it?

My best answers: for the most part, yes, by early in 1992, a year or so after the release of System 7.0; serious money for software upgrades; in the long run, yes.

In the short run, you're best off planning to living with System 6.0.x and the old-fashioned cut and paste for some time to come. Don't jump quickly onto the System 7.0 bandwagon unless you're sure you have the time, patience, and money to pay the piper that plays the tune.

Contributing editor Bruce F. Webster can be reached via BIX (webster) and via MCI Mail (Bruce_Webster).

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**STATE OF THE MAC**

**Virtual Ports**

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**AN INTERVIEW WITH JAMES VON EHR, PRESIDENT AND CEO OF ALTYS CORPORAION**

**J**ames Von Ehr is co-founder, with Kevin Crowder, of Altys Corporation. The Plano, Texas-based company develops and publishes Fontastic, Fontographer, The Art Importer, and Metamorphosis. In addition, Altys developed Freeland, published by Altys Corporation. Begun in 1984, Altys is now a company of 26 employees and $3 million in annual revenues. Before founding Altys, Von Ehr worked at Texas Instruments for more than a decade. He has a B.S. degree in computer science from the University of Michigan and an M.S. degree in computer science from the University of Texas.

**MW** How did you begin working in the computer field?

**VON EHR** In 1973 after finishing school in Michigan, my girlfriend and I drove to Dallas in my Volkswagen bus to interview at Texas Instruments. We camped out the night before the interview, and she cut my long hair so that I'd look respectable. They must have liked me, because they made me an offer during the interview. The job was in the operating system group extending a FORTRAN compiler. TI had just announced the first affordable minicomputer—it cost $20,000. That excited me, and it seemed like a great place to work.

**MW** What was your first exposure to Apple computers?

**VON EHR** The hardware maintenance engineer at TI who serviced our computers convinced me that I should have an Apple II. So in 1978 I bought one. I had an interest in music and I built a synthesizer to connect to it, with digital-to-analog converters and patch panels everywhere. I started going to college for my M.S. degree at about the same time.

I finished my M.S. in 1982, and by then I was really busy with my work and my projects. I was doing assembly programming on the Apple II, writing music programs. I had been appointed senior member of technical staff at TI, and they loaned us 99/4 computers. I did some game programming on the TI 99/4 home computer. TI published my program just before they got out of the personal computer business. I made enough royalties from the game to fund leaving the company in 1984.

**MW** Why did you leave?

**VON EHR** For a lot of the same reasons people leave big companies: the insecure, bad managers who will not let people grow, constant politics, unproductive meetings.

**MW** What happened in 1984?

**VON EHR** In 1984 I did some consulting, wrote games for the Commodore 64 that were unfinished, and hummed around. In early '84 the game market was collapsing.

**MW** How did you become involved in the Mac?

**VON EHR** At TI I had hired a summer intern, Kevin Crowder, who worked for me. He was going to go on to graduate studies, but I convinced him to come work for me at TI. Kevin was the cofounder of Altys.

We knew we wanted to work together and we kept trying to find something to do. We started a graphics presentation package on the IBM PC, like Persuasion. But the graphics performance of the PC was miserable. We liked the Mac but at that time it only had 128K of memory.

We thought about a CAD package, electrical CAD for PC-board layout on the Mac, but 128K of memory couldn't handle it. When the 512K Mac arrived we looked at it more seriously, but it still wasn't enough for CAD. Then Kevin had the idea of becoming a utility company.

**MW** Were there other utilities then for the Mac?

**VON EHR** Not really. At most there was clip art.

(continues)
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MW How did you decide what to do?

VON EHR Kevin said let's do a font editor, there is no decent product for that. So we did Fontastic. We thought about it for two weeks. And on December 14 of 1984 we said yes. We went to our lawyer and incorporated, and bought a 512K Mac. We drove to Megamax, the people who wrote a C compiler for the Mac, and bought that, and started programming. We had to learn C and Mac programming. I signed us up as Apple developers so we had a copy of the draft of Inside Macintosh.

It was obvious to us that this was a serious computer; the manner in which it handled events and the managers were all like a real computer operating system. I have a lot of respect for the original guys who did that work. They had a lot of vision. And I have to put the current guys on the back for keeping that vision going while keeping the operating system compatible.

MW How long did it take to write your first program for the Mac?

VON EHR From start to finish the program took three months. After that, we agreed the Mac was the hardest machine we had ever programmed for. That product was Fontastic. It had 5000 lines of code and cost $39.95. It took up 40K on a disk.

MW When did you begin shipping?

VON EHR April of 1985. We placed our first ad in Macworld. I made it up, it looked terrible. I signed a personal guarantee with Macworld that I'd pay for the ad. Two days after it appeared we began to get calls. It was disappointing how the business built up. There were no mailings of orders at the post office like you have a vision of as a small developer. Instead there was one letter one day, two or three on another, and none sometimes.

Then slowly the business built up. Fontastic was not very stable in those days; nothing was very stable then. I suspect that the Mac toolbox was not too stable. We fixed the bugs as we learned about them. We had a lot of experience at fixing bugs and with
quality service at Texas Instruments. Just before we shipped 2.0 we got calls asking if the product worked with LaserWriter fonts. We told people that the fonts would print on the LaserWriter but that they wouldn't like them because they were bittedmapped.

MW That presented you with your next business opportunity?

VON EHR Yes. We started to work on Fontographer in June of 1985. It was for object-oriented graphics. It draws outlines of characters, not turning dots on and off like a paint program.

We demonstrated Fontographer at the first Macworld Expo in Boston, in 1985. People had lots of comments about various aspects of the program. How to achieve tangent joins, smoothing curves, and straight lines. We went back after the show and eventually totally rewrote the interface. That set us back one month. In January of 1986 we shipped the first Fontographer. We took the product to the January Macworld Expo and sales there paid for our attending the show.

MW What happened with Fontastic?

VON EHR By January of 1986 we reached a peak of 800 units sold per month. It made us happy. We came out with Fontastic Plus in 1987. People still do bitmap editing with it. There are probably 18,000 copies of the program out there.

By May of 1986 the success of Fontographer allowed us to move out of my house and into a real office. Fontographer cost $395. We had learned about distribution of software, learned about pricing of software, that it doesn't just reflect the cost of development. We learned that developers don't get much of the money that is made from development of software.

MW How did FreeHand come about?

VON EHR Our Fontographer customers told us they wanted a PostScript drawing program. We had one in Fontographer but it was limited. So we got started on a much less limited program. We started in February of 1986 but with me as the only full-time pro-

(continues)
grammer and Kevin part-time, we had to get help.

Kevin quit TI in July of 1986 and started working full-time on FreeHand. I was doing Fontographer 2.0. That just about sunk the company.

MW How so?

VON EHR We had preannounced Fontographer 2.0, so sales of 1.0 dried up. I was doing 80-hour weeks to finish up Fontographer, which was the basis of the short-term success of the company. It finally shipped in October of 1986. I think that helped earn us the respect of the industry; it showed that we cared, did quality software, and talked to our customers.

MW How was it received?

VON EHR Really well. Sales went up and the company was saved.

MW How did Aldus end up publishing FreeHand?

VON EHR As we were going along I realized what a big marketing project that product was. I realized we needed a bigger partner to make the most of the project.

We talked to Letraset and got serious with them. Then our Australian distributor found out what we were doing. Woolie Hershberg at Infomagic in Australia called Aldus president Paul Brainard, who was in Germany, and told him about our program—and told him that we were about to sell the rights to someone else. The next week I was at Aldus.

Kevin and I agonized for six weeks deciding who to go with. In retrospect, going to a big company was the right thing to do. People ask us “Don’t you wish that you had the rights?” and “Don’t you feel bad that Aldus gets most of the money from the program while you just get a royalty?” But I’m not so sad. We couldn’t have marketed that program ourselves back then so I’m okay with that decision.

MW You’re still working on FreeHand?

VON EHR Yes, most of us at the company are working on the next version of FreeHand.

MW How did you advance from Fontographer to Metamorphosis?

VON EHR Our customers said they didn’t want to draw existing artwork over again. In Fontographer we ask them to draw the font or logo. If they already have these in some format, they don’t want to redraw them. You could do that in Fontographer, but it takes a lot of work so we came up with the idea of KeyMaster.

MW What was that idea?

VON EHR To take any picture in any format EPS or PICT file and crack that file, understand it, and have the computer write a PostScript font program to describe the object. The Art Importer [originally KeyMaster] imports a file and does that.

MW Why the change of name?

VON EHR KeyMaster became a trademark problem.

MW What is Metamorphosis?

VON EHR Since we made Fontographer, people have wanted to import and manipulate PostScript Type 1 fonts, make display type, change the curve on the (continues)
Combine the raw power of your Macintosh with the utility of a modem and the indispensable convenience of a fax machine — and you’ve got a DataLink Send-Fax™ modem from Applied Engineering.

Send faxes directly from your Mac’s screen without ever printing a “hard copy” of the information. The exclusive AE Send-Fax™ software installs itself in your Mac’s Chooser DA. Faxes can then be sent as simply as printing. Imagine not having to waste time waiting around the fax machine to see if your faxes got through. Go right back to what you were doing, while AE Send-Fax™ operates in the background. You’ll automatically receive a report when the fax is completed.

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Best of all, AE Send-Fax™ comes with the best modems you can buy — the DataLink™ series. 2400 bps modems that deliver unparalleled reliability, futuristic capabilities and unmatched technical excellence. Modems designed exclusively for the Macintosh, not “ported over” from another platform.

The result? Standard features like complete communications software included free, full Hayes AT compatibility, asynchronous data format, auto answer, non-volatile memory, automatic tone and pulse dialing, remote access, built-in diagnostics, FCC certified designs, free tech support, five year warranties and more. And upgradeability to MNP-5 with 4800 bps throughput speeds and error-free data transfer.

DataLink/Mac™ (left) for the Mac II series, includes an extra serial port so you can add a peripheral, even when the built-in ports are occupied. DataLink Express™ (center) works externally with all Macintoshes and features another AE exclusive, our “Line Engaged” indicator to show a shared line is in use. Since DataLink Express works with all computers (w/serial port), we included both mini-8 and DB-25 ports. DataLink/Mac Portable™ (right) includes AE Send-Fax™ and MNP-5 as standard features and incorporates an ultra-low power design to extend the Mac Portable’s battery life.

Order today! To order or for more information, see your dealer or call (214) 241-6060 today, 9 am to 11 pm, 7 days. Or send check or money order to Applied engineering, MasterCard, VISA and COD welcome. Texas residents add 7 1/2% sales tax. Add $10 outside USA.

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<td>AE Send-Fax™ Option</td>
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*When not originally purchased with modem.
Monitors/Cards

Why settle for monochrome? Now, MacAvenue lets you take hold of some screaming colors and create bright visuals that will grab attention. Combine the Seiko 14-inch Sony Trinitron monitor and the RasterOps 8-bit or 24-bit color card, and you'll have colors that are 43% brighter than the Apple color monitor.

- **Complete 8-bit color system.**
  - Seiko 14-inch monitor: $795
  - RasterOps 208 8-bit color board: $365

- **Complete 24-bit color system.**
  - Seiko 14-inch monitor: $995
  - RasterOps 264 24-bit color board: $595

Printers

A microLaser With MACRO applications

The microLaser is a remarkable Macintosh-compatible PostScript printer that is compact, user-friendly, upgradeable and affordable. Featuring a complete package of Adobe PostScript and HP LaserJet™ Series II emulations, the microLaser PS prints at 300x300dpi and flaunts 11 PostScript font families with a total of 35 different fonts — all in an infinite array of point sizes. And, at just over a foot square, the microLaser fits neatly on your desk. If you want a really high-powered machine, enhance the standard 1.5MB RAM by adding memory boards — up to 4.5MB. The microLaser is AppleTalk-ready and compatible with the Centronics® parallel interface.

- **microLaser PS.**
  - $2425

- **Envelope Feeder.**
  - $299

- **Second Paper Drawer.**
  - $325

- **TI microLaser RAM upgrade.**
  - $399

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The Protogé from MacAvenue is everything you'd expect from the best drive in the business: quiet, cool, quick, elegantly engineered, tough enough to travel and priced to move. It arrives pre-formatted with custom-designed Disk Management Software that allows you to partition your drive and password protect each partition. Smart features include external termination and push-button SCSI ID setting.

- **Capacity External Quantum Internal Quantum**
  - 20MB $345 N/A $995 N/A
  - 40MB $395 $455 $325 $375
  - 80MB $625 $645 $465 $595
  - 100MB $849 $836 $675 $645

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   Should you experience a problem with anything you purchase from MacAvenue, call our product support staff at 800-766-8221 weekdays from 8:30am to 7:00pm, CST. We will be happy to assist you with any hardware or software difficulty. If we cannot resolve the problem over the phone, we'll assign you a return material authorization (RMA) number and a Federal Express number. We will replace the product with equivalent merchandise and pay the shipping both ways.

3. **One-Year Limited Warranty**
   For up to one full year after your purchase, MacAvenue will replace or repair (at our option and without cost) any product you are not completely satisfied with, and we will pay for return freight to you.
## Hardware

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## Software

### Writing & Publishing

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### Utilities for Writers/Publishers

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### Fonts & Font Utilities

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### Business Software

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### Database Management

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### Office Productivity & Utilities

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<td>32390 MacProject II 1.2 (MacProject II)</td>
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</table>
Personality...and Price
From Your Best Source for Macintosh Products

Boards/Memory

Build Your Memory
You need at least 4MB to run a couple of heavy-hitting applications with MultiFinder. Take advantage of MacAvenue bargains to upgrade your Plus to 4MB or take your SE30 to 8MB. MacAvenue offers only the best surface-mounted, 80-nanosecond memory products. And you'll get a step-by-step installation guide with a tool to "crack" the Mac Plus or SE. If you want to speed up printing of complicated graphics and heavily formatted reports, beef up your printer's RAM as well.
- 2 x 1MB SIMMs. 25480 - $150
- 4 x 1MB LaserWriter SIMMs. 25483 - $436
- 4 x 1MB FX SIMMs. 25484 - $436
- 4 x 4MB SIMMs. 25487 - $1,900
Free with your 4 x 4 MB SIMM purchase -- NanoDisk — lets you store up to 28MB of applications and files for fast retrieval, $79.95 value.

Software

Scan by Hand
If you can't set up an elaborate scanning station, try the hand-held ScanMan from Logitech. You'll get 32 shades of gray in photographs, drawings, logos, and illustrations up to four inches wide. Connects directly to the Mac SCSI for easy installation. Resolution from 72dpi to 400dpi delivers a quality image both on screen and on paper. ScanMan 32. 22751 - $317

M - O - N - E - Y
Bypass painful bookkeeping chores with Quicken, the money management program that costs you less than an hour with an accountant. Keep tabs on your expenses, watch the bottom line of your small business, and track your personal income — all at the same time. Quicken writes and addresses checks, reconciles your bank statement, and lets you know where you are with the budget. Quicken. 28458 - $35

Edging Out the Jagged Edge
Forget those nasty jagged edges on the bit-mapped letters of your screen fonts. Adobe TypeManager gives you the look of PostScript type and it improves the output of your non-postscript printer. By eliminating the need to store several sizes of each font, TypeManager saves drive space. Adobe TypeManager. 29824 - $55 Adobe Plus Pak. 29834 - $107

Build the Town
Are you a model citizen? Or does every policeman know you by name? It doesn't matter in SimCity, because you're the boss. Build the perfect city or create the most bizarre urban landscape you can imagine. You're the mayor, the planner, the cop on every beat. And the Sims — the simulated humans that live in your city — always respond to your decisions. SimCity. 28678 - $28 SimCity Supreme. 28680 - $47

Keyboards

Have it Your Way
The Switchboard, the first modular keyboard for the Macintosh or PC computer, gives "user-friendly" a whole new meaning. The keypad and cursor key can be on the left or right — you decide. The Switchboard. 25182 - $174

Hide Your Work
This MacAvenue keyboard drawer holds all standard and extended Mac keyboards. Interior dimensions of drawer are 22.25" x 9.5" x 2.25". Comes complete with all installation hardware. MacAvenue keyboard drawer. 41783 - $19

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Q, put their own logo into a font. They wanted to get access to outlines in FreeHand, to do effects.

Metamorphosis realized that need. It created the PostScript code. A hacker friend of ours developed a PostScript trick that allows us to extract a font outline from the laser printer. We actually pull the outlines from the printer.

MW Didn't that present problems for Adobe?

VON EHR Adobe is pretty careful about [allowing access to their fonts] and has a lot of safeguards to prevent people from getting access to them. But we announced Metamorphosis on the opening day of the Seybold conference at which John Warnock announced that the PostScript format has been opened. It was a relief on one hand and frustrating on another because we had a big announcement that was overshadowed by Adobe.

The program has two planned releases. The first allows us to convert Type 1 fonts to an editable format, the second release, which we're still working on, converts any font from one format to another—TrueType to PostScript Type 1 and the converse.

And of course there are a lot of people interested in going the other way: those with installed libraries of PostScript fonts.

MW When will the second part be ready?

VON EHR As soon as Apple freezes the order in which the points are added to the specifications, which we specify important coordinates. For example, in a T there is a specific focus for the left and right sides of the vertical stem of the T. Type 1 hints assure that every stem of that font is the same.

We have to provide hints that tell the Type 1 font how to interpret the width of features such as the vertical stem width. This interpreter makes all of the stems the right width when they are printed.

In TrueType you have to adjust each point on an outline. And the program for TrueType has to specify the order in which the points are adjusted—in Type 1 you just note the important points. In TrueType you have to specify what point to move where and in what order.

MW How do you write software to do this?

VON EHR In Type 1 fonts you just have data statements, hints that describe (continues)
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Also, the performance of PostScript 2 will be faster. And some of the technology for Adobe Type Manager will be incorporated into PostScript 2.

MW What is the future of Adobe Type Manager?

VON EHR I think that it's fairly good. Even with TrueType, ATM will have a reasonably big base, and TrueType won't be generally available for a year. It's in developers' hands but not in the general public's, so that Type 1 fonts have even more chance to be established. TrueType will eventually be stronger if Apple and Microsoft improve it, and in two years it will be popular.

MW FreeHand and Illustrator—how do you compare the two?

VON EHR Hmm. I'll have to think carefully about that. I think I can say that FreeHand is easier to use. I think that FreeHand has more capabilities, that there is more that can be done with it. It was the first Mac product to have style sheets for graphics. FreeHand has named colors and so can edit colors more easily. Type handling is superior. Illustrator has smoother drawing and a bigger mindshare. Illustrator has a bigger installed base than FreeHand—Adobe was out there with the product for almost two years with no competition.

MW Will there be a PC version of FreeHand? With Windows 3.0?

VON EHR That's what will make FreeHand possible on the PC. We'll see something running in 1990, but probably not shipping.

(continues)
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MW How will the performance of the two products compare?

VON EHR The PC version will be comparable to the Mac version. Running it on a 25MHz, 386 machine will be comparable to a Mac II.

MW FreeHand is still slow. Why?

VON EHR Internally we have a display PostScript interpreter. Illustrator draws into the screen buffer, which requires a lot of memory, equal to the size of the screen. We don't require off-screen memory. The downside is that we have to convert to QuickDraw. We go through the work of display PostScript and then convert to QuickDraw calls. We did it that way to be compatible with the Mac programming model. Apple says clearly in the Mac programming manual not to talk directly to the screen.

MW Illustrator does that.

VON EHR Illustrator breaks when new Macs come out because Apple changes the rules of how QuickDraw works. With FreeHand we pay a price in performance to obey Apple rules. But we have taken that issue to heart and have an answer in 3.0. We're working on it.

MW Will we see the program at the August Macworld Expo?

VON EHR We are hoping. We're working on the ease-of-use and performance issues.

MW How about things like file conversions? The features in Adobe Photoshop that allow one to do that are really great.

VON EHR FreeHand is able to read PICT and EPS files and we plan to continue in that vein. We have always done color separation in FreeHand, as well as PostScript will allow, with its problems with both screen angles and screen frequencies.

MW Which Adobe will soon improve.

VON EHR Exactly.

MW Can Altsys make it as a small software developer? We're in an era of mergers.

VON EHR I think we can. Our corporate charter is that we don't have to be the biggest or the fastest-growing company, but to be the best. When people think of Mac graphics I want them to think of Altsy.

We do look at acquisition and wonder if it is the right time to be acquired. I have a problem in going public or being acquired. We're a little too small to go public, and the market punishes those companies that have long-term thinking. Next-quarter earnings are more important to public companies than the next three years. Management is always accused of short-term thinking, but they're graded for short-term thinking.

MW What about acquisition?

VON EHR There are two downsides. It is hard to protect employees' jobs. We only have 26 employees, so I do not have a lot of positions to cut. I am careful to hire good people so there are none to slash, and that is typically what an acquiring company does. There is a time to sell, and our original plan was to grow and sell the company. Most people believe that you sell a company when it is at a peak, but I disagree. I believe the time to sell a company is when products are mature in engineering and it is time to milk them for maximum revenues. Some people sell their companies when they are at their most popular. It would be time for us to sell the company now if that were our model.

And when companies are sold they immediately slow down. There are meetings, and you lose control to new managers who want to assert their own control. I think that right now it's a very competitive market and that if we spend lots of time in meetings we would fall behind.

MW What is the offer you couldn't refuse?

VON EHR Oh, three times sales. Say $9 million.

MW That sounds like a good offer. (continues)
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MW Aldus is the obvious choice?

VON EHR Yes. But we get nibbles from others. Venture capitalists ask if we need money. I say we're doing well on our own.

MW How do you relate to Apple as a small developer?

VON EHR Apple treats us fairly well. They're working closely with us in the font area, especially in the area of Asian [nonroman] fonts, where we're pretty important to them.

MW As a small developer and publisher how do you relate to the retail and distribution channel?

VON EHR We are happy with MacAmerica in the distribution channel. They do a good job on the Macintosh side. They were the first with Mac products, they make consistent orders in reasonable quantity, and they are good about paying for software—an attribute not shared by other distributors.

Mail order has been good for us as well. Our products are specialized, and not too many retailers want to put them on the shelf. Retail wants to buy Claris, Microsoft, Aldus, and Adobe and that's about it. If it's not a spreadsheet or database the retailer is not too interested in carrying it.

With Fontographer we're in distribution and mail order, and that is most of our sales. Almost none (2 percent) of our sales are direct, primarily those people without access to computer stores or those who don't like mail order.

MW What are the trends for paint and illustration software?

VON EHR Paint software, in the sense of black-and-white, bitmap editing is going away. We'll see more high-end paint packages such as PixelPaint Pro and ColorStudio—photo-retouching packages, not so much paint packages, with halftone editing features.

Illustration is going to get more painterly. I've been thinking for a long time that our illustration software is too hard-edged, technical, and too dull. Paint systems are much more human looking, but they have no quality when you zoom in. The future for illustration programs is in better-integrated textures, to give more human feeling.

MW What is the biggest challenge Apple faces in the near term?

VON EHR The company is surrounded by challenges. They have moved toward workstation capability and yet they can't abandon the entry-level people. They have to satisfy the clamor for the low-end machine without abandoning their vision of an easy-to-use, powerful machine.

MW What is a low-end machine?

VON EHR My idea? A Mac based on a 68030, at a low speed, would be OK.

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I'm after a machine that will last ten years in the market, like the Apple II. To do that today a machine will need virtual memory. Applications years from now will need many megabytes to run. I would hate to see Apple make a machine today that won't run applications in a few years.

It must have space to upgrade RAM memory. It's OK to ship a machine with 1MB or 2MB of RAM, but it must be expandable. Expansion to 4MB is reasonable today. But in five years 20MB to 30MB will be needed.

The home computer that will finally be useful in the home will have a performance rate of about 150 MIPS, 100MB of RAM, a 1-gigabyte hard disk, and access to a high-speed network. We'll see that in the 1995-to-1997 time frame.

**MW** Do you have any comments about the demand for a low-cost machine?

**VON EHR** I get tired of people clamoring for a low-cost Mac. I don't want a toy. If I wanted to program a toy I would work on Amiga or Atari machines. I want a computer that can do useful work for people at a low price. People bought lots of Apple IIIs in the $1500 price range ten years ago, so I don't think it's unreasonable to ask people to pay $2000 today.

Comparing the Mac to Taiwanese clones is not useful. If you can get your work done on a PC clone, fine, then you should be using one. But many people can't get past the interface on a clone.

**MW** What do you think about John Sculley as the head of technical development?

**VON EHR** He'll be a busy man. I wish him well but I don't see how he can lead the technology group. He's a real smart guy, but he doesn't have the technical background to understand the issues.

Of course it could be a situation like at IBM where there is a lot of technology within the company and marketing only lets a part of it see the light of day. There could be great technology in the Apple labs [and Sculley could facilitate its marketing].

**MW** What technology should Apple be adding to the Macintosh?

**VON EHR** I am intrigued by the object-oriented approach that Next has taken in its system software. I think that should be considered. Hardware-wise, we're missing graphics accelerators, but there is another issue in hardware. DMA [direct memory access] is needed to increase the access speed to the disk. There is a lot of commentary about the need for multitasking, but that will depend upon the availability of DMA.

**MW** Are Mac clones a possibility?

**VON EHR** I talked to someone two years ago who wanted my help in building (continues)
one. They wanted me to work on the system software in the ROMs. I told them no, that there was too much work there. I estimated 100 man-years and that was two years ago.

MW But it could be done?

VON EHR Yes.

MW In a legal way, much as IBM ROM BIOS was cloned?

VON EHR It could be, but Apple is a moving target. You've got the SEs, the Mac II, the IIs. The question is what functionality you would want to implement. The Mac has a massive software-development investment; the hardware is not a problem. But Apple understands that the value lies in its software these days.

MW What are your favorite products, other than your own, in hardware and software?

VON EHR Think C. It's the best development environment we've ever seen. It's better than Apple's MPW because the turnaround time is so fast. You can make changes and see your program run. It's the fastest we've ever seen, even on workstations. But we're up against its limits now with development on FreeHand. To do FreeHand we have to merge some of the external subroutines where we blow the jump-table limits.

For software, I admire the simplicity of MacWrite. I use version 4.0. I don't need any more power for what I do, and it's better than Microsoft Word for letter and word spacing. DeskPaint [Zedcor] is still available without upgrading to DeskWorks. And the first time I saw PixelPaint, it amazed me. It was one of the first to use pop-up menus like FreeHand's.

For hardware, the Mac IIsx and the LaserWriter BMX hum along pretty well.

MW We are seeing a lot of companies releasing fonts on CD. Is that the future?

VON EHR I have a question about the quality of a lot of the type on the discs. There is a lot of quantity.

MW Aren't we talking about the standard type libraries from companies like Linotype and Monotype?

VON EHR I believe that those companies would disclaim creation of some of the type on the discs. Remember that fonts can be implemented poorly.

MW What about gray-scale fonts?

VON EHR We don't believe in them. Apple doesn't believe in them. They're useful for one thing, video. You can't print them if you don't have a gray-scale printer. There is no on-screen support for them, and there is limited support for gray scale on the Mac II ROM chips. Let's set makes them. But a 24-point gray-scale font, when scaled to 25 points, turns to garbage. They just don't scale well. AT.M doesn't support them. TrueType doesn't support them.

MW But they make a computer screen as readable as paper?

VON EHR Yes, by blurring the characters. I would rather increase readability by increasing the resolution, by moving from 72 dots per inch to 96 dpi or to 144 dpi. At 144 dpi you have twice the resolution and characters are crisper.

MW What do you think about the Personal LaserWriters?

VON EHR It's great for the Mac and great for us if more people can afford laser-printer quality. It also opens up an interesting opportunity for someone to do a PostScript-printer driver, if they're quick. A lot of our customers require PostScript-quality graphics, but with ATM and TrueType, everyone can get excellent fonts, even on a QuickDraw-based printer.

MW What is the future of Mac type?

VON EHR The market is getting full. All the major players are now in the Mac market. So there will be a shakeout. I predict prices will drop.

There will be a lot of jockeying with TrueType, which presents a new opportunity for sales. I see lots of opportunities for tool makers. Now that the market has opened, Adobe has removed the quality barrier so that Fontographer users can produce type of the caliber of the major type foundries.

MW Who do you expect will be the new font developers?

VON EHR Most graphic artists I know have at least one typeface in them. One font that they would like to see on paper. And many companies will want to do their logos.

MW Can small type developers really succeed?

VON EHR Casady & Greene has begun to be considered a serious type foundry. Zuzana Licko at Emigre magazine. David Berlow, formerly of Bistream, has founded a company with Roger Black called The Font Bureau [in Boston], making fonts for magazines.

There is a renaissance of small type houses. People can get into the market for a low up-front expense, and they are only limited by their creativity. Top font designers from throughout the world are working on the Mac, like Matthew Carter, vice president at Bistream. Matthew has said to me that the tools on the Mac today are better than ever before.
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Both of them give you the capacity to create professional looking video tapes or connect directly to a big screen TV for an interactive video presentation. We think it's revolutionary. For more information on a need to know basis call 1-800-448-8231, or from California call 408-739-4570.

Macintosh Video Output from GENERATION X
The Return of Illustrator

Adobe Illustrator is getting a long-awaited upgrade. Illustrator version 3.0 has a simpler, less modal interface, built-in chart-making tools, and greatly improved text features.

You can enter and edit text directly on an illustration without going through a dialog box. Text blocks have no size limit; can contain any mix of fonts, sizes, and styles; and support kerning, tracking, leading, and other precise typographical controls. You can convert Type 1 fonts to outlines to modify letters as Bezier curves; you can flow text into columns, inside a series of linked objects, or attached to a curved path.

Version 3.0 generates a variety of bar, line, area, scatter, and pie charts from numbers you import or type into a table. It provides none of the number-manipulation features of other graphing tools such as DeltaGraph or KaleidaGraph, but it can transpose rows and columns and lets you set the scale—for example, one head in a population graph can represent 1000 people or 1 million. You can save a graph as a template and apply it to a different set of numbers.

In Illustrator 3.0 you can select and edit single objects in a group without ungrouping; add points to or remove points from a curve; grab and manipulate Bezier curves directly; and convert corner points to smooth points, largely eliminating the need for the tedious scissors tool.

Aldus FreeHand 2 still has it over Illustrator 3.0 in a few areas. Illustrator does not permit drawing in the preview window, requires using the Blend tool to create even simple foundations, and cannot import TIFF files as templates or art (it will import EPS files and incorporate them in a final piece).

Illustrator 3.0 should ship in September. It will list for $595 and require two megabytes of memory. ATM and Separator 3.0 will be bundled with it. For more information, contact Adobe Systems in Mountain View, California, at 415/961-4400. -D.L.

Animation for Sign Language

Advances in computers that can generate speech—and respond to it as well—are giving the visually impaired access to computers and all the information they make available. But barriers for the hearing impaired, who often have difficulty learning to read, have been slower to fall. A group of linguists at the Center for Sign Language and Communication of the Deaf at Hamburg University in West Germany have been working on this problem for ten years, first documenting the grammar of sign language, then developing a

...continues

A sign in HamNoSys with its character from the HamNoSys font just below the thumb.
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The Sound and the Graphics

The folks at Motorola who make the microprocessors that are the heart of every Mac have come out with a chip that promises to merge sound and graphics in ways not possible before. The 96002 Media Engine is a digital-signal-processor chip with added I/O capabilty that allows it to act as a sound-and-graphics processor for multimedia and other applications. The chip can work with Motorola 68040, which has begun shipping, or with other microprocessors such as Intel's 80486.

The 96002, designed to produce compact-disc quality sound and graphics, can operate at a very hot 50 MFLOPS (million floating-point operations per second). Although it adds the floating-point math capability, the chip is basically a 32-bit version of Motorola's 56001 digital signal processor, which is used for digital audio devices and in the Next machine.

Expected applications include animation, 3-D graphics, compression and decompression of full-motion video, and image modeling. Several vendors are working on products containing the chip, including Ariel Corporation, which said it is shipping the MM-96, a board for the PC AT and compatibles that can hold one or two 96002 chips. The board, intended for scientific, industrial, or multimedia use, may also come out in a Mac version. For more information, contact Ariel Corporation, in Highland Park, New Jersey, at 201/249-2900. —T.M.

Islands in the Screen

Farallon Computing has brought out new versions of its Timbuktu and Timbuktu Remote screen-sharing programs, and has also introduced several hardware products for connecting Macs to Ethernet. The new Timbuktu, version 3.1, lets you see and control the desktops of several Macs at once, with each desktop appearing in a different window. Timbuktu connects to the other Macs via the LocalTalk network. Previously you could see the desktop of only one other Mac. The new Timbuktu Remote, version 2.0, lets you see your own desktop in a resizable window while you control a second Mac over a modem. The previous version of Timbuktu Remote did not let you see your own desktop and the remote desktop at the same time. Timbuktu Remote 2.0 also adds a call-back feature for added security over the modem, and CGL scripting that lets you go through an in-
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Business Sense is an extraordinary bargain and is now available direct to the end user at just $179 including a 30 day, no questions asked, money back guarantee. A complete fully functional demo disk is available for just $10. All you have to do is give us a call today at 307-789-7257. MasterCard and Visa are accepted.
FilmMaker combines many of MacroMind Director's animation tools with rendering and presentation features. Like Director 2.0, FilmMaker can composite animated images, import PICT or PICS files, combine animation with sound, perform some interactive functions, and play animations in HyperCard. But FilmMaker has some significant features not found in Director 2.0. It is actually a set of four applications (Animate, Color, Sound, and Present) and five utilities (FilmMaker DA, Mark, Picture Runtime, Sequence Runtime, and Sequence Transfer).

Animations are composed in Animate, color effects added in Color, sounds added in Sound, and the final presentation composed and played back in Present. The utilities perform a wide variety of functions, such as converting pictures from graphics applications into FilmMaker format and running animations inside HyperCard.

The Animate application supports numeric control of an object's location, rotation, and color. Animate also has rendering functions like antialiasing, dithering, and remapping. An outstanding feature is its ability to create parent-child relationships between objects. Like the three-dimensional modeling program Swivel 3/D Professional, objects can be linked so that they move together or in relation to each other. Unlike Swivel, linked objects in FilmMaker also share color changes, and the Tree window shows which objects are linked together.

The Color application has an eyedropper tool for selecting and changing colors either one frame at a time or by groups of frames, to allow color effects like fades. Present is an object-oriented environment for linking animated sequences, transitions, and other parts of a presentation. It can create buttons and key commands that trigger transitions to the next element, and it can even open other applications and load their files.

FilmMaker ships in a metal film-reel canister for $1995. It requires 5MB of RAM. For more information, call Advent Computer Products in Encinitas, California, at 619/942-8456.

—Jonathan Cassell

A One-Mac Band

Composer-sculptor-inventor Trimpin suffers from allergies to brass and wood that forced him to stop holding brass and woodwind instruments to his mouth. No matter, though: he now plays brass, woodwinds, strings, and percussion instruments, not to mention garbage cans and clogs, with his Mac. For the past 15 years, he has been designing and building electromechanical devices that attach to acoustic instruments and play them in response to MIDI signals.

Trimpin descends from a long line of German inventors including—he is sorry to say—the one who, in the 1640s, created the first alarm clock. Trimpin’s computer control of acoustic instruments opens realms of musical possibility, placing him at the fore-

(continues)
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front of a musical avant-garde. Until now, so-called computer music has been played on synthesizers. Acoustic instruments have been played alongside or interactively with computers, but not by computers.

Using the Mac, Trimpin controls his orchestras as no human conductor can. For example, he can play an unlimited number of tempos at once, and can synchronize instruments exactly. Exact synchronization is critical for creating the resonant effect essential to his compositions. He can also play each of his instruments beyond human capability—using 20-note chords, for example, or playing at superhuman speeds.

Trimpin automated acoustic instruments, instead of working with synthesizers, because of the former's resonant qualities. He refers to his compositions as psycho-acoustic—written with human perceptual faculties in mind—and one of his main interests is the way sound moves through space. He arranges instruments in a circle, with the audience in the center, in order to make sound travel in different directions around the room. He can, for example, play a theme in the left-front corner of a room, expand it in the left-rear corner, play an opposing contrapuntal motif across the back wall on a different set of instruments, play with echo effects, or make a single sound seem to move.

Trimpin uses various Macs with Mark of the Unicorn's Performer (MIDI software). He designed the boards for his electromechanically modified instruments, using 6809 CPUs, custom-coded EPROMs, UARTs (communications protocol chips), and VIAs (versatile interface adapters). He has also invented input devices, including a light-sensitive one that he uses to compose. The device senses the shadow of his hand interrupting the light.

Composer-inventor Trimpin has designed circuit boards and mechanisms for playing a host of acoustic instruments.

As yet, Trimpin has no interest in recording, he says, because current recording technology cannot duplicate the acoustic elements of his compositions. Instead, he performs live and creates sound sculptures. In 1990–1991, he and/or his work will be at the Los Angeles Arts Festival; Seattle's Bumpershoot Festival; the Banff Center for the Arts; Minneapolis's Walker Art Center; New York's Hall of Science; the Portland, Oregon, Art Institute; Vancouver New Music; and San Francisco's New Langton Arts.

—Ann Garrison

Minitab Makes the Mac

Minitab is a statistical software package developed in the 1970s for mainframes, now available on the Macintosh. It was originally targeted for statistics students and lacked some advanced capabilities found in other statistical packages such as SPSS. Minitab was popular for its easy-to-learn interactive approach back in the days when most statistical packages were largely batch oriented. Current releases of Minitab have much-enhanced statistical capabilities, and the application is now used by many professionals, though it still lacks some significant functions, particularly for analysis of variance. The program's macro feature makes it possible for users to fill in gaps in Minitab's capabilities, and the Mac version ships with a collection of popular macros that run inside Minitab or under Apple's MacroMaker.

The Macintosh version of Minitab is a complete replication of the mainframe package, including support for its limited, mainframe-oriented graphics tools. People familiar with Minitab will be able to use the Mac version immediately, and extensive online help files are available in case you need to brush up on anything.

Minitab barely uses the Macintosh interface. Only a few basic commands, mostly for importing and exporting data, appear on the menu bar. Even text files created by Minitab require a separate application for editing (MiniWriter, a text-editor desk accessory, is included for this purpose). Still, despite its command-line nature, Minitab remains remarkably easy to use, thanks in part to its relatively simple language. Once you become familiar with the language, you may even find it simpler and quicker than more Mac-like statistics packages. But users wanting a more typical Macintosh approach will probably prefer programs like StatView, and users wanting the most complete set of features will probably (continues)
S

uddenly, the market seems to be flooded with companies selling high-resolution PostScript® imagesetters.

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This ad was entirely produced on a Linotype Publishing System.
PostScript Prices Drop, Printers Get More Intelligent

The printer wars are heating up, with several vendors offering lower-cost PostScript printers. Among these are GCC Technologies, which has introduced PostScript versions of its popular PLP II and PLP IIS, and QMS, which announced its QMS-PS 410. The new GCC printers are the Business Laser Printer II (BLP II) and the Business Laser Printer IIS (BLP IIS).

GCC's BLP II prints 4 pages per minute and has a suggested list price of $299, while the BLP IIS produces 8 pages per minute and lists for $2799. The QMS-PS 410 prints 4 pages per minute. At press time, QMS had not finalized the printer's list price, but the company said its goal was $2795, give or take $100. The GCC printers actually use an LED-array-print engine from Oki to draw the page image on the print drum. The QMS-PS 410 uses the Canon LBP-LX laser-print engine.

The new GCC and QMS printers all have one serial port, one parallel port, and an AppleTalk connector. The QMS-PS 410 has an Emulation Sensing Processor that can tell whether a file is in PostScript, HPPCL (Hewlett-Packard Printer Control Language), or HPGL (Hewlett-Packard Graphic Language) format. HPPCL is used by HP's popular LaserJet family and many other PC printers. HPGL is most often used in plotters. Having sensed the type of file, the QMS-PS 410 automatically switches to the appropriate printer emulation.

The QMS-PS 410 was slated to begin shipping in July. The GCC printers were scheduled to be available beginning in June. Apple also planned to begin shipping in July its Personal LaserWriter NT, a 4-pages-per-minute PostScript printer with a list price expected to run about $3300. (See "LaserWriters for Less," August 1990.) For more information, call GCC in Waltham, Massachusetts, at 800/422-7777, or QMS in Mobile, Alabama, at 205/633-4300.—Ted Landau

Vector + Raster = Shapes

Shapes, a new program from Letraset, blurs the distinction between PostScript (vector-based) and bitmapped (raster-based) graphics. It also blurs the hard edges of PostScript graphics with an antialiasing feature, allowing you to output good-looking text and graphics on non-PostScript media, including color printers, film, and video.

Shapes adds a PostScript drawing layer to Letraset's ColorStudio. While ColorStudio's image and mask layers are raster based, the layer added by Shapes is vector based; PostScript objects overlay the graphics in the other layers. Unlike other PostScript graphics programs, Shapes allows you to soften the edges of objects, a capability that should delight anyone who uses the Mac in video or film production, where anti-aliased text is a must.

In addition to improving the appearance of text, Shapes' anti-aliasing can eliminate the need for trapping, a problem that has plagued many who print color separations on the Mac. Since Shapes can soften the sharp line between two adjoining colors, a slight misalignment when printing won't cause the thin gap that sometimes appears between different ink colors.

Shapes is a PostScript RIP (raster image processor). When you print a ColorStudio document on a PostScript printer, the PostScript objects print as a PostScript overlay to the bitmapped image. When you print to a non-PostScript device, the PostScript objects (continues)
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SHARP EXPANDS THE POWER OF THE WIZARD.
Erfert Fenton

on and quarter of 1990 and will sell for sex travaganza "sold on CD-ROM for $95. "You've got a hot date with Virtual Valerie for an erotic interlude!"

At the San Francisco Museum of Modern Art—only two blocks from the Expo hall where Virtual Valerie was for sale—you could have seen another Mac-based interactive sex fantasy. There, in larger-than-life video, a woman dressed much like Valerie, in black miniskirt, low-cut bodice, and long satin gloves, beckoned to visitors. "Touch me," she insisted, seductively. "Try and reach through the screen." If you touched her legs on the HyperCard screen, she led you into the garden, where the Woman in Red, the Zen Master, and the Demon appeared and then vanished through the trees. If you touched her hands, you'd be in the bar, where you could choose a character with whom to pursue an erotic fantasy. And if you touched her head, the artist, Lynn Hershman, appeared to explain the game's intent: to explore the powerful intimacy of mass media, to consider its effect on how we see and the way we desire. (Not to mention what we order on CD-ROM.)

Hershman created Deep Contact with a 12-inch interactive videodisc with color and sound, a Sony video projector, a video camera, a Pioneer 6000 videodisc player, a Macintosh IIx computer, a Microtouch touch-sensitive screen, and a console pedestal. Sara Roberts of Lucasfilm wrote the HyperCard program and the drivers. Deep Contact will travel to New York's International Center for Photography in 1991 and may travel to France and Canada later. For further information, call Lynn Hershman at 415/398-8055.

—Ann Garrison

Swivel Goes to Toontown

Bugs Bunny beware: personal computer animation has come of age. Using Paramcomp's Swivel 3/D Professional, artists are creating high-quality computer animation for television commercials.

Swivel 3/D Professional is a new version of the three-dimensional modeler Swivel 3/D. Animators use Swivel for functions like linking, which joins objects so they move in relation to each other—useful for objects with moving parts, such as cartoon characters.

Sara Roberts of Lucasfilm (left) wrote the HyperCard scripts for artist Lynn Hershman's interactive sex fantasy.

Deep Contact

Those of you who attended Macworld Expo in San Francisco may have been amused, offended, or otherwise interested by a flyer for Virtual Valerie, a "multimedia sextravaganza" sold on CD-ROM for $95. "You've got a hot date with Valerie, your cybernetic fantasy," it teased. "But first, you'll have to find her! You begin on the street in front of her building and take it from there... until you meet Virtual Valerie for an erotic interlude!"

Other advantages of Shapes include varying levels of transparency for PostScript objects (translucent type, for example), smooth color blends, and faster printing by pre-rendering complex shapes or blends on a PostScript imagesetter. An auto-trace feature lets you convert graphics from ColorStudio's bitmapped layer into PostScript objects.

In the prerelease version, text couldn't be typed directly in Shapes, but had to be imported as an EPS outline. According to a Letraset representative, either the final version or a forthcoming update will offer the ability to type PostScript text directly.

Shapes will be available in the second quarter of 1990 and will sell for $295 (free to anyone who purchased ColorStudio before June 1).

—Erfert Fenton
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Just imagine a hard drive for the Macintosh line of computers that lets you spend less time waiting and more time creating. A drive that maximizes your computer capabilities and makes fast work of database management, desktop publishing and computer-aided design. A drive that can connect your network in a flash, and be very reliable. It's not a dream. Rodime Systems' Cobra Series offers access times as low as 14.5 milliseconds and storage as high as 650MB. And up to 48K of look-ahead caching to take advantage of the high performance of these drives. Cobra internal drives range from 45MB to 210MB while our external Cobra drives go from 45MB to 650MB. So, you can work with a long list of advanced software applications.

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up to eight sources, and a material editor that can create color and reflection effects on surfaces. Professional also adds 24-bit full-screen display.

Jim Ludtke, a New York free-lance artist, used Professional to create a 3-D cartoon character in a commercial spot for Nabisco and Nintendo. In the spot, a cartoon Mario brother (from the Nintendo game “Mario Brothers”) bounds across the TV screen with a mob of real kids in hot pursuit.

To create the cartoon character, Ludtke drew in Mario’s component parts separately and then joined them with Professional’s linking feature. Ludtke smooth-shaded Mario with Swivel’s plastic material to give the character a fleshy look, and, for a final touch, he used the light panel to illuminate Mario with three light sources, enhancing the 3-D effect.

To animate Mario, Ludtke tweened frames of the character in motion, saved them in the PICS animation file format, and exported them to MacroMind Director 2.0 for sequencing into an animated segment. He then connected his Mac to a Quantel Harry workstation for final editing and export to videotape.

Swivel 3/D Professional lists for $695. For more information contact Paracomp in San Francisco at 415/956-4091.—Jonathan Cassell

Object-Oriented Paint

Unlike CA-Cricket Paint’s FreshPaint feature, any altered selection in VideoPaint remains live until you deselect it, but unlike FreshPaint, you can use all VideoPaint features on a selection. With VideoPaint’s simple macro-recording capability you can save a mask to reselect an area; and tool palettes and other user-defined features can also be saved as macros, in effect making VideoPaint a paint-application generator.

VideoPaint Professional’s macros will be upgraded later to make the FreshPaint-like feature obsolete: the ability to automatically convert bitmap images to vectors and to store the vectorizations with time information will give VideoPaint an efficient animation tool that can double as an infinite undo. If you don’t like something in a painting, just play it backwards to the point where you got off the track, make a correction, and reapply your later work.

VideoPaint Professional will list for either $595 or $695, and upgrades from the current version will be less than $200. For more information, contact Olduvai in Coral Gables, Florida, at 305/665-4665.—D.L.

Making Media

Multimedia is about to get easier. Mixing video footage, CD music, and Mac animation to wow people with impressive presentations and demos sounds great, but doing it—which normally requires scripting in HyperCard—can be a real chore. MacroMind’s new MediaMaker reduces cueing and running all your devices to pushing a few picons—picture icons (icons containing images taken from the clip they represent)—about on a time line, almost like previewing slides on a light table.

MediaMaker has two environments. In the Collections environment, you create databases of clips from any device that (continues)
It's 9:01. And it's do-or-die.
All 5 offices of Venture Vessels have just 10 minutes to finish a presentation. Together.

San Francisco
Los Angeles
Newport
Philadelphia
Sydney

It's 9:05. For a moment, things run aground. Philadelphia points out a need for another sail. And, thanks to Aspects, they're able to alter the graphic right there for everyone to see.

San Francisco
Los Angeles
Newport
Philadelphia
Sydney

It's 9:10. The conference breezes right along with text contributions made together by San Francisco, Los Angeles and Newport. And everybody agrees—the presentation is ready to set sail.

San Francisco
Los Angeles
Newport
Philadelphia
Sydney

Introducing Aspects, the first simultaneous conference software for the Macintosh.

No matter what your group project, Aspects gives you a visual dimension to communication. Whether you’re across a continent or merely across the hall, you now have the power to develop ideas through the exchange of words and images, without leaving your desk. Imagine. Now hold interactive meetings with up to 16 Macintosh® users, in real-time. And save thousands of dollars in time and travel expenses.

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Everyone can actively participate in an Aspects conference—at the same time. They can write text. Create graphics. Insert material from their own files. While everyone else in the conference watches. And the exchange of ideas is a fast-flowing, natural process. Giving on-line work new levels of vision and cooperation. You might say that Aspects lets one Macintosh user dot the i’s, while the other crosses the t’s. Literally.

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has a Mac driver (as well as native Mac files such as sounds, PICT files, and Macromind Director animations), assign them to picons, and give each a text description. (The first version of MediaMaker can't search the text file but a later version will be able to.) MediaMaker provides tools for each format, for example, letting you advance a laser disc one frame at a time to mark exactly where you want a clip to begin.

In the Sequencer environment, you grab picons from collections and lay them out along a timeline. Each format has its own line, so a video picon can launch a laser-disc player at the same moment a sound picon starts a CD player. Picons contain only information about where a clip starts and stops or where a file is on your hard disk, so collections take up little disk space and can be created and sequenced on a Mac Plus or SE. Complete sequences can be played and written out to a video cassette.

MediaMaker is simple to understand and to use. It lacks special effects and editing tools like the Avid workstation or other time-domain editing systems, and cannot run outside applications that might be useful such as ScreenRecorder or HyperCard (later versions may have this ability; for now, it can call XCMDs or Director XObjects for that purpose). It has only a bare minimum of user-definable events like waiting for a mouse-click or pausing for a specified period.

MediaMaker should ship in September and will probably list for $395 or $495. For more information, contact Macromind in San Francisco at 415/442-0200.—D.L.

**Color in the Palm of Your Hand**

![ClearScan Color](image)

ClearScan Color is a hand-held scanner that supports 512 colors and can merge several swaths into one image.

The first hand-held color scanner, the ClearScan Color from NCL America, has a palette of 512 colors and a resolution of 300 dpi. The ClearScan Color scans images in swaths that measure 2½ inches wide by 5 inches long. The scanner comes with a utility that helps merge several swaths into a single image. To help match the edges of the swaths, the software can enlarge the images while you're overlapping and merging them.

Although the palette contains 512 colors, the device stores the scanned image as a PICT2 file with 256 colors. Included editing software lets you rotate images, adjust the contrast, use special effects, or convert images from color to gray scale.

With a suggested list price of $795, the device is not intended as a replacement for a flatbed scanner in high-use applications, but as a low-cost solution for the occasional or beginning user. The ClearScan Color was slated to ship in July. For more information, contact NCL America at 408/754-1006 or 800/521-0121.—T.M.

**Musings on Natural Language**

How people think about information and how computers operate on data are converging in a new area called natural language (NL) processing. Muse, the first natural-language application for the Macintosh, integrates relational database, spreadsheet, and graphing tools behind an interface that can interpret and execute typed requests like "compare and graph longevity in New England and the Deep South."

In the above example, Muse would search through your data files for census information, extract figures for the appropriate states, build a table, and then draw an appropriate graph, such as a bar chart. If your query were a bit more complex—for example, if you ask it to chart changes in longevity for the past 100 years—Muse would know to generate a 3-D graph or an animated bar chart.

The principles underlying earlier NL applications written for mainframes, as well as Muse, are based on the branch of linguistics called transformational-generative grammar. Because natural language, unlike the procedural languages native to computers, is inherently not calculable, natural language rules must be interpreted in the application's deep structure as calculable or algorithmic procedures, such as Boolean operators, lists, or arrays. Muse comes with several hundred transformational rules for converting between natural language and the underlying metalanguage, and this rule set is stored in an external database, making it possible for (continues)
If you can think of better ways to spend your time than backing up your hard disk, you need FastBack II or FastBack Tape. FastBack II is the world's fastest and most reliable backup software for the Macintosh.

FastBack Tape gives you a fast, ultra-reliable 120 megabyte tape drive, for the ultimate backup system. It even lets you schedule automated, unattended backups to take place whenever you choose. Even when you're otherwise occupied.

After all, you have better things to do.
A high-speed cable links the external box to the RadiusTV's NuBus board inside the Mac. RadiusTV supports 16 bits of color, about one bit less than the bandwidth of broadcast TV, but not enough less for the average viewer to notice the difference.

It works with Radius 24-bit color adapter boards, which support the NuBus's high-speed block-transfer mode. Radius says there is nothing to prevent RadiusTV from working optimally with other 24-bit boards that support block-transfer mode. At press time, Raster-Ops Corporation had just announced the 8L Display Board and 2L Display Board, both of which support block transfer. Other display vendors are also working on 24-bit boards with block-transfer capability. RadiusTV

That information can be captions for the hearing impaired or ticker-tape data from CNN, for example.

The suggested retail price for RadiusTV will be under $5000, according to Radius. The company expected to begin shipping in June. For more information, contact Radius in San Jose, California, at 408/434-1010.—T.M.

MapInfo to Chart New Territory

Software developers have taken advantage of the Macintosh's visual interface to simplify most kinds of computing tasks, but curiously, mapping and manipulating geographical information—certainly one of the most inherently visual tasks a computer could be asked to perform—has been slow to take off on the Macintosh. That is beginning to change. MapInfo, known for its DOS product of the same name, is developing a

Mac version of MapInfo that, as company president Sean O'Sullivan describes it, is "a surface to databases." It is not a map-drawing package but instead a geographical information system (GIS), a tool for displaying and comparing information across a geographical area. For example, AT&T

(continues)
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uses MapInfo in its Call before You Dig program to provide exact descriptions of where not to dig based on surface features such as addresses, sewer holes, and road signs, and neurologists at Johns Hopkins University are even using MapInfo to map nerve pathways in the brain as they conduct tests with implanted electrodes.

MapInfo has three linked views into its information. Like any database,
you can study, enter, or modify raw data in the browse view; in the map view you study and manipulate maps and information overlaid on them by your queries; and in the graph view the same data appears in bar charts and other formats. MapInfo can also read native-format FoxBase+/Mac and Microsoft Excel.

MapInfo's database engine is SQL, shielded with a friendly interface that provides excellent query tools and simplifies accessing data in larger databases and spreadsheets. It provides a query dialog box for simple queries and a second dialog box for complex queries—in the second dialog box, you can access the SQL code directly if you want to. MapInfo's SQL has an extended command set appropriate for geographical queries including within, proximity, and perimeter. MapInfo also supports entering topological data with a scanner and aligning it with maps.

MapInfo will list for $695. For more information, contact MapInfo in Troy, New York, at 518/274-8673.—D.L.

Survey: High Expectations for Low-End Mac

This month's survey, which was mailed to 1000 subscribers, examines Macworld readers' expectations for the much-anticipated low-cost Mac. The survey, which 47.5 percent of our survey group responded to, indicates that the Macintosh community would be extremely receptive to a new inexpensive Macintosh.

A whopping 42.6 percent said that if the low-cost Mac met their expectations they would be extremely likely to buy it despite the fact that most of the respondents already own Macs. Another 21.7 percent said they would be very likely to buy the low-cost Mac. Other respondents were not so enthusiastic, with 19.6 percent saying they would be only somewhat likely to buy, and 15.1 percent responding that they would not be likely to buy.

As for what our readers expect from a low-cost Mac, 49.4 percent said they expect the price to be from $500 to $999—less than the list price of a Macintosh Plus. 25.5 percent said they expect the price to be between $1000 and $1249; and 16.6 percent expect the price to be in the $1250 to $1499 range.

When asked how much memory they expected in the low-cost Mac, 39.4 percent said 1MB. Almost as many, 37.4 percent, said 2MB—indicating that many of our readers want the new Macintosh to be able to run System 7.0 with no memory upgrade (System 7.0 will require a minimum of 2MB). Only 14.3 percent said they expected 2.5MB.

As for the microprocessor, 43.2 percent said they expect a 68020 (the processor used in a Mac II), 29.4 percent said a 68000 (the processor used in a Mac Plus), and 25.5 percent said a 68030 (the processor used in the Mac IIvx, IICx, and IIfx).

In the storage department, an overwhelming majority—77.4 percent—said they expected the low-cost Mac to be able to accommodate an internal hard disk. Most respondents did not expect the low-cost Mac to include a color display, with 57.2 percent saying they expect a black-and-white display, 28.3 percent saying gray scale, and only 14.3 percent saying color.

Finally, a slight majority said the low-cost Mac should not be modular—that is, should not have a separate system chassis and monitor—with 52.6 percent saying it should not, and 46.4 percent saying it should.

—Jonathan Cassell

In this month's survey 64 percent of responding readers said they would be either very likely or extremely likely to buy a low-cost Mac that met their expectations.
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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 — ($79 each).

The chart explains exactly what you need to achieve the desired level of performance.

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

<table>
<thead>
<tr>
<th>Amount</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 MB</td>
<td>Remove all four existing 256K SIMMs, install two 1M SIMMs, leave two sockets for future expansion.</td>
</tr>
<tr>
<td>2½ MB</td>
<td>Remove only two 256K SIMMs, install two 1M SIMMs.</td>
</tr>
<tr>
<td>4 MB</td>
<td>Replace all four 256K SIMMs with four 1M SIMMs.</td>
</tr>
<tr>
<td>8 MB</td>
<td>Replace all four 256K SIMMs with eight 1M SIMMs.</td>
</tr>
</tbody>
</table>

To upgrade an 8-socket Mac II, IIx, IIcx, or SE to this amount of memory:

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

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.

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1-800-255-6227
Call 24 hours a day, 7 days a week
If You Can Find A Better Deal In Hard Drives . . .

Between now and August 31st, MacWarehouse is offering savings on every hard drive we sell. So, if you’re thinking of buying a new hard drive, your timing couldn’t be better. Check out our sale prices and your savings, compared to our December 1989 prices, in the chart.

We offer drives by leading manufacturers like Cutting Edge, C.M.S., Quantum, Power User, PLI Infinity Turbo and others — all at unheard of low prices.

Just return it to us within thirty days and we’ll refund your money. Then there’s the MacWarehouse Loaner Drive Program. Buy from MacWarehouse and if you ever have a problem, you won’t be without a drive for more than a few hours.

MONEY BACK GUARANTEE
They’ll tell you which drives come with the MacWarehouse 30-day money back guarantee. Try one at home. And if, for any reason, you’re not 100% satisfied, just call us now and tomorrow morning you’ll be up and running with the best hard drive deal in the business!

LIMITED TIME OFFER
MacWarehouse sale prices, based on capacity, are shown in the chart. Also shown are the savings from pre-holiday prices. (This is a limited time offer, valid through August 31, 1990.) Overnight delivery is just $3, anywhere in the Continental United States.

So call us now and tomorrow morning you’ll be up and running with the best hard drive deal in the business!

<table>
<thead>
<tr>
<th>Model</th>
<th>20+ MB</th>
<th>30+ MB</th>
<th>40+ MB</th>
<th>60+ MB</th>
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<td>309</td>
<td>379</td>
<td>435</td>
<td>469</td>
<td>529</td>
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<tr>
<td>CMS, MacStack</td>
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<td>309</td>
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<td>399</td>
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<td>-</td>
<td>569</td>
<td>619</td>
<td>649</td>
<td>649</td>
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<tr>
<td>Quantum Internal</td>
<td>-</td>
<td>-</td>
<td>399</td>
<td>-</td>
<td>-</td>
</tr>
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</table>

Savings are calculated from MacWarehouse December 1989 published prices. *Quantum drives are for internal installation and require a 3.5 internal drive kit for $25. **Quantum turbo drive. ***40 = one removable Cartridge Drives come with cartridge. Additional cartridges available.

Let our helpful sales staff take the hassle out of buying a drive. They’ll tell you which drive mechanism uses. They’ll also tell you about access speed, reliability, software and the manufacturer’s warranty.

Ready To Use
A hard drive from MacWarehouse couldn’t be easier to use. We’ll tell you which ones come pre-formatted — ready to use right out of the box. You just plug in, turn on your Mac and go!

If you do need any help, the MacWarehouse Technical Support staff is standing by our toll-free lines to assist you.

MacWAREHOUSE
1-800-255-6227
Call toll-free Twenty-four hours a day, seven days a week.
Inquiries 1-908-367-0440
Fax 1-908-905-9279
© Microwarehouse Inc.

MacWarehouse 30-Day Money Back Guarantee
Many of our drives come with the MacWarehouse 30-Day Money Back Guarantee. If, for any reason, you’re not completely satisfied, call us within thirty days of receipt for a return authorization number and full refund of the purchase price.
MORE 3.0 (Symantec Corp.) Producing backbreaking reports get you ahead, staying there requires MORE! MORE 3.0 combines outlining, word processing, desktop presentations and financial charting so concepts flow from your "doodle" pad to the board room in no time. A single step transforms ideas into bullet or tree charts. Over 100 templates and layouts simplify the formatting of all your documents. MORE'S Chart Tutor even provides step-by-step instructions on preparing everything from overhead transparencies to 35 mm slides. (business) $265.

INTUIT
Quicken 1.5 ........................................ 35.
Quicken Plus (Inc. of Intuit) ..................... 39.
MEGA
Managing Your Money ................................ 122.
Monogram
Business Sense ........................................ 269.

MOUSE PADS (Computer Hardware)
(mouse knows for sure! Choose from the variety of criteria. Import your own data or use the U.S. Census statistics included. Use ATLAS'S Mapmaker to read ZIP-coded "name and address" files, then aggregate their data into categories and subcategories. Access information by scrolling through, clicking and expanding on topics organized in four logical formats. Perfect for research writing or honing up on topical "Buzz" words for presentations. (desk accessories). $49.

ACCOUNTING & PERSONAL FINANCES
Atrix
Checkwriter II 2.8 .................................... 37.
Payroll 3.2 ........................................ 39.
Payroll PLUS or TimeMinder ...................... 175.

ATLAS'S MapMaker Version 4.5
(3 rd ed., Strategy Mapping, Inc.) Put your business on the map! ATLAS'S Mapmaker 4.5 quickly displays hidden relationships in geographic data with striking color graphics. Includes everything you need to map the U.S. & the world by a wide variety of criteria. Import your own data or use the U.S. Census statistics included. Use ATLAS'S Mapmaker to read ZIP-coded "name and address" files, then aggregate their data into categories and subcategories. Access information by scrolling through, clicking and expanding on topics organized in four logical formats. Perfect for research writing or honing up on topical "Buzz" words for presentations. (desk accessories). $49.

Managing Your Money ................................ 122.
Monogram
Business Sense ........................................ 269.

BLANK MEDIA
B.A.S.F. made in U.S.A
DS/DD (box of 10) .................................... 14.
DS/HD Density (1.44 Meg) ........................ 24.
Sony
DS/DD (box of 10) .................................... 13.
DS/HD (1.44 MB) ..................................... 24.

BUSINESS & PRESENTATION
A Lasting Impression
Resume Expert (word vers.) ....................... 39.
Cover Letters or Students ........................ 39.
Managers or Sales & Marketing .. 39.
Healthcare or Finance & Banking .. 39.
Education or Arts & Leisure .. 39.
Comp. Sciences & Engineering .. 39.

Macintosh SE/Plus w/Extended Key- 
board Carrying Case (Targus) 
Panther your Mac with a Targus case made of 
Zilicron treated nylon to give you 
waterproof durability and an impact 
absorbing high-density foam layer with a soft 
protective lining for complete 
protection. Cushioned shoulder pad and handles provide 
extra comfort and convenience. Plus 
there's room for everything from your 
Mac, a hard disk drive, and the extended 
keyboard to pockets for your mouse, 
fofflies, cables, and pens. (accessories) $69. Full line available.
The new 3.0 edition of the popular Power User's Tool Kit includes BOOMERANG 2.0, an ingenious utility, which makes it much easier to use the SP Dialog (the dialog box that appears when you choose Open or Save from the file menu).

You'll also find the latest version of DISINFECTANT (anti-viral freeware) and REMEMBER?, a handy reminder of the day's events when you start up your Mac.

The POWER USER'S TOOL KIT 3.0 is FREE from MacWAREHOUSE when you order from us. If you want the disk, you pay only $1.50 for shipping and handling. The programs are shareware, so you can try them free of charge. If you wish to continue using them, some authors ask that you pay a fee ($10-$35). Many of the programs are absolutely FREE.

All of the details are explained on the disk, which is yours to keep.

LAST CHANCE TO WIN A TRIP TO LONDON!
There's still time to enter our latest contest and win an all-expenses-paid trip to the MacUser.U.K. Show in London, November 7-10, 1990. Your name is automatically entered into the drawing when you order from MacWAREHOUSE, or just fill out and mail the entry coupon below.

MediaTracks (Parallax)
MediaTracks lets you record whatever takes place on your screen so your audience can watch "tapes" of that activity just as it appeared. MediaTracks comes with a full set of tools for editing and annotating tapes. It is in conjunction with MacRecorder to add clarifying narration. No more need to waste time repeating instructions, just tape a common procedure once, and let people watch it at their convenience. (communications) $189.

DeltaGraph 1.5 (DeltaPoint)
Chart a course for success with new DeltaGraph 1.5! This powerful 2 and 3-D full color charting program delivers everything you'll need to create professional looking charts for business and scientific presentations. Features: 25 chart types, overlays, Superscripts/Subscripts, CricketGraph file import and more. Use the Data Notebook to import spreadsheet data and DeltaGraph will create the chart you want. Then import EPS or PICT files or use DeltaGraph's extensive drawing tools for embellishment. (business) $97.

Chart a course for success with new DeltaGraph 1.5! This powerful 2 and 3-D full color charting program delivers everything you'll need to create professional looking charts for business and scientific presentations. Features: 25 chart types, overlays, Superscripts/Subscripts, CricketGraph file import and more. Use the Data Notebook to import spreadsheet data and DeltaGraph will create the chart you want. Then import EPS or PICT files or use DeltaGraph's extensive drawing tools for embellishment. (business) $97.

I'm Kerry, call me at:
MacWAREHOUSE
1-800-255-6227
(1-800-ALL-MACS)

Inquiries: 908-367-0440
FAX: 908-905-9279

Call anytime - day or night
24 hours a day, seven days a week.
(Midnight express service available weekdays.)
Earl Weaver Baseball
Exciting major league action, TV-style special effects, and the strategies of Earl Weaver make for a realistic, comprehensive game simulation. Batter-Pitcher confrontation screen centers you in the action. Receive a FREE 1989 baseball stars disk with purchase. Offer good while supplies last. (entertainment) $32.

McPrint
Easy-to-use software utility that lets you use almost any Mac application on virtually any printer including HP LaserJet II and IID. McPrint displays all your printer’s fonts for true text and graphics at your printer's maximum resolution. (utilities) $95.

Hard Covers
Hardtop printer and keyboard covers made from high-impact ABS plastic fit right on your key- board or printer to provide solid protection against dust and spills. Guards against damage while in transit. (accessories) Starting at $15.

FastLabel 2.0
(Vertical Solutions)
Stick it to the chore of simple label printing in three easy steps! Import addresses, lists and graphics, then use FastLabel's preformatted templates (or create your own) to produce everything from disk, VCR and cassette labels to name badges, signs and more. (business) $89.

FastEnvelope - This handy DA lets you import lists and graph­ ics to print eye-catching envelopes, then adds postal bar codes saving you time and money on bulk mailings. (business) $50.

FROM MacWAREHOUSE

DESKTOP ACCESSORIES

<table>
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<tr>
<th>Product</th>
<th>Price</th>
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<tr>
<td>Casady &amp; Greene</td>
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<td>QuickOEX</td>
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<tr>
<td>DiskClick</td>
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<tr>
<td>Construction Set v. 2.0</td>
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<td>JAM Software</td>
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<tr>
<td>Smart Alarms &amp; Atp. Diary</td>
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<tr>
<td>Smart Alarms (1 - 4 users)</td>
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<td>Smart Alarms (5 - 8 users)</td>
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<td>Smart Alarms (9 - 15 users)</td>
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<td>Smart Alarms (16-25 users)</td>
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<td>Microlytics</td>
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<td>Database 1.5</td>
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<td>VGA+</td>
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<td>Solutions</td>
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<td>SmartScrap &amp; The Clipper 2.0</td>
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<td>Vision Software</td>
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DESKTOP PUBLISHING

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<td>ColorStudio</td>
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<td>FontStudio</td>
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<td>ImageStudio or Ready.Set,Got</td>
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<td>Read III 2.1 (OCR)</td>
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<td>Read III Personal 2.0</td>
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<td>XPress 3.0</td>
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<td>Silicon Beach</td>
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<td>PLUS2.0</td>
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<td>Springboard Publisher II</td>
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<td>TimeWorks</td>
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<td>Publish-It! Easy</td>
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DISK DRIVES/BOARDS

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<td>MacSack 60 Meg</td>
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<td>MacSack 80 Meg</td>
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<td>MacSack 44 Meg Removable</td>
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<td>Cutting Edge</td>
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<td>800K External Floppy Drive</td>
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<td>SyQuest Removable 45 Meg</td>
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<td>Under the Mac 30 + Meg</td>
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<td>Under the Mac 80 + Meg</td>
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<td>Dayna Communications</td>
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<tr>
<td>Dayna File Single 360K (5/4/4)</td>
<td></td>
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</tbody>
</table>

Personal Press
(Silicon Beach)
Personal Press creates professional layouts for you. Forget the long, steep learning curve, because Personal Press' AutoCreate can transform stories and graphics into layouts. It includes a full-featured word processor with spelling checker and thesaurus, controls for scanned images, spot color separations, posted notes, link navigator, extensive page previewing, and on-line help. (desktop publishing) $199.

Personal Press Dual 360K & 1.44MB .. 749.
Fujitsu
800K Floppy Drive ...... 159.
Komet Technology
Drive 2.4 .......... 329.
Rapport ................ 199.
Orange Micro
Grapplers ... Call
Mac 286 Co-Processor 1079.
Peripheral Land, Inc.
Infinity Dual-40 Meg Turbo 1875.
Infinity Turbo 40 Meg 998.
Turbo Floppy 1.4 .... 399.
Power User
20 Meg Drive .......... 309.
30 Meg Drive .......... 359.
45 Meg Drive .......... 459.
60 Meg Drive .......... 499.
80 Meg Drive .......... 499.
44 Meg Removable Drive .... 679.
Quantum
44 Meg MB Raw Drive ... 399.
Quantum 80 MB Raw Drive .. 649.

The Ultimate Neon SE
Carrying Case (UO Design)
Here’s the latest in fashionable canteenware for the active Macin­ hacker. It’s the NEW “Neon Ultimate” SE in fluorescent green, hot pink and brilliant yellow neon accent! Protect and project your Plus or SE with its high density foam padding & durable DuPont Cordura nylon exterior. Secure all your peripherals in its roomy padded inner compartments & two exterior pockets. FREE matching desk wallet with purchase while supplies last. (accessories) $99.

EDUCATIONAL/ PERSONAL

Beacon Technology
GEMS of the Word ..... 25.
BrightStar
Alphabet Blocks ..... 30.
Taking Tiles ..... 28.
Davidson
Math Blaster or Reader Rabbit ... ea. 30.
Fair Tale Technologies
Navigato
Learning Company
Math Rabbit or Reader Rabbit ..... ea. 35.
Nordic Software (full line available)
MacKids Preschool Pack ... 35.
Penton Overseas
VocalLearn French, Spanish, German, Italian, Russian, or Hebrew ... ea. 35.
VocalLearn Japanese ..... 35.
Voice & Video Instruction Videos
HyperCard or PageMaker 3.0 ..... ea. 35.
Word 4.0 Video Tutorial ..... 35.

ENTERTAINMENT

Artwax
Bridge 6.0 ..... 24.
Daily Double Horse Racing ..... 13.
Broderbund
Ancient Art of War at Sea ..... 27.
ShufflePak Cafe ..... 19.
Where in Time is Carmen Sandiego?Call
Metamorphosis (Alleys)
Metamorphosis converts PostScript fonts into a variety of formats, now including Type 1 (ATM-compatible). Edit, modify, or regenerate your PostScript fonts. Manipulate type outlines in Atlas, FreeHand or Adobe Illustrator to create special font effects.

Metamorphosis converts your Type 1 fonts into A type 1 format for more accurate viewing in screen when using Adobe Type Manager and more precise printing on any PostScript printer. $149.

The Art Importer Solved! When it comes to collecting imported art, serious Mac users give their high bid to The Art Importer. Use the Art Importer to create high-resolution PostScript graphics from Mac artwork. The fonts are compatible with most Mac applications. (fonts) $89.

Computerized Classic Accounting (Absolute Solutions)
Mirroring the paper journals and ledgers that bookkeepers and accountants are accustomed to, Computerized Classic Accounting provides a remarkable level of accounting, record keeping, and analysis, in a simple, flexible product that can be easily customized. CCA is the only true, fully-integrated spreadsheet accounting product. CCA was nominated by Macuser for an Eddy and has earned a 4 1/2 mouse rating. (accounting) $225.

HardWare & Peripherals

DataDesk International
HyperDialer ....................... 30.
ICOM Simulations ............... 59.
HyperSONIC ...................... 89.
MicroMaps ...................... 59.
HyperAtlas ...................... 59.
SuperCard 1.5 .................... 189.
SuperStream International .... 75.
HyperBible ....................... 129.
Somak .......................... 49.
Script Edit ....................... 49.
Symmetry ....................... 49.
HyperDA 1.2 ..................... 45.
TimeWorks ....................... 57.
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WIZ Tablet ...................... 57.
WIZ Pen ....................... 60.
WIZ Temper ..................... 57.
CH Products .................... 39.
Matrix IV Plus Mouse/Joystick 49.
Micron Adapter ................ 39.
Rolier Mouse ADB ............ 72.
DataDesk Intl ................... 175.
DataDesk Switchboard ........ 175.
Mac 101 Keyboards .......... 129.
Forte Communications ....... 269.
Remote Keyboard/Mouse .... 269.
Kensington ..................... 109.
New Turbo Mouse .......... 118.
Keyboardics ................... 118.
The readers of Macworld magazine are a discerning lot; we've always believed that. And after looking over the final tally for this year's World-Class Awards contest, we're more convinced than ever. Listed on the following pages are the forty-four Macintosh products that readers voted as their favorites. Congratulations to each of the 1990 World-Class winners.

BY SUZANNE STEFANAC
Each year, we solicit reader response by publishing World-Class ballots in our February and March issues. We provide the hardware and software categories, and our readers write in the names of Macintosh products they believe warrant World-Class status. The ballots are then counted by an independent tabulating service, Wilson Associates, and winners are announced at the Macworld Expo in Boston.

1990 HIGHLIGHTS

This is the fourth year that Macworld magazine has sponsored the World-Class Awards, and in looking at each year’s winners, we find both patterns and surprises. Of our 44 1990 World-Class hardware and software winners, 27 were reader favorites last year as well. Fifteen products deserve special notice because they’ve been voted World-Class products all four years: the ThunderScan for the digitizer/scanner category; the Radius Full Page Display System for the black-and-white display category; Kensington Microwave’s Turbo Mouse series for input devices; Hayes’s Smartmodem series for modems; Apple’s ImageWriter II for dot matrix printers and LaserWriter II series for laser printers; Claris’s FileMaker for database management and MacProject for project management; Aldus PageMaker for page layout; Microsoft Word for word processing, Works for integrated package, and Excel for spreadsheets; Symantec’s More II for outline processing; FreeSoft’s WhiteKnight (formerly Red Ryder) for general communications; and finally, in business accounting, Layered’s Insight series won the first three years and the company’s atOnce application won this year.

The Most Promising Newcomers for 1990—Hewlett-Packard’s DeskWriter printer in the hardware division and Adobe Type Manager (ATM) in software—both provide Macintosh users with reliable, affordable output solutions. The Macintosh IICi and the Macintosh Portable were strong hardware contenders, but ATM swept the software category. It is interesting to note that the spectrum of products voted Most Promising Newcomer was quite wide—72 hardware products each received one vote, as did 95 software products.

In two upsets, Wolfram Research’s Mathematica scored higher than Abacus Concepts’ StarView, another triple winner. And Aldus FreeHand replaced Adobe Illustrator as the readers’ choice in the drawing/illustration/animation category.

AND THE WINNERS ARE

On the following pages, you will find the list of 1990 World-Class products grouped according to category. The product names in bold are the winners; below each winner we’ve listed additional products that received a significant number of votes in each category. The percentage associated with Others signifies the remaining votes—the higher the number, the greater the number of other contenders in the category. Also, because no reader voted in every category, we’ve included the percentage of respondents for each category. While the results can’t be construed as an endorsement by Macworld magazine, they clearly reflect the preferences of our readers.

1990’S GRAND-PRIZE WINNERS

The World-Class contest thrives because readers take the time to respond. We are grateful to everyone who submitted a ballot. To thank our readers for participating, we drew seven ballots at random from among those submitted to the contest and, in cooperation with winning hardware and software companies, these lucky readers will receive selections of this year’s World-Class products.

Michael J. Mandala is the pastor of Christ the King Catholic Church in San Diego, California. A Mac owner since the first 128Ks in 1984, Father Mandala now uses a Mac SE for his parish work and in his consulting work with inner-city organizations in the San Diego area.

Fourteen-year-old Jamie Morgan of Kingwood, Texas, received a Mac Plus from his parents as a reward for getting straight A’s in school last year. The Mac helps him keep up with his schoolwork—science is his favorite subject—and he hopes to someday be an astronaut.

Although Gary R. Presley-Nelson works in a mainframe environment at Tandem Computers in San Francisco, California, there are enough Macintoshes in his office to warrant the recent installation of AppleTalk. At home, Presley-Nelson has two Mac SEs and his wife, a dentist, has a Mac Plus at her office.

Amy Schroeter uses her Mac IICi with a LaserWriter IINXT and an Apple Scanner to design newsletters, brochures, flyers, and in-house publications for Diesel Specialties in Esterville, Iowa. Her favorite software packages are MacDraw II, PageMaker, PixelPaint Professional, and Microsoft Word.

A resident of New York City, Bernard Shanfield is a practitioner of the Hellerwork Method, a type of bodywork pioneered by a student of Idha Rolf. To track his budget and take care of correspondence, Shanfield finds that Microsoft Works with a Mac SE and a LaserWriter IINXT meets his needs quite well.

Ron Smith, a pediatrician in El Dorado, Arkansas, owns several Macintoshes—a IICi, a Mac II, two Mac Pluses—and a LaserWriter Plus. Besides designing databases, forms, and a newsletter, Smith finds time to do some programming on the side.

Retired civil engineer John N. Williams of Front Royal, Virginia, donated his 128K Mac to his children and now relies on a 2MB Mac II with a GCC Personal LaserPrinter. His consulting firm, Neat Company, specializes in rural area mapping and in setting up emergency 911 databases. “I used to teach Lotus 1-2-3 to evening classes,” Williams notes, “until I saw Excel on the Mac. Now I can no longer justify teaching MS-DOS–based spreadsheets when anyone can teach themselves using the Mac.”
## Hardware

### Alternative Mass Storage

<table>
<thead>
<tr>
<th>Product, Manufacturer</th>
<th>% of votes</th>
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<tbody>
<tr>
<td>Data Pak series, Mass Microsystems</td>
<td>14</td>
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<tr>
<td>Bernoulli Portable 44, Iomega Corporation</td>
<td>11</td>
</tr>
<tr>
<td>Cirrus removable cartridge drives, La Cie</td>
<td>8</td>
</tr>
<tr>
<td>Ehman 44MB Removable Cartridge, Ehman</td>
<td>8</td>
</tr>
<tr>
<td>RED optical drives, Pinnacle Micro</td>
<td>7</td>
</tr>
<tr>
<td>Others</td>
<td>52</td>
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<tr>
<td>Total</td>
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(12% of respondents voted in this category)

### CPU Upgrade

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<th>Product, Manufacturer</th>
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<td>Radius Accelerator 25, Radius</td>
<td>10</td>
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<tr>
<td>Mac SE/30 Upgrade, Apple Computer</td>
<td>8</td>
</tr>
<tr>
<td>50/030 Accelerator, DayStar Digital</td>
<td>7</td>
</tr>
<tr>
<td>Marathin 030, Dove Computer</td>
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<tr>
<td>Others</td>
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</table>

(10% of respondents voted in this category)

### Display — Black and White

<table>
<thead>
<tr>
<th>Product, Manufacturer</th>
<th>% of votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radius Full Page Display System, Radius</td>
<td>23</td>
</tr>
<tr>
<td>Radius Two Page Display System, Radius</td>
<td>21</td>
</tr>
<tr>
<td>Portrait Display, Apple Computer</td>
<td>13</td>
</tr>
<tr>
<td>ClearVue System, RasterOps</td>
<td>12</td>
</tr>
<tr>
<td>Others</td>
<td>31</td>
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<td>Total</td>
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</table>

(16% of respondents voted in this category)

### Display — Color

<table>
<thead>
<tr>
<th>Product, Manufacturer</th>
<th>% of votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AppleColor High-Resolution RGB Monitor, Apple Computer</td>
<td>38</td>
</tr>
<tr>
<td>SuperMac 19-inch color monitor, SuperMac Technology</td>
<td>17</td>
</tr>
<tr>
<td>Radius DirectColor Series, Radius</td>
<td>13</td>
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<tr>
<td>Others</td>
<td>32</td>
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</table>

(16% of respondents voted in this category)

### Digitizer/Scanner

<table>
<thead>
<tr>
<th>Product, Manufacturer</th>
<th>% of votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP Scanjet series, Hewlett-Packard</td>
<td>18</td>
</tr>
<tr>
<td>ThunderScan, Thunderware</td>
<td>17</td>
</tr>
<tr>
<td>MSF-3002, Microtek</td>
<td>15</td>
</tr>
<tr>
<td>Apple Scanner, Apple Computer</td>
<td>14</td>
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<tr>
<td>Others</td>
<td>36</td>
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(22% of respondents voted in this category)

### Graphics Board

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<th>% of votes</th>
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<tbody>
<tr>
<td>ColorBoard 264, RasterOps</td>
<td>31</td>
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<tr>
<td>Spectrum/24, SuperMac Technology</td>
<td>25</td>
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<td>Others</td>
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(10% of respondents voted in this category)
# HARDWARE

## Product, Manufacturer, % of votes

### HARD DISK (80MB OR LESS)

<table>
<thead>
<tr>
<th>Product, Manufacturer</th>
<th>% of votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Hard Disk SC series, Apple Computer</td>
<td>9</td>
</tr>
<tr>
<td>MacStack series, CMS Enhancements</td>
<td>7</td>
</tr>
<tr>
<td>DataFrame XP series, SuperMac Technology</td>
<td>7</td>
</tr>
<tr>
<td>Cirrus hard disks, La Cie</td>
<td>6</td>
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<td>Others</td>
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(35% of respondents voted in this category)

### HARD DISK (ABOVE 80MB)

<table>
<thead>
<tr>
<th>Product, Manufacturer</th>
<th>% of votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rodime Plus series, Rodime Peripheral Systems</td>
<td>10</td>
</tr>
<tr>
<td>Cirrus hard disks, La Cie</td>
<td>8</td>
</tr>
<tr>
<td>DataFrame XP series, SuperMac Technology</td>
<td>5</td>
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<tr>
<td>Others</td>
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(12% of respondents voted in this category)

### INPUT DEVICE

<table>
<thead>
<tr>
<th>Product, Manufacturer</th>
<th>% of votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbo Mouse series, Kensington Microware</td>
<td>41</td>
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<tr>
<td>Apple Mouse, Apple Computer</td>
<td>9</td>
</tr>
<tr>
<td>Mac-101 Enhanced Keyboard, DataDesk International</td>
<td>8</td>
</tr>
<tr>
<td>Apple Extended Keyboard, Apple Computer</td>
<td>6</td>
</tr>
<tr>
<td>Kurta IS/ADB Tablet, Kurta Corporation</td>
<td>5</td>
</tr>
<tr>
<td>Others</td>
<td>31</td>
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(21% of respondents voted in this category)

### PRINTER - COLOR

<table>
<thead>
<tr>
<th>Product, Manufacturer</th>
<th>% of votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>QMS ColorScript-100 series, QMS</td>
<td>42</td>
</tr>
<tr>
<td>HP PaintJet series, Hewlett-Packard</td>
<td>21</td>
</tr>
<tr>
<td>ColorQuick Ink-Jet Printer, Tektronix</td>
<td>11</td>
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<tr>
<td>Others</td>
<td>26</td>
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(12% of respondents voted in this category)

### PRINTER - DOT MATRIX

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<tbody>
<tr>
<td>ImageWriter II, Apple Computer</td>
<td>62</td>
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<tr>
<td>DeskWriter, Hewlett-Packard</td>
<td>8</td>
</tr>
<tr>
<td>ImageWriter LQ, Apple Computer</td>
<td>7</td>
</tr>
<tr>
<td>WriteImpact Printer, GCC Technologies</td>
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<td>Others</td>
<td>16</td>
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(25% of respondents voted in this category)

### PRINTER - LASER

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<tbody>
<tr>
<td>Apple LaserWriter II series, Apple Computer</td>
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<tr>
<td>Personal Laser Printer series, GCC Technologies</td>
<td>8</td>
</tr>
<tr>
<td>Business Laser Printer series, GCC Technologies</td>
<td>3</td>
</tr>
<tr>
<td>HP LaserJet series, Hewlett-Packard</td>
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<tr>
<td>Silentwriter, NEC</td>
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<td>Others</td>
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(37% of respondents voted in this category)
### Micro-to-Mainframe Communications

<table>
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<th>Votes</th>
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<tbody>
<tr>
<td>MacIrina, Digital Communications Associates</td>
<td>28</td>
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<tr>
<td>MacMainFrame series, Avatar Corporation</td>
<td>12</td>
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<tr>
<td>Netway, Tri-Data Systems</td>
<td>10</td>
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<tr>
<td>Others</td>
<td>50</td>
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(3% of respondents voted in this category)

### Modem

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<tr>
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<td>28</td>
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<tr>
<td>Practical Modem series, Practical Peripherals</td>
<td>18</td>
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<tr>
<td>Interfax, Abaton Technology</td>
<td>8</td>
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<tr>
<td>NetModern series, Shiva Corporation</td>
<td>7</td>
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<tr>
<td>SupraModem Series, Supra Corporation</td>
<td>5</td>
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<td>Others</td>
<td>34</td>
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(21% of respondents voted in this category)

### Network

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<tbody>
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<td>PhoneNet series, Farallon Computing</td>
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<tr>
<td>TOPS FlashBox, Sun Microsystems/TOPS Division</td>
<td>23</td>
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<tr>
<td>AppleShare, Apple Computer</td>
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<td>Others</td>
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(8% of respondents voted in this category)

### Most Promising Newcomer — Hardware

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<th>Votes</th>
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<tbody>
<tr>
<td>DeskWriter, Hewlett-Packard</td>
<td>17</td>
</tr>
<tr>
<td>Macintosh IICi, Apple Computer</td>
<td>13</td>
</tr>
<tr>
<td>Macintosh Portable, Apple Computer</td>
<td>10</td>
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<tr>
<td>Personal Laser Printer series, GCC Technologies</td>
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<tr>
<td>Others</td>
<td>53</td>
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(22% of respondents voted in this category)

### Software

<table>
<thead>
<tr>
<th>Product, Manufacturer</th>
<th>Votes</th>
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<tbody>
<tr>
<td>atOnce, Layered</td>
<td>13</td>
</tr>
<tr>
<td>Insight Expert Accounting, Layered</td>
<td>8</td>
</tr>
<tr>
<td>MultiLedger, CheckMark Software</td>
<td>7</td>
</tr>
<tr>
<td>Simply Accounting, Computer Associates</td>
<td>6</td>
</tr>
<tr>
<td>Business Sense, Monogram Software</td>
<td>6</td>
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<tr>
<td>Others</td>
<td>60</td>
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(15% of respondents voted in this category)

### Business Accounting

<table>
<thead>
<tr>
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<th>Votes</th>
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<tbody>
<tr>
<td>atOnce, Layered</td>
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<tr>
<td>Insight Expert Accounting, Layered</td>
<td>8</td>
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<tr>
<td>MultiLedger, CheckMark Software</td>
<td>7</td>
</tr>
<tr>
<td>Simply Accounting, Computer Associates</td>
<td>6</td>
</tr>
<tr>
<td>Business Sense, Monogram Software</td>
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<tr>
<td>Others</td>
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(15% of respondents voted in this category)
<table>
<thead>
<tr>
<th>BUSINESS PRESENTATION GRAPHICS</th>
<th></th>
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<tbody>
<tr>
<td>Aldus Persuasion, Aldus Corporation</td>
<td>42</td>
</tr>
<tr>
<td>PowerPoint, Microsoft Corporation</td>
<td>22</td>
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<tr>
<td>CA-Cricket Graph, Computer Associates</td>
<td>4</td>
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<tr>
<td>CA-Cricket Presents, Computer Associates</td>
<td>4</td>
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<td>Others</td>
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(24% of respondents voted in this category)

<table>
<thead>
<tr>
<th>EDUCATION/TRAINING</th>
<th></th>
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<tbody>
<tr>
<td>HyperCard, Apple Computer</td>
<td>16</td>
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<tr>
<td>Where in the World Is Carmen Sandiego?</td>
<td>9</td>
</tr>
<tr>
<td>Broderbund Software</td>
<td></td>
</tr>
<tr>
<td>Reader Rabbit, The Learning Company</td>
<td>8</td>
</tr>
<tr>
<td>Voyager, Carina Software</td>
<td>6</td>
</tr>
<tr>
<td>Typing Tutor, Simon &amp; Schuster Computer Software</td>
<td>4</td>
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<td>Others</td>
<td>57</td>
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(13% of respondents voted in this category)

<table>
<thead>
<tr>
<th>COMMUNICATIONS—GENERAL</th>
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<tbody>
<tr>
<td>MicroPhone, Software Ventures*</td>
<td>27</td>
</tr>
<tr>
<td>WhiteKnight, The FreeSoft Company*</td>
<td>20</td>
</tr>
<tr>
<td>Red Ryder, The FreeSoft Company</td>
<td>13</td>
</tr>
<tr>
<td>Smartcom, Hayes Microcomputer Products</td>
<td>9</td>
</tr>
<tr>
<td>Others</td>
<td>31</td>
</tr>
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<td>Total</td>
<td>100</td>
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</tbody>
</table>

(23% of respondents voted in this category)

*MicroPhone received the greatest percentage of the vote (27%), but we declared a tie because there is an upgrade policy between WhiteKnight and Red Ryder (with a combined tally of 33%).

<table>
<thead>
<tr>
<th>GAME</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SimCity, Maxis Software</td>
<td>13</td>
</tr>
<tr>
<td>Tetris, Spectrum HoloByte</td>
<td>10</td>
</tr>
<tr>
<td>Crystal Quest, Casady &amp; Greene</td>
<td>9</td>
</tr>
<tr>
<td>Beyond Dark Castle, Silicon Beach Software</td>
<td>7</td>
</tr>
<tr>
<td>Falcon, Spectrum HoloByte</td>
<td>6</td>
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<tr>
<td>Others</td>
<td>55</td>
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(13% of respondents voted in this category)

<table>
<thead>
<tr>
<th>INTEGRATED PACKAGE</th>
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<tbody>
<tr>
<td>Microsoft Works, Microsoft Corporation</td>
<td>87</td>
</tr>
<tr>
<td>Microsoft Office, Microsoft Corporation</td>
<td>4</td>
</tr>
<tr>
<td>HyperCard, Apple Computer</td>
<td>3</td>
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<tr>
<td>Microsoft Excel, Microsoft Corporation</td>
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<td>Others</td>
<td>4</td>
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(20% of respondents voted in this category)

<table>
<thead>
<tr>
<th>COMPUTER-AIDED DESIGN (CAD)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Claris CAD, Claris Corporation</td>
<td>28</td>
</tr>
<tr>
<td>MiniCad+, Diehl Graphsoft</td>
<td>13</td>
</tr>
<tr>
<td>Dreams, Innovative Data Design</td>
<td>8</td>
</tr>
<tr>
<td>Vellum, Ashlar</td>
<td>8</td>
</tr>
<tr>
<td>VersaCAD/Macintosh Edition, VersaCAD Corporation</td>
<td>6</td>
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<td>Others</td>
<td>37</td>
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(13% of respondents voted in this category)
### DATABASE MANAGEMENT

<table>
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<tr>
<th>Software</th>
<th>Votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FileMaker, Claris Corporation</td>
<td>33</td>
</tr>
<tr>
<td>4th Dimension, ACUS</td>
<td>22</td>
</tr>
<tr>
<td>FoxBase+/Mac, Fox Software</td>
<td>10</td>
</tr>
<tr>
<td>Double Helix, Odesta Corporation</td>
<td>8</td>
</tr>
<tr>
<td>Others</td>
<td>27</td>
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(33% of respondents voted in this category)

### DESK ACCESSORY

<table>
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<tr>
<th>Software</th>
<th>Votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitcase, Fifth Generation Systems</td>
<td>21</td>
</tr>
<tr>
<td>DiskTop, CE Software</td>
<td>18</td>
</tr>
<tr>
<td>QuickDex, Casady &amp; Greene</td>
<td>4</td>
</tr>
<tr>
<td>Font/DA Juggler Plus, AIsoft</td>
<td>3</td>
</tr>
<tr>
<td>SmartScrap &amp; The Clipper, Solutions International</td>
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<tr>
<td>TypeAlign, Emerald City Software</td>
<td>3</td>
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<td>Others</td>
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(40% of respondents voted in this category)

### DRAWING/ILLUSTRATION/ANIMATION

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<th>Votes</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>Adobe Illustrator, Adobe Systems</td>
<td>24</td>
</tr>
<tr>
<td>MacDraw, Claris Corporation</td>
<td>17</td>
</tr>
<tr>
<td>Canvas, Deneba Software</td>
<td>12</td>
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<tr>
<td>Others</td>
<td>19</td>
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(47% of respondents voted in this category)

### MICRO-TO-MAINFRAME COMMUNICATIONS

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<th>Votes</th>
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<tbody>
<tr>
<td>VersaTerm-Pro, Synergy Software</td>
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<tr>
<td>WhiteKnight, The FreeSoft Company</td>
<td>16</td>
</tr>
<tr>
<td>MicroPhone, Software Ventures</td>
<td>7</td>
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<tr>
<td>Maclima, Digital Communications Associates</td>
<td>6</td>
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<td>Others</td>
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(6% of respondents voted in this category)

### MULTIMEDIA

<table>
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<tr>
<th>Software</th>
<th>Votes</th>
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</thead>
<tbody>
<tr>
<td>Director, MacroMind</td>
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<tr>
<td>HyperCard, Apple Computer</td>
<td>18</td>
</tr>
<tr>
<td>SuperCard, Silicon Beach Software</td>
<td>8</td>
</tr>
<tr>
<td>Others</td>
<td>18</td>
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(11% of respondents voted in this category)

### MUSIC

<table>
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<tr>
<th>Software</th>
<th>Votes</th>
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</thead>
<tbody>
<tr>
<td>Finale, Coda Music Software</td>
<td>23</td>
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<tr>
<td>Studio Session, Bogas Productions</td>
<td>10</td>
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<tr>
<td>Performer, Mark of the Unicom</td>
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</tr>
<tr>
<td>Vision, Opcode Systems</td>
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<td>MacRecorder, Farallon Computing</td>
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<tr>
<td>Others</td>
<td>40</td>
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(11% of respondents voted in this category)
<table>
<thead>
<tr>
<th>Product, Manufacturer</th>
<th>% of votes</th>
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<tr>
<td><strong>OUTLINE PROCESSING</strong></td>
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<tr>
<td>More II, Symantec Corporation</td>
<td>51</td>
</tr>
<tr>
<td>Acta, Symmetry Corporation</td>
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<tr>
<td>MindWrite, Access Technology</td>
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<td>Microsoft Word, Microsoft Corporation</td>
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<tr>
<td>Others</td>
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<td>QuarkXPress, Quark</td>
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<tr>
<td>ReadySetGo, Letraset USA</td>
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<td>Others</td>
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<td>(49% of respondents voted in this category)</td>
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<th><strong>PROJECT MANAGEMENT</strong></th>
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<tr>
<td>MacProject II, Claris Corporation</td>
<td>69</td>
</tr>
<tr>
<td>KeyPlan, Symmetry</td>
<td>8</td>
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<tr>
<td>AEC Information Manager, AEC Management Systems</td>
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<tr>
<td>Focal Point, TenPointO (Activision)</td>
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<td>Micro Planner Plus, Micro Planning International</td>
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<th><strong>SPREADSHEET</strong></th>
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<tr>
<td>Microsoft Excel, Microsoft Corporation</td>
<td>74</td>
</tr>
<tr>
<td>Wingz, Informix Software</td>
<td>21</td>
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<tr>
<td>Microsoft Works, Microsoft Corporation</td>
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<td>Full Impact, Ashton-Tate</td>
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<td>Others</td>
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<th><strong>PAINT — BLACK AND WHITE</strong></th>
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<tr>
<td>SuperPaint, Silicon Beach Software</td>
<td>62</td>
</tr>
<tr>
<td>MacPaint, Claris Corporation</td>
<td>11</td>
</tr>
<tr>
<td>Studio/8, Electronic Arts</td>
<td>8</td>
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<tr>
<td>Canvas, Deneba Software</td>
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<td>DeskPaint, Zedcor</td>
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<td>Others</td>
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<td>(32% of respondents voted in this category)</td>
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<table>
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<tr>
<th><strong>STATISTICS/MATH</strong></th>
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<tr>
<td>Mathematica, Wolfram Research</td>
<td>31</td>
</tr>
<tr>
<td>Data Desk Professional, Odesta Corporation</td>
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<tr>
<td>Theorist, Allan Bonadio Associates</td>
<td>6</td>
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<tr>
<td>Others</td>
<td>34</td>
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<td>Total</td>
<td>100</td>
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<td>(11% of respondents voted in this category)</td>
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</table>
**Paint — Color**

- **PixelPaint, SuperMac Technology** 44
- **Studio/8, Electronic Arts** 19
- **SuperPaint, Silicon Beach Software** 15
- **Canvas, Deneba Software** 10
- **UltraPaint, Deneba Software** 5
- Others 7
- Total 100

(19% of respondents voted in this category)

**Personal Finance/Taxes**

- **MacInTax, SoftView** 36
- **Quicken, Intuit** 36
- **MacMoney, Survivor Software** 11
- Managing Your Money, Meca Ventures 9
- Dollars & Sense, Monogram Software 4
- Others 4
- Total 100

(32% of respondents voted in this category)

**Programming Language**

- **Think’s Lightspeed C, Symantec Corporation** 42
- **Think’s Lightspeed Pascal, Symantec Corporation** 9
- **HyperTalk, Apple Computer** 6
- Others 43
- Total 100

(23% of respondents voted in this category)

**Utilities — Disk and File**

- **Symantec Utilities for Macintosh (SUM), Symantec Corporation** 34
- **DiskTop, CE Software** 13
- **PC Tools Deluxe/MacTools, Central Point Software** 5
- **DiskExpress, Alsoft** 5
- Others 43
- Total 100

(39% of respondents voted in this category)

**Word Processor**

- **Microsoft Word, Microsoft Corporation** 66
- **WriteNow for Macintosh, T/Maker** 12
- **MacWrite, Claris Corporation** 12
- **WordPerfect for the Mac, WordPerfect Corporation** 3
- **FullWrite Professional, Ashton-Tate** 2
- Others 5
- Total 100

(74% of respondents voted in this category)

**Most Promising Newcomer — Software**

- **Adobe Type Manager, Adobe Systems** 27
- **UltraPaint, Deneba Software** 4
- **Wingz, Informix Software** 4
- **Type Align, Emerald City Software** 3
- **TypeStyler, Broderbund Software** 3
- Other 59
- Total 100

(33% of respondents voted in this category)
Which word processor takes the laurels when it comes to advanced document events like footnotes, merge, indexes, or styles? Six top packages compete in a septathlon that tests the limits of their programming prowess.

WORD PROCESSOR OLYMPICS

This isn't an Olympic year for sports fans, but for those who use a Macintosh word processor, every year looks like an Olympic year. Annually, like earnest trainers, word processor designers send forth the fruits of months of hard labor. Out in the marketplace, the programs compete in a variety of events, and the one with the best overall score takes home the gold. And every year, even before the medals are handed out, the trainers go back into a huddle and start redesigning new, even more powerful, competitors.

This year's 1990 Word Processor Olympics eschews minor-league contests like multiple columns, headers and footers, page numbers, finding and changing. No, sir. We're talking tough, world-class competition here: footnotes, tables of contents, glossaries, indexes, cross-references, mail merge, and style sheets. While you may not choose a word processor solely on the strength of its advanced features, if one or more of these special skills are essential to your work, a program's standing in the advanced competition is at least as important as its overall score.

This year's contestants range from heavyweights Microsoft Word 4, WordPerfect 1.0.3, Full Write Professional 1.1, and newcomer Nisus 2.03 to bantamweights WriteNow 2.2 and MacWrite II. (WordPerfect 2.0, scheduled to ship this fall, and Nisus 3.0, which may be available by the time you read this, were not available for review.) Here's my report on this year's winners and losers from Macworld's seat in the press box.

BY ROBERT C. ECKHARDT
Footnotes and Endnotes

Footnotes and endnotes are to writers what compulsory figures are to figure skaters: an art, a science, a pain in the ankle. But while skaters perform compulsory figures pretty much the same way they always have, writers are now aided by footnotes and endnote automation.

Footnote automation is the only Olympic-level function found in all major Macintosh word processors. At its most basic, footnote automation (and to a lesser degree, endnote automation) operates the same way in all programs. You place the insertion point in the main text, select a command, and then enter the text of the footnote. The word processor does everything else: it enters the footnote reference in the main text and at the beginning of the footnote; it numbers the footnote according to the current sequence; it places the footnote at the bottom of the page, and continues it to the next page if necessary; and it readjusts the main text to accommodate the note. Compared to doing footnotes the old-fashioned way, even this basic level of automation is little short of a miracle.

For a perfect 10, however, the judges require more than just a miracle. They give points for the following: user-definable symbols (such as an asterisk) as well as autosequenced numbers for references; the ability to set a document's starting footnote number and/or reset footnote numbers back to 1 at each new page or document division (such as a new chapter); a choice of reference number configurations (such as* or **); the ability to adjust the space between the main text and footnotes; control over when and how footnotes are continued (set the minimum number of footnote lines that must remain on a page when the note breaks, for example). Top-class contenders must juggle these and other options and make it look easy (see "The Footnote Finals").

The performances of WriteNow and MacWrite in this event are clearly not top-class. WriteNow doesn't support endnotes at all, for example. Nor does it offer footnote styles or symbol references or allow you to reset footnote numbers within a document.

MacWrite II is one of the few programs in which you see, enter, and edit footnotes and endnotes in the main document window. Otherwise, its footnote and endnote function is not much more sophisticated than WriteNow's.

Like MacWrite, Nisus supports either footnotes or endnotes, but not both in one document. But Nisus surges ahead of both WriteNow and MacWrite by allowing you to: reset footnote numbering at each new page or anywhere within a document; adjust the space between footnotes and the main text; change the appearance of the separator; select from several different reference number configurations; and control footnote continuation. Nisus stumbles, however, in its lack of editable footnote styles, thus forcing you to format reference numbers and notes one by one.

Although each falls short of perfection, Word, WordPerfect, and FullWrite Professional amass the most points in this event. All three programs insert numbers in sequence when you ask for a footnote, but WordPerfect can also insert letters, or symbols if you've defined a sequence for them. The program also offers the widest choice of reference-number configurations, and offers useful controls for the appearance of the separator, the distance between footnotes and text, and footnote continuation. This promising start is marred, however, by WordPerfect's inability to display foot-

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### THE FOOTNOTE FINALS

<table>
<thead>
<tr>
<th>Feature</th>
<th>FullWrite</th>
<th>MacWrite II</th>
<th>Nisus</th>
<th>Word</th>
<th>WordPerfect</th>
<th>WriteNow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supports endnotes</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>○</td>
</tr>
<tr>
<td>Place endnotes at document divisions</td>
<td>×</td>
<td>×</td>
<td>○</td>
<td>×</td>
<td>×</td>
<td>○</td>
</tr>
<tr>
<td>End- and footnotes in same document</td>
<td>×</td>
<td>×</td>
<td>○</td>
<td>×</td>
<td>×</td>
<td>○</td>
</tr>
<tr>
<td>Allows reference symbols</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Set starting reference number</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Restart numbering each page</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Restart elsewhere within document</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Displays footnotes in main window</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Enter and edit in main window</td>
<td>○</td>
<td>○</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Offers choice of reference-number configuration</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
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<tr>
<td>Editable style for all references</td>
<td>○</td>
<td>○</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Editable style for all footnote and endnote text</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Adjust space between notes and text</td>
<td>○</td>
<td>○</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Editable footnote separator</td>
<td>○</td>
<td>○</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Controls for footnote continuation</td>
<td>○</td>
<td>○</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
</tbody>
</table>

○ = yes  ○ = na  ○ = partially implemented
notes in the main document window and to list endnotes at the end of a document division. The program also lacks editable footnote styles (a problem WordPerfect 2 is supposed to fix).

One reason Word's footnote function is a leader is that the program provides built-in styles, which make footnote and reference formatting easier than in any other program. In addition, Word is the only program that places an editable continuation notice at the split in a continued footnote. Word disappoints, however, because footnotes and endnotes are mutually exclusive within a document, and Word lacks reference number-configuration options, controls over spacing between footnotes and main text, and footnote continuation controls. FullWrite Professional stands up well against Word and WordPerfect, and it alone can refer to a single footnote or endnote in two or more places. But FullWrite falls short as well; it lacks spacing and continuation controls, an editable separator, and an easy way to reset footnote numbers back to one at each new page.

The Winners: Overall, footnote fetishists will find more than enough of what they crave in any of the three medalists. For their combination of useful features, user control, and ease of use, Word and FullWrite tie for the gold. WordPerfect actually offers more options and greater control, but several significant omissions and a relatively high level of difficulty relegate it to the bronze.

Document Merge
The second most widely contested event in the Word Processor Olympics is mail merge; of the six entrants, only Nisus cannot perform mail merge (Paragon promises that Nisus 3 will remedy this deficiency). Mail merge, of course, is the process by which names, addresses, and other information are copied from a data document and inserted in the indicated locations in multiple copies of a main document. Although the pseudopersonal touch provided by merged documents fools no one these days, they are de rigueur for everything from annual holiday newsletters to fund-raising solicitations.

One of the more difficult aspects of mail merge is creating and entering the needed merge codes so the program knows what data to put where in the main document (such as insert a name after the salutation Dear). Word and WriteNow use identical merge codes, and in both code entry is largely a manual affair. In this regard, Word and WriteNow are sorely in need of an interface-lift. Code entry in FullWrite and WordPerfect is semiautomatic (you select codes from a dialog box or menu) and thus a little easier; neither could be called easy, however, since careful, manual setup is still required. MacWrite, which automatically creates a list of preformatted codes, is the clear winner in this arena (see “A Field Kit for Mail Mergers”).

Data codes (names, addresses, phone numbers) are one type of merge code; conditional and special instructions are another. Conditional codes can be difficult to master, but they enable you to do such things as establish conditions under which certain text is or is not printed (for example, you might want to add a request for an especially large contribution if the income figure in a data document is over a certain amount). Special instructions can, for example, cause the program to ask for input during the merge process, or insert the contents of some third document (a contract clause, perhaps) in the merge document.

FullWrite trails badly in this event, since it supports neither conditional nor special instructions (see “Track and Field Events: Document Merge”). MacWrite offers standard conditional instructions only. WordPerfect supports special instructions, but frankly, its merge facility is about as confusing as they get. Ultimately, Word and WriteNow are way ahead of the others here, since they support a wide and versatile variety of both conditional and special instructions.

All the programs reviewed here can use data exported from spreadsheets or databases. Most read exported tab- or comma-delimited text files directly. FullWrite can read unconverted dBase Mac files as well, while WordPerfect requires that all exported data files be processed by a special conversion utility. Most programs can either send merged documents directly to the printer or “print” them to disk (create a document containing all the merged files). FullWrite alone cannot print to disk, and in WordPerfect, sending the merged documents directly to the printer requires special coding. In both WordPerfect and FullWrite, the merge command always creates a complete set of merged documents; in the other programs, you can merge a subset of the records in the data document if you prefer.

The Winners: Document merge in identical-cousins Word and WriteNow is currently unbeaten (but certainly not unbeatable). These two front-runners, which offer a strong
combination of maximum power and only moderate difficulty, would be neck-and-neck but for the fact that Word's table feature can greatly facilitate the creation of a data document. So Word gets the gold and WriteNow the silver. MacWrite's exceptional ease of use but less-powerful functions take the bronze.

**Styles and Style Sheets**

Writing without style sheets is like running the marathon with one shoe; it can be done, but why do things the hard way? A style specifies a set of formats ranging from font and font size to paragraph indents and line spacing. A style sheet stores a group of styles and their definitions. With a style, you can apply numerous formats with a single command. Even more important, because styles maintain links to their definitions, when you change a style definition in the style sheet, you simultaneously change the format of all text currently in that style. Simple in concept, styles and style sheets are undoubtedly the most valuable players in any formatting team.

WriteNow, WordPerfect, and MacWrite are disqualified from this event since none of them support true styles (WordPerfect plans to include them in WordPerfect 2). Nisus offers styles, but they're still in the 98-pound-weakling stage, since they can control character formats, such as font and font size, but not paragraph formats, such as justification or indents (Paragon says this limitation will be lifted with Nisus 3).

Therefore, the only real contest in this event is between FullWrite and Word (see "Style-Sheet Meet and Glossary Games"). FullWrite Professional offers both an array of built-in styles (for document elements such as headings, footnotes, and tables of contents) and user-defined custom styles. In addition to the usual absolute style definitions, such as 14-point Palatino with 18-point leading, you can also create relative style definitions, such as 25 percent greater leading and 3 points larger font size.

While FullWrite's styles are impressive, Word's performance is better in almost all respects. Word's integration of built-in styles and document elements (including outline headings, index levels, and table-of-contents entries) gives it a definite edge. Word's styles are also distinguished by the way in which you can link styles to another (so you can change the font in all styles, for example, by changing the font in one base style); the fact that you can specify that one style always follow another style (standard paragraph style follows subhead style, say); and the ease with which you can call up styles from the keyboard, the menu, or the ruler.

**The Winners:** Word's overall approach to style sheets is so thoughtful, well-integrated, and useful that Word easily gets the gold. FullWrite brings home a silver, and Nisus—a very distant third for now—merits a bronze.

**Glossaries**

Glossaries are electronic lockers containing often-used graphics or laborious-to-type text. Because they're tagged with, and called up by, simple abbreviations, glossary entries can be inserted in a document quickly and easily. Type "usoc," say, and a glossary can quickly replace it with United States Olympic Committee. Ideally, entries useful for different tasks can be stored in different glossary files (one for contracts, for example, and another for horse-race handicapping). You should be able to store glossary files separately from document files and open and close different glossary files as needed.

Neither MacWrite nor WriteNow has glossaries (although 80 bucks will buy you Thunder II, an excellent add-on spelling checker with a built-in glossary function). WordPerfect doesn't support glossaries either, although its macro function lets you create glossary-like macros. Nisus, FullWrite, and Word have full-fledged glossaries. Nisus and Word glossaries can contain both text and graphic entries, and in both these programs glossary text maintains its style sheet links. In FullWrite, glossaries store only text, and style links to glossary text are severed.

You can open only one glossary at a time in Nisus, but Nisus's glossaries are extremely easy to work with (see "A Gold Medal Glossary"). You can open any number of glossaries in Word, but reviewing and editing entries is no easy task. In FullWrite any number of glossary files can be open at once, and glossary entries can be easily reviewed and edited.

In all three programs, you can have the program immediately flesh out glossary abbreviations as you type. Nisus is unusual in that it can also wait until you finish typing a section of
 sends the text to a special database. When you reach the point in the document where you want a reference to appear, you go to the reference database and select the previously marked text (such as “Table 5”) or its location in the document. To create a phrase like “see Table 5 on page 59,” you can select both types of cross-reference. Location cross-references are updated automatically. When changes to text affect cross-references (such as when Table 5 becomes Table 7) you must update the reference with a special command.

Because it’s tied in with FullWrite’s automatic numbering of classified elements, cross-referencing in FullWrite requires an additional step. First you create a classification category (such as tables, figures, or text), then you classify the item to be cross-referenced. Finally, you enter the cross-reference, which can include the item name and number, or the page number, or both (see “Writing Yourself a Citation”). Classification numbers (such as figure numbers) are displayed and automatically updated in the cross-reference; page numbers are not displayed in the document window, but they are updated when you print.

The Winners: The cross-reference functions in either FullWrite Professional or Nisus can be helpful, though a combination of both programs’ abilities, plus the ability to reference material in other documents, would be closer to the ideal. Nonetheless, cross-references in FullWrite are part of a larger scheme in which items can be numbered and compiled in a list automatically. As a result, FullWrite’s cross-references pack a significant punch, and get the gold.

But Nisus manages to score, too, in its ability to cross-reference actual text, such as figure captions or subheads, and earns a silver medal as a result.

Cue Music, Raise Flags
Just as the Olympics can’t include every sport known to humankind, our Word Processor Olympics doesn’t cover every aspect of word processing. But in the seven events in this Olympiad, the final tally is clear: Word is first; FullWrite is a distant second; and Nisus takes third (see “Winners’ Circle”). Of course, just as the number of medals on an athlete’s chest doesn’t always tell you how well he or she functions in the real world, how well a word processor fits your needs is only partly related to the advanced events covered here.

WordPerfect’s low score may well reflect the opinion of many Macintosh users, for example, but many people migrating from PC compatibles apparently find the program to be just their cup of tea. In contrast, FullWrite’s high medal count doesn’t excuse its sluggish performance on Mac Pluses and SEs or the program’s insatiable appetite for RAM. And Nisus’s good showing doesn’t take into account its poorly organized menu structure and hastily slapped-together feel (or its convenient built-in graphics program, for that matter).

But if you regularly use any of the advanced features described here, pick a word processor that has both good basic skills (see “Words, Words, Everywhere” in the September 1989 Macworld) and mastery of the finer points. Doing so will put you, too, in the winner’s circle.

See Where to Buy for contact information.

Robert C. Eckhardt is a contributing editor of Macworld and Publish and the author of” The Fully Powered Mac (Brady) and other books.

The seven events in our Olympiad test only a fraction of these word processors’ functions. When it comes to the events in question, however, the results are clear: Microsoft Word, WriteNow, and Nisus take the lion’s share of the medals and the glory.
Liz Vantrease used the Mac to transform an empty stage into a room full of music. One act of her opera, Liz, composed and scored on the Mac, was recently performed at the Virginia Commonwealth University Performance Arts Center.
WITH A LITTLE HELP FROM MY MAC

For most people, the Mac makes things easier. For people with disabilities, it can make the impossible possible.

by Brita Meng

Liz Vantrease, of Richmond, Virginia, is writing an opera.

In 1985, after 13 years as a newspaper reporter and editor, she followed a lifelong dream to the master's program in music composition at Virginia Commonwealth University. Halfway through, she was diagnosed with amyotrophic lateral sclerosis (ALS), or Lou Gehrig's disease.

Knowing Vantrease would eventually lose the strength to handwrite her music, two friends gave her a Mac on an indefinite loan. Using Mark of the Unicorn's Professional Composer to write and print scores, she completed her degree in 1988. Although Vantrease no longer works full-time, she is now a free-lance music critic for the Richmond News Leader.

"Without my computer, I'd be in a lonely, silent, boring world. Three scenes of my opera, a suite for piano, and a piece for flutes wouldn't exist—because I wouldn't have been able to write them down. Because ALS impairs my speech, I communicate by typing messages on my computer to friends, family, doctors, and my computer bulletin board pals."

She continues, "My Mac helps me keep up with world news and with trends in music (through a music bulletin board). I get support and helpful advice from folks in the disabilities forum on CompuServe. In short, my computer and modem give me a window to the world into which my feeble legs and arms can no longer carry me."

Vantrease isn't the only person who feels that way about her Mac. Computers now enable disabled people to work without leaving home, communicate without being able to speak, and read without being able to turn pages or see. For many individuals with disabilities, computers are more than just an easier way to do things. They're a way to achieve independence and maintain self-esteem.

Many Needs, Many Solutions

According to U.S. government estimates, 15 percent of the population is disabled—over 42 million children and adults in this country alone. An additional 750 million disabled people live in other parts of the world. That total is growing by more than a half million people every year. In fact, one family in three is dealing with some form of disability.

Disability can be defined as a lack of fit between a person's goals, his or her capacities, and the resources in the environment. For a wheelchair user, disability is not being confined to a wheelchair; it's being confronted with a flight of stairs. For a child with dysgraphia (a fine-motor problem that affects handwriting), disability is not poor handwriting; it's having a pencil as his or her only available writing tool.

There is a growing sense among people with disabilities, their families, doctors, and therapists that something almost magical can happen when people with disabilities encounter a computer. The problem is how to make that magic work for a particular person (see "Finding Resources"). With the right equipment, computer access can expand an individual's abilities and increase his or her independence at home, at work, and at school.
IT'S NOT AN EXAGGERATION TO SAY THAT MY MAC SAVED MY SANITY AFTER I WAS FORCED TO RETIRE.

WITH A LITTLE HELP FROM MY MAC

André Alm is working on a project called the Smart House System for Swedish Electrolux (see "Enabling Electronics"). The Smart House will make it easier for disabled people to control their home environments.

There are currently hundreds of specialized products—keyboard guards, voice synthesizers, head pointers, chin switches, braille printers—that enable people with all levels of disabilities to use the Mac and other computers. But it's important to remember that not all potential solutions bear labels that read "special education" or "rehabilitation." In fact, off-the-shelf products such as Kensington Microware's Turbo Mouse trackball are popular and make very cost-effective adaptive devices. Software products such as CE Software's QuickKeys can help some users address dexterity difficulties, and Apple's own system software helps others.

Friendly Features

Many design features of the Macintosh and the Mac interface bypass the effects of physical challenges. One of these features is the humble mouse. "It's not an exaggeration to say that my Macintosh saved my sanity after I was forced to retire from the firm and the active practice of law," states Steve Magleby, a Salt Lake City attorney with multiple sclerosis (MS). "At that time, I felt completely cut off from the outside world because I could no longer write legibly or use a regular typewriter. However, after getting my first Macintosh some months after retiring, I was able again to do things, such as write letters, some small legal tasks, and take care of finances—primarily because of the interface and mouse."

In addition to the mouse, Apple has built in several features that make the Mac easier to operate for disabled users. Some are obvious: the Control Panel assists users with limited dexterity by letting them turn off the keyboard's Key Repeat feature. Hearing-impaired or deaf users should be aware that the Mac beep is also user configurable from the Control Panel. Turn the volume down completely and the computer will start to signal alerts with a menu-bar flash.

EasyAccess, a piece of System software shipped with every Mac, provides two utilities, Sticky Keys and Mouse Keys. Sticky Keys gives one-fingered typists the ability to complete commands like Option-B. Mouse Keys turns the numeric keypad into a full-functioning mouse; keys on the keypad direct the cursor around the screen (for more information on these utilities, refer to your Macintosh manual).

Just being able to write with 24-point type and then print at 12-point is a big advantage for visually impaired users. In addition, Apple's CloseView system utility enlarges screen contents up to 16 times normal size. This feature can assist not only the visually impaired, but anyone sitting farther than usual from a monitor—in a wheelchair or a bed, for example.

Other features are less obvious. Unlike the IBM PC, Apple's floppy disk drives have no latches. When a disk is ejected, it's pushed out far enough so that it's easy to grasp. Although the Mac Plus and SE power switches are difficult to reach for many users, the Mac II family can be turned on from the keyboard.

Mac Adaptability

For some individuals, these built-in features are not sufficient to provide access. Fortunately, the large market represented by people with disabilities, along with encouragement from the federal government (see "Statutes of Liberty"), has induced vendors to make a wide variety of adaptive peripherals available.

André Alm is a 23-year-old computer science student at the University of Västerås in Västerås, Sweden. "Up until 1978 I led the life of a normal, healthy young boy. In October of that year, while climbing a tree in my garden, I fell to the ground and broke my neck." As a result, Alm is paralyzed from his shoulders down. Alm bought his first computer, an Apple IIe, in 1984; late in 1985, he got his first Mac.

"Prior to owning a computer I used a normal typewriter with a stick in my mouth. That was very cumbersome, and I could not, for instance, draw. As the computer is such a flexible tool, I can do many things I could not do before."

For a mouse, Alm uses Prunte-Romich Company's HeadMaster device, which consists of a headset and a transceiver that monitors head movements.
A prototype of the Smart House System André Alm is helping to design, his own room in Västerås, Sweden, enables Alm to work, play, and communicate. The heart of the system is the CORE universal appliance controller, developed by Steve Wozniak’s company CL9 (CORE devices are in red). A HyperCard stack in a Mac Plus acts as an interface for the CORE, which communicates with the other devices in the room via infrared transmissions. Alm accesses the CORE stack either through Timbuktu and LocalTalk from his IIcx, or via a keyboard wired to a sip-and-puff switch that reaches to the bed. (The stack scans options, enabling it to be controlled by only two commands.) Another CORE device is attached to Alm’s wheelchair. Using the COREs, Alm can operate his TV, satellite dish, VCR, stereo, and tape player from his bed, wheelchair, or IIcx. He can also lock and unlock doors, and soon he will have the ability to control lights and a burglar alarm.
along with a puff switch (which users blow into) for making selections.

For keyboard emulation he uses a Swedish product called a Temac, manufactured by RehabCenter AB. The Temac has 100 LEDs, each corresponding to a keyboard key. When Alm wants to type a letter, he highlights a particular LED key, and blows into the HeadMaster puff switch to select that character. "I have used several software keyboard- emulation programs," says Alm, "but those weren't 100 percent compatible with all programs. With the Temac keyboard I can type about 100 keystrokes per minute." With his head mouse and keyboard, special design controls, and a custom HyperCard stack, Alm now uses three Macs to control his home environment, open doors, dial the phone, and operate his stereo, TV, and VCR (see "Enabling Electronics").

Adaptive peripherals are essential access devices for many people with physical challenges such as André Alm. Rapidly emerging as equally critical is the software that comes bundled with all Macs: HyperCard. At the Center for Applied Special Technology (CAST), HyperCard plays a vital role in helping disabled children become more independent. Matthew Huggins is a student with severe cerebral palsy that leaves him unable to control his limbs or talk. Although he cannot use any traditional curricular materials, Matthew is in a regular first-grade class—thanks to HyperCard.

When Matthew turns on his Mac, he sees a customized HyperCard Home Card, where buttons highlight sequentially (a process called scanning) so that he can choose the activity he wants. Although Matthew can't point or use a keyboard, he makes selections by clicking his chin switch, which substitutes for a mouse. From his Home Card, Matthew can choose among a variety of HyperCard stacks developed by CAST. Through these stacks, Matthew and others like him can access an entire first-grade curriculum, as well as play games, type, read sports stories, and control home environments (lights, heaters, radios, and so forth). By clicking on an icon, he can go to his library of scanned books and browse pictures or hear stories read aloud. He also writes with a scanning, on-screen word processor.

The liberating effect that the Macintosh can have on the life of a student is mirrored in the business world. Together with his wife, Sarah, David Skinner operates Thrushwood Publishing, a laser desktop publishing service, from their farm outside of Ottawa. "I am 43 and have had ALS for at least 12 years," explains Skinner. "I have not been able to write or type since late in 1982, and I completely lost the ability to speak last year. I am quadriplegic, ventilated [need assistance to breathe], and dependent on a stomach tube for feeding. I do, however, have near perfect hearing and eyesight."

To communicate, Skinner uses the Communi-Mate by Wells & Ryan of Indian Creek, Illinois. Communi-Mate is a computer based, menu-driven alternate communication and environmental-control system that can be operated with a single switch. It's connected to Skinner's own computer system—Thrashwood uses a Mac for desktop publishing—which consists of a Laser 128EX computer (Apple IIe clone), a Votrex speech synthesizer, a Radio Shack household appliance controller, and a Laser 190A dot-matrix printer. Skinner operates the Communi-Mate by using an eyebrow switch to select options when they highlight from available menus: signal, text composition, environmental control, medical options, and basic conversation. "By using it to dictate instructions, I can use the Macintosh with the help of Sarah or one of the nurses in charge of my care six hours a day."

"In addition to the normal, mundane uses one might expect—small talk, calling for help, turning lights on and off—I use my computer for heavy duty writing," Skinner continues. "Besides the large amount of correspondence I deal with, I also produce articles for several newsletters and journals, and have started work on my first book. We scan the Communi-Mate's output into a Mac II for final editing and layout. Dest's Publish Pac OCR software can read the Epson font, often with 100 percent accuracy."

Sensory Challenges

People with sensory disabilities have a different set of needs than do those with physical disabilities. The possibilities the Mac offers to the blind and visually impaired are dramatic—despite the fact that the Mac's graphical interface is so visually oriented and requires a certain amount of hand-eye coordination.

Marc Sutton, a technical-support person at Berkeley Systems, is blind. He was the prime tester and documentation writer for Berkeley Systems' Outspoken, a screen-reading program that uses Apple's Macintosh to pronounce words. With the numeric keypad as a mouse, users can navigate around the screen as Outspoken announces "window," "icon," and other visual landmarks of the Mac interface in synthesized speech. Because the program can read aloud lines or individual words, users can also use Outspoken to browse and edit text.

According to Sutton, "The Mac is a reading and writing device that lets you keep up with sighted people. It gives access to jobs, information stored in books in libraries, and other electronic formats—online and on CD ROM. For example, you can scan a book with a scan-
When the new school year starts, seven-year-old Megan Rasbold-Gabbard will join other first-graders in class at the Butler School in Belmont, Massachusetts. Because she has cerebral palsy, Megan uses the Mac to communicate with her classmates, like Shannon and Jason here.
"THINK ABOUT IT,"

HE TYPED TO ME

OVER THE NETWORK.

"WITHOUT TELE-

COMMUNICATION,

I COULD NOT SHARE

THESE THOUGHTS

WITH YOU."

With a little help from my Mac, then convert it to text with optical character recognition (OCR) software, and print it with a braille printer, like TeleSensory Systems’ VersaPoint 40. It does a lot for someone’s independence.

He continues, “One reason the Mac is good for visually disabled users is because, thanks to Apple, there are developer standards for Mac software. The File menu is always in the same place. The Edit menu is in the same place. And so on. One of the hardest parts of doing Outspoken was the nonstandard dialog setups some software developers use.”

Robbie Park, a high-school student who has low-vision and physical disabilities, uses Articulate Systems’ Voice Navigator, a speech-recognition system. After training the Voice Navigator to recognize his speech, Robbie can tell the Mac to open a file, to type a word, or to dial a telephone number, simply by saying what he wants out loud.

Because of his visual disability, Robbie needs his text enlarged on the screen through CloseView and his text read aloud with Talking Keys, a public domain desk accessory that uses Macintosh. Once again, HyperCard plays an important role—Robbie uses stacks developed at CAST to organize his hard drive and do his homework.

Hearing disabilities may be a less formidable obstacle to using a Mac than blindness or visual impairment. But a computer can affect a hearing-impaired user in profound ways. Barry Prowell is a senior programmer analyst for Bull HN Worldwide Information Systems and a Vietnam veteran with a nearly total loss of hearing and the use of only one hand.

“My greatest use comes in the area of telecommunications. My Apple II computer is my telephone. I have enough hearing left that when coupled with my speech-reading abilities, I can converse without too many problems. The problem is, if I can’t see who I am talking to, I can’t hear. Since conversing online is really reading and typing, we have an excellent environment for the hearing impaired.”

Prowell operates the AzApple Special Needs BBS in Phoenix. “If someone wants to reach me and they have a computer, it’s just a matter of dropping a mailbox message to me. The same applies to America Online. Think about it,” he typed to me over the network, “without telecommunication, I could not share these thoughts with you as quickly or easily.”

Technology for Learning

Like physical and sensory challenges, learning disabilities continue to affect people throughout their lives—not just while they’re in school. For example, a child who can’t read (decode) words—although bright and interested enough to learn—can’t gain access to the ideas in books. Often, a learning disability causes difficulty in expressing thoughts and ideas in writing. Spelling, grammar, and writing organization can all be affected, so that it’s not uncommon for a learning disabled (LD) college student who speaks fluently to write at the eighth- or ninth-grade level.

In schools and colleges across the country, students with learning disabilities are using off-the-shelf Mac software to help overcome their difficulties. Outline processors such as Acta Advantage, for example, can provide an easy and flexible way to organize—and reorganize—thoughts for papers. Writing aids like Deneba’s Spelling Coach Professional can help students concentrate less on mechanics and more on expression.

Even basic word processors can make writing easier for anyone who has trouble with more conventional techniques. According to Richard Wanderman, a HyperCard developer and founder of the Forman School’s Macintosh

Not all disabilities are obvious to the eye.

Fourteen-year-old James Nellson uses a Mac to overcome his difficulties with the mechanics of written language: spelling, handwriting, and composition.
Many disabled people do not know about new technologies that can help them, where to get information about special equipment, or how to pay for it. Information services such as CompuServe, America Online, and GEnie all have dedicated forums or roundtables for discussing disability issues. Many user groups have special-interest groups for users with disabilities. In addition, there are a number of organizations devoted to helping individuals with disabilities gain access to computers.

Founded jointly in 1987 by Apple and the Disabled Children's Computer Group (DCCG) of Berkeley, California, the Alliance for Technology Access (ATA)—formerly called the National Special Education Alliance (NSEA)—is a coalition of independent organizations dedicated to providing disabled individuals access to information and resources on using computers of all types, including Macs.

Each ATA member operates a resource center equipped with a variety of computers, adaptive devices, and software. There are currently over 40 ATA resource centers around the country.

According to Alan Brightman, manager of Special Education and Rehabilitation at Apple, "Disabled people often have problems with retail establishments. Aside from general access barriers like stairs, there's a high intimidation factor. And of course, typical retailers usually don't carry a wide variety of adaptive devices for people with disabilities to try out."

The goal of ATA centers is not only to help people find an appropriate computer, but also to help individuals adapt that computer to their particular needs. Although each non-profit resource center has its own area of expertise, they share information via AppleLink. That enables a center specializing in the needs of people with visual disabilities, say, to draw on the resources and expertise of another, which may focus on individuals with learning disabilities. See Where to Buy under ATA Centers in the back of this issue for a list of ATA locations and phone numbers.

Another available resource is the Trace Center at the University of Wisconsin Madison, a leading center for development and evaluation of computers and adaptive devices for people with disabilities (608/262-6966). It offers HyperCard-controlled CD ROM and floppy-based versions of Abledata, a database of all adaptive technology products—from wheelchairs to headmice. In addition, the staff that maintains the Abledata database will search their product database for people who call (800/344-5405, voice or TDD).

Closing the Gap publishes a bimonthly newspaper about computer technology for people with special needs. One issue each year is a resource directory that lists vendors of hardware and software and organizations for disabled computer users. Write to the group at P.O. Box 68, Henderson, MN 56044 (or call them at 612/248-3294).—B.M.

**FINDING RESOURCES**

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**Talking Back**

Modern technology has redefined the way people think about disabilities—in fact, in many cases, technology has eliminated the greater part of the disability itself. But many agree there are still barriers to full independence.

Barry Prowell says, "As for the hardware vendors, I have one question: When are you going to put the damn power switch on the front of the machine? I shouldn't complain, because I can screw in a 3-foot extension to my artificial arm and reach the sucker. And while you're at it, put a master reset button there too."

Steve Magley adds, "Macs are so much easier for all kinds of disabled people to use. It's unfortunate that Apple has yet to produce the much-rumored low-cost Mac."

 Says Liz Vantrease, "A lighter-weight portable Mac would be very helpful. I need to be able to take a computer with voice synthesizer along with me when I go out to see doctors or friends."

David Skinner agrees. "Sarah and I like to travel a lot, and no longer being able to talk adds stress to a task that's not easy at the best of times. Even with a battery pack, the Communi-Mate is not really portable. Right now, if I try to get Sarah's attention in the car, she doesn't know if we took a wrong turn and are headed for Havana or whether I have a sore butt!"
Thanks to several federal laws, people with disabilities now have legal rights to challenge discriminatory action and to request services. Public Law (PL) 94-142, the Education for all Handicapped Children Act, requires school districts to provide accessible technological aids to students with disabilities if those aids will enable those students to be competitive with other students. Federal law mandates that a child of elementary- or secondary-school age with an identified disability have an Individual Educational Plan (IEP). If you feel your child could benefit from computer technology, you must ensure that access to technology is written into the IEP. For example, should a student’s disability prevent him or her from speaking or writing, an IEP can call for a computer communication aid that produces synthesized speech, enabling a student to communicate with teachers and classmates. Parents have the right to appeal IEP decisions should parents and school disagree on the potential benefit of computer access. All states have Parent Advocacy Programs to help parents of children with disabilities.

Section 504 of the Rehabilitation Act of 1973 (PL 99-506) mandates nondiscrimination in postsecondary programs. While Section 504 does not require colleges to provide students with individual computers, it does require nondiscriminatory access to any campus computer that is part of the normal college experience. Students denied nondiscriminatory access to computers on campus should file complaints with their campus Section 504-compliance officer or with the U.S. Office for Civil Rights.

PL 100-407, the Technology-Related Assistance for Individuals with Disabilities Act, is designed to help states inform persons with disabilities about the potential impact of technology on their lives, and to provide the mechanisms to put assistive technology into their hands. By May 1990, the U.S. Department of Education had funded 23 states under PL 100-407. For more information, contact state and local government offices about such state programs.

For software developers, André Alm offers some advice. “A disabled person nearly always has problems in physically handling the looking up of information in manuals. I would really like to see them include much more online help in their programs.”

Barry Prowell has another comment. “I only have five fingers. I just love those developers who write programs that make you press the Option key, Shift key, and X to do something. Hold the keys down, click the mouse, and drag . . . I only have so many appendages to work with before I get accused of kinky computing.”

Richard Wanderman pleads for a better speech-synthesis program than Macintalk, the only software-based speech synthesizer on the Macintosh. Doctors at CAST agree. According to program director Anne Meyer, “An intelligible, inexpensive, text-to-speech system is critical for children with learning and communication disabilities.” Digitizing speech with the MacRecorder for playback on the Macintosh—which sounds much more natural than Macintalk—simply takes up too much room on a disk drive.

Independence in 1990
No matter what type of disability is involved, computers in general, and the Macintosh in particular, are significant tools for enhancing users’ independence.

Liz Vantrease says it all when she observes, “The Mac is an empowering device. It can give you back some of the things that were so unfairly stolen from you by illness, accident, or birth defect.”

Given the prevalence of physical, sensory, and learning disabilities, the odds are good that you know someone who might benefit from a computer, or that you yourself have a disability that might be well served by one of the Mac’s features or products (if so, you may want to contact one of the organizations listed in “Finding Resources”). Greater awareness in the public at large of the computer’s capabilities offers the greatest promise of all for fulfilling the potential for independence that can be unlocked by a Mac.

See Where to Buy for contact information on products and ATA centers.
Believe it or not, some folks don't need a drive larger than 40MB, 50MB, or 60MB. For you non-pack rat types, Macworld Labs reviews 54 low-capacity drives.
I
t's all Apple’s fault. If it would just offer a reasonably priced drive in every capacity for every Mac, then users wouldn’t need to wade through specs sheets and price lists to choose a drive. But Apple can’t do that—it would have too many options and configurations to deal with for just a peripheral business.

So other companies are flooding in to fill the gaps that Apple has left. And, boy, are those companies creating a torrent. In fact, so many companies have set up shop that you begin to wonder how they can all survive. Well, many won’t. Jasmine didn’t; Crate didn’t. That’s why everywhere you turn, you see an ad proclaiming an even better hard disk deal.

During the past year, we’ve noticed an increasingly loud roar from drive vendors. Gimmicks abound, claims have been made that border on false advertising, and price wars are getting more intense. None of this bodes well for the consumer—not even the price competition. A cheap drive isn’t such a great deal if it breaks and the company is no longer around to fix it.

For this article, Macworld Labs tested, prodded, and prodded 40MB, 50MB, and 60MB drives from 31 companies. Many of the vendors are longtime players who have sent us quality products in the past, and their drives performed true to form. Other companies—such as Bay Micro Systems, Hard Drives International, and Star Data—are relatively new to the Macintosh hard drive arena; some new entrants fared well against established products, but many didn’t.

Following Tradition
Most top-rated drives come from companies that toe a traditional line—they aren’t trying to win market share solely on price or hype. Instead, they consistently pay attention to details and put together quality products. Our favorites typically offer cleanly designed formatting and diagnostic software; a sturdy, platinum-colored case that fits perfectly underneath a Macintosh SE; and informative, professionally bound (not photocopied) manuals. These drives generally aren’t the cheapest, but they aren’t overpriced either. Most are sold through dealers, since generally speaking, customers can get more prompt, personal service through a local dealer. (Some companies, such as GCC and Microtech International, sell drives through dealers and direct). Drives from Apple, EMAC, GCC, Maxcess, MicroNet Technology, Microtech International, Rodime Systems, Ruby Systems, PLI, and Storage Dimensions all fall easily into the category of traditional drives. (Of course, a few drives that make our list don’t meet all the above conditions—particularly with respect to case design. For instance, we like the small, fast drives from EMAC, FWB, Liberty, and La Cie as well as SuperMac Technology’s larger, vertical DataFrame XP).

Some of the preferred drives include more than formatting and diagnostic software; partitioning and backup software are especially common. Backup software is handy for any size hard drive. A good program is fast, compresses data, lets you back up to a variety of media, and provides the ability to perform incremental backups—in short, it does all the things Apple’s HD Backup doesn’t. Our favorite package, Fifth Generation Systems’ speedy FastBack II, comes bundled with Rodime’s Cobra. We also like Centa Systems’ BackTrack, bundled with Microtech’s Nova; SuperMac’s DiskFit, bundled with the DataFrame; PLI’s TurboBack, bundled with the PLI 50 Turbo; and, to a lesser degree, Symantec’s SUM II, which comes with GCC’s UltraDrive.

Partitioning software, which lets you divide a hard disk into volumes of various sizes, is probably unnecessary for users with drives of less than 80MB. Programmers may want to divvy up the space on a hard drive in order to get around the System’s 2000 or so files-per-volume limit. Other users may just like to group files on separate volumes in order to stay organized or to cut down on start-up time. Of all the drives we looked at, Storage Dimensions and SuperMac have the partitioning software with the best interface.

Only a few drives include other types of software, but the best deals are worth noting. PLI includes three utilities it developed in-house: Turbo-Optimizer reclains the empty space on a fragmented hard disk, Turbo-Cache enables you to store hard disk data in fast system RAM, and TurboSpool spoils print jobs. Likewise SuperMac includes its popular print spoolers, SuperSpool (for the ImageWriter) and SuperLaserSpool (for laser printers).

Most other hard drive vendors rely on bundling arrangements with software vendors. Especially popular are hard drive utilities such as Symantec’s SUM II, bundled with GCC’s UltraDrive; Norton Computing’s Norton Utilities for Mac, bundled with Microtech’s Nova and EMAC’s Impact and Metro drives; and Central Point Software’s MacTools, bundled with Storage Dimensions’ MacinStor. With its E Series and V Series drives, Maxcess includes CE Software’s QuickKeys Lite (a macro program that, unlike the standard version of QuickKeys, limits you
## MACINTOSH SE Results

### Overall Fastest

| 0.99 | CMS PowerCache (R) | 114.58 | 49.18 | 97.87 | 170.50 | 5222 | 4346 |
| 0.99 | iMac Pro (C) | 114.58 | 49.18 | 97.87 | 170.50 | 5222 | 4346 |
| 0.99 | iMac Pro (C) | 114.58 | 49.18 | 97.87 | 170.50 | 5222 | 4346 |
| 0.99 | iMac Pro (C) | 114.58 | 49.18 | 97.87 | 170.50 | 5222 | 4346 |

#### Desktop Duplication 10MB

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### Macintosh SE Results

#### Some drives that ran fast on a Macintosh II ran slower on a Macintosh SE, and vice versa. For instance, the Seagate-based GCC UltraDrive 45 ran much faster than the Quantum-based UltraDrive 40 on a Macintosh SE. But the Quantum-based UltraDrive 40 was the second-fastest drive overall on a Macintosh II. Macintosh Plus and SE owners should look at the Macintosh SE test results for guidance, while owners of faster Macs should look at the Macintosh II results.

**Actual result**
- 35.8 *Fastest in test*
- 80.5 *Slowest in test*

**Percentage slower than the fastest**
- 0%-10%
- 10%-20%
- 20%-30%
- 30%-40%
- 40% or more

**Note:** Seek results are not included with other tests for the overall index.

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**C** = Conner CP3040

**CP** = Conner CP340

**K** = Kalok

**Q** = Quantum

**R** = Rodime

**S** = Seagate

**W** = Western Digital
to 14 keystrokes), DiskTop (a useful file-management program), and MockPackage (a group of utilities, including a text editor and background printer). The PCPC MacBottom drive comes with a nifty utility that lets you copy a single large file onto a couple of floppy disks and then restore the file on another Mac.

### Less Traditional but Still Loved

Not all of the drives we like best take as traditional an approach as the ones listed above. Take the creative design approach adopted by La Cie. The king of consumer choice, La Cie sells three lines of drives—Cirrus, Tsunami, and ZFP (which stands for zero footprint; the unit fits beneath a Macintosh SE). The company's original drive, the Cirrus, has an oddly rounded case that stands vertically beside a Mac (see photo). Nonetheless, the Cirrus has always been a quiet, fast performer. La Cie's latest creation, the Tsunami, looks even odder—wave-like scallops undulate along its bottom edges and a round, purple fan bulges out at the top (see photo). This drive maintains the Cirrus's speed and silence, and some people appreciate its unusual look.

But La Cie hasn't stopped at simply offering three different case designs. Consumers can choose either a Quantum or Conner mechanism when purchasing any 40MB drive. The mechanism you pick determines the length of the warranty (five years for Quantum, one for Conner) and the price you pay ($50 to $100 more for a Quantum). Where you purchase your drives may determine which one you get—La Cie sells Cirrus and ZFP drives directly; you must purchase Tsunami drives through dealers.

Even more clever in this age of concern about customer support for hard drives, La Cie offers free on-site service to purchasers of the Tsunami drive. If you have a problem, you call La Cie, which in turn calls TRW, which calls you to set up a time to visit your office. TRW then either replaces or repairs the faulty drive. Although this is really no quicker than getting a company with a guarantee turnaround time to send you a replacement unit, it does save you the hassle of shipping the drive.

La Cie isn't the only vendor to offer special features or additional choices in order to distinguish itself from the crowd. Some innovations, such as La Cie's longer warranties for the Quantum-based drives, may truly represent a good deal. Others are a bit trickier to evaluate. For instance, EMAC's sturdy Metro drives include SCSI Sentry, a protective circuit that prevents a drive's controller from being damaged due to a short in the SCSI circuitry. Shorts in the SCSI circuitry are infrequent, however. You'd have to do something unusual, like poke a paper clip into the holes of the SCSI connector on the back of a Mac, in order to short a SCSI circuit. Still, people have been known to do worse things to their Macs, and a little extra protection might not be a bad idea.

Just be careful not to get swept away by features you can't really use. For instance, some companies, such as Mirror and MacProducts, include several megabytes of shareware on their drives. While that may seem like a good deal at first, it's frustrating to plug in a new 40MB drive only to find out that 5MB or more have been filled up with miscellaneous demonstration programs (in other words, advertising), games you don't want, or outdated virus-protection programs.

### Small and Mobile

In the June issue we first reported on a new crop of small, lightweight drives that draw their power from the Mac's floppy port (see "Midrange Hard Disks," Macworld, June 1990). Because many of the drives had trouble booting from fast Macs such as the IICx, and because they won't work on a Macintosh II (which doesn't have a floppy port), we hesitated to recommend them to anyone other than Mac Portable users. Over the past few months, however, some companies have solved these problems.

Of the floppy-port-powered drives we tested this time, only Advanced Gravis's HardPac and Tallgrass Technologies' TravelPac failed to boot from a Macintosh IICx with an internal drive. The others—the Dolphin Systems Porta, iDS Pro, iDS Wip (an even smaller version of the iDS Pro), Relax Sierra, MacProducts Sierr, MicroNet Technology Micro Pack, and Ruby Systems' Dwarf—all worked fine. In answer to our complaint that none of the drives would run on a Macintosh II without adding an external power supply (and thereby negating the size and weight advantages these drives hold), iDS now includes an adapter.

Since these drives have become better behaved, we are more inclined to recommend them, although we still find them best suited to Macintosh Portable users. The MicroNet Micro Pack supports the Portable's sleep mode—when not in use this drive powers down so as to conserve the battery. Our favorite drives without a power supply include the fast iDS Pro, the very tiny iDS Wip, MicroNet's Micro Pack, and Ruby Systems' Dwarf (which includes numerous ventilation holes to prevent heat buildup). Each of these drives is a solid performer and extremely quiet (thanks to the lack of a fan or power supply).

### Bargain Hunting

If you're looking for a low, low price per megabyte, a number of companies are glad to oblige. These discounters generally sell direct, but although they offer the basic cables and formatting software you need to get a drive up and running, they offer little in the way of extras. In addition, these companies count on buying mechanisms in bulk from a variety of suppliers in
### Macintosh II Results

To determine the overall fastest and slowest drives, we added up the numbers from the real-life tests for each drive and indexed them based on the fastest drive. These indexed numbers are shown in the farthest left-hand column. We then grouped the drives according to how much slower they were overall than the fastest drive. For instance, the drives coded with red are 0 to 10 per cent slower. Actual results for individual tests are also shown and color coded. The drive that ran fastest and the drive that ran slowest in each test are also marked.

<table>
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<th>Geometric Mean Duplication</th>
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<th>Save</th>
<th>Search</th>
<th>Compile</th>
<th>(KB/sec) per second</th>
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### Actual Results

- Fastest: 80.5
- Slowest: 35.9
- Percentage slower than the fastest:
  - 0%–10%: 20%
  - 10%–20%: 20%
  - 20%–30%: 20%
  - 30%–40%: 20%
  - 40% or more: 20%

### Drive Indexing

- C = Conner CP3040
- CP = Conner CP340
- K = Kalok
- Q = Quantum
- R = Rodime
- S = Seagate
- W = Western Digital

**In order to determine the overall fastest and slowest drives, we added up the numbers from the real-life tests for each drive and indexed them based on the fastest drive. These indexed numbers are shown in the farthest left-hand column. We then grouped the drives according to how much slower they were overall than the fastest drive. For instance, the drives coded with red are 0 to 10 per cent slower. Actual results for individual tests are also shown and color coded. The drive that ran fastest and the drive that ran slowest in each test are also marked.**

---

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*Seek results are not included with other tests for the overall index.*

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## A Consumer's Guide to Low-Capacity Drives

<table>
<thead>
<tr>
<th>Product</th>
<th>40MB Drives</th>
<th>45MB-50MB Drives</th>
<th>60MB-70MB Drives</th>
<th>Internal Versions</th>
<th>Method of Sale</th>
<th>Takes Power from Floppy Port</th>
<th>Dimensions (h x w x d, in inches)</th>
<th>Case Material</th>
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*1 C = Conner CP4040, CP = Conner CP4049, K = Kale, Q = Quantum, R = Rodime, S = Seagate, W = Western Digital.  
*2 This service is provided by dealers.  
*3 No internal version for the Macintosh Plus.  
*4 Depends on the mechanism.  
*5 Direct to educational institutions.  
*6 Two years if you purchase a carrying case.  
*7 Case includes power switches on front for controlling other peripherals and the Macintosh CPU.  
*8 With extended warranty.
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<tr>
<th>Type of Termination</th>
<th>Partitioning Software</th>
<th>Backup Software</th>
<th>Password-Protection Software</th>
<th>Other Commercial Software</th>
<th>Warranty (in years)</th>
<th>Extended Warranty Available</th>
<th>Toll-free Telephone Support</th>
<th>Guaranteed Turnaround Time</th>
<th>Data Recovery upon Request</th>
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order to keep their price to the consumer down. Thus, month to month, the mechanisms they have available may come from different makers.

Of the discounters, Ehman and Hard Drives International provide the best products, although the quality can still be spotty. For instance, if you read our hard drive roundup in the June issue, you'll know that the Ehman drives caused us no end of problems, while the Hard Drives International PowerDrive worked fine. This time around, all of Ehman's drives were average performers but the Conner CP340-based PowerDrive was acceptably slow.

The CP340-based PowerDrive also required some work to format. When attached to a Macintosh SE, the drive should have run fastest at a 2:1 interleave ratio. Instead, we recorded faster times when the drive was formatted at a 3:1 ratio—the ratio that is normally more appropriate for a Mac Plus.

Both Ehman and Hard Drives International are working to improve the quality of their products and their support. For instance, Ehman has cleaned up its formatting software and has hired more customer service representatives. We'll continue to follow these companies to see if the changes work. Two other companies, MacProducts and Relax, also could be considered discounters since their prices are generally low. Relax, however, sells through dealers only, while MacProducts sells both through dealers and direct. In "Midrange Hard Drives" we reported problems copying files and folders on Relax and MacProducts drives, a problem we attributed to Relax's driver software (which MacProducts licenses). Out of interest, we double-checked some of the 80MB drives we had originally tested. Neither these nor any of the 40MB to 60MB drives we tested this time had difficulty copying files. Whatever the initial problem was—whether driver related or mechanism related—it seems to have been fixed.

Other discounters didn't do well either in our benchmark tests or in our subjective review. We wouldn't touch Star Data's StarMac with a ten-foot SCSI cable, much less attach it to our Macs. The problems started immediately after we formatted the drive. The StarMac wouldn't mount. We had to restart the Mac every time in order to get the drive to show up on the

Do-It-Yourself Termination

Nearly every time we publish a review of hard drives, we complain about drives with internal termination. Apple requires that the first and last peripherals attached to a Mac's SCSI port be terminated—echoes from electronic signals passed through the cable must be deadened. Since many hard drive companies bank on the fact that a hard drive will be the first (and only) peripheral in a chain, they add termination. For a first-time Mac user, this makes a hard drive a plug-and-play proposition.

But for anybody with a couple of other SCSI peripherals attached, dealing with termination can be a nightmare. If you've already got, say, an internal drive (which is terminated) and an internally terminated tape backup drive hanging off the SCSI port, and you want to add a hard drive that a vendor has so kindly terminated for you, here's what to do.

First of all, check out what type of termination the drive has. If the drive comes with a small 50-pin adapter, then you're lucky—you've picked a drive that is externally terminated. Otherwise you'll need to remove the internal terminators.

You'll need to know what you are looking for. Internal terminators look like tiny pieces of plastic with little metal legs sticking out. You see only the plastic tops; the legs are firmly secured inside the drive.

Most drives don't allow easy access to terminators; you need to open the drive's case with a small Phillips screwdriver. Some cases, such as those with Ehman drives, have a piece of clear plastic that lets you see the terminators. Removing the plastic allows easy access to the terminators.

Once the case is open, you need a pair of pliers to remove the terminators. If you ever played the game of Operation as a child, you know what this procedure feels like. Grasp the terminators firmly with the pliers and pull them straight out, gently. I never was very good at Operation, and I usually end up bending the pins on at least one of the terminators. That won't hurt the drive, but you'll never be able to reinsert a bent terminator.

That's it. Close up the drive's case and you're done. If you ever need to terminate the drive, you'll have to put the terminators back in (assuming you are more skilled at removing them than I am). An external terminator won't work because internal and external terminators have different SCSI power requirements.
desktop, and we never did get the drive to work as a start-up disk. When we finally got the StarMac mounted, it said we had used 29,472K on the disk with 0 files. Only by erasing the drive from the File menu could we get a correct reading. To top things off, the StarMac uses the same Conner CP340 mechanism that the problem Power- Drive does and, as a result, had the same formatting and speed problems. True to form, however, the StarMac's software wouldn't let us change the drive's interleave ratio.

For the real kicker, we could never reach Star Data after our initial product order (the telephone number had been disconnected). The point here is that you should be cautious when it comes to bargain hunting. If the lowest price per megabyte is your main criterion, pick a product from a more widely known company such as Ehman or Hard Drives International. At least you know that the drive comes with all the cables and software you need to get started. Some no-name discounters may try to cut corners by omitting SCSI and power cables. In addition, both Ehman and Hard Drives International are trying to provide quality products at a low price, although they have not yet reached the level of consistency of companies that put attention to detail over price per megabyte. If you want to try a product that this article doesn't review, try asking online-service users for their recommendations. Future articles on hard drives in Macworld will review products from companies such as Third Wave and Alliance Peripheral Systems that have been getting good notice on some of these services.

Recommendations

As always, there's a smattering of drives we would avoid, a few that we like best, and a whole slew that fall somewhere in between. We didn't have much luck with the slow, problem-plagued Conner CP340-based Hard Drives International PowerDrive. Don't get this mechanism confused with the Conner CP360X, however. The extra 0 in the number scheme makes a big difference—CP340X-based drives were winners, fast and quiet. Other drives to avoid include the slow, feature-poor Western Digital Preference 40AP and the noisy Dolphin Integra 60 (the other Dolphin drives didn't jangle our nerves at all, however). A newcomer, Deltraic's 40MB drive with a Kalok mechanism, was noisy when seeking data and wouldn't always work as a start-up disk. (Deltraic's 40MB drive with a Quantum mechanism worked just fine, however.) Drives with a Seagate mechanism are also not highly favored. They are a bit cheaper than Quantum and Conner mechanisms, and they do give you a couple of extra megabytes of drive space, but they tend to be slower and noisier.

In spite of our complaints, we've picked several drives that we really liked—and, not surprisingly, we've picked many of these drives as winners before. GCC's fast UltraDrives are top on the list with a sleek case; excellent, clear manuals; and the inclusion of SUM II Storage Dimensions' MacinStor drives are consistently reliable, with clean formatting software and the MacTools hard drive utility. We also liked the well-designed, reliable MicroNet drives and the speedy Rodime Cobra. The slender Cobra has some nice touches, such as an on-screen, simulated LED indicator. Both the EMAC Metro and Microtech Nova drives include Norton Utilities for Mac, the easiest to use of all the hard drive-utility packages. The Nova drive also includes nice backup software, while the Metro drive has a handy power switch on the front of the case. And yes, we still love the funky, fast La Cie Cirrus and Tsunami drives. Their silence is a big plus, as are their low prices and wide variety of mechanism and warranty options. For users looking for portability, we recommend the small, fast, lightweight Liberty drives.

Numerous other drives walk the middle line between being top picks and being not recommended. There is nothing wrong with these drives, it's just that there are so many products to choose from that even a couple of nice touches can move a drive from being a fine, solid product into being a top-rated drive. Perhaps the competition will give consumers even better products from which to choose. See Where to Buy under Hard Disks for contact information.
Wherein our man of the moment tries to live by a modem alone

The ads are enough to make the average efficiency-monger's mouth water. "Join the Information Age," they beckon. "Use your Macintosh to connect with the real world. Correspond, fax, buy, sell, meet, bank, and shop—without stirring from your ergonomic desk chair!"

The products advertised are, of course, online information services. Anyone with a Mac and a modem can dial one up, usually paying by the hour, and connect to a distant roomful of mainframe computers—and thereby to a national network of other users. Such services now number in the dozens, each billing itself as the computer owner's ideal link to a world of information and services.

Having been sufficiently enticed by such ads, I made up my mind to greet the challenge of online services with an open mind (and a valid credit card). As a matter of fact, I decided it wasn't enough just to meander hopelessly through computerized jungles; if I was to emerge from this experience a better man, I would have to truly master my craft. Therefore, I vowed to try the Information Age on for size: I'd attempt to live for an entire week without leaving the apartment. Yes, I would shop, correspond, conduct business, and even socialize, with a modem as my sole link to the outside world.

I armed myself with a 4-foot stack of manuals, promotional materials, and directories provided by the seven general-purpose networks I'd joined: CompuServe,
fee for unlimited usage. This system—which BIX regulars love—causes one unfortunate side effect, however. At peak times, you may get an “all ports busy” message instead of a connection. And when you do reach the service, it may be frustratingly sluggish.

**BIX Fix**

Despite its technical reputation, BIX isn’t intimidating. A numbered list of possible commands appears at every juncture; you type the appropriate number and press Return. BIX offers the usual slew of services—E-mail, downloadable software, BBS areas—but I went straight to the Macintosh Questions area.

What I found there amazed me: hundreds of well-informed, articulate answers to all kinds of Macintosh questions that had been posted by BIX members. Examples: “Why is my new mouse’s ball black instead of white?” (The black ones are the newer Taiwanese-made mice.) “Why do they say MultiFinder isn’t true multitasking?” (It is much closer to multitasking than it’s given credit for.) I added a question about my double-clicking dilemma to the pile, making a mental note to check for responses the next day.

When I returned to BIX, I didn’t find one answer to my question—I found many. The respondents all agreed that my double-clicking problem wasn’t unusual and that the trouble lay with the contacts inside the mouse. One fellow even uploaded an illustrated 5-page set of instructions for repairing the mouse. I learned more about the clicking process than I’d ever wanted to know, but along the way, I found the solution to my problem and made a few friends.

**WEDNESDAY**

The friends I was making online were telling me that Apple had released System 6.0.5. Fortunately, almost every online service is a treasure trove of publicly distributable Mac software. And no service (except Connect) charges you extra for downloading the software.

I tried Genie first. Like BIX, Genie is a text-based service, but it’s much larger and has a less technical bent. There’s a lot of creativity evident in Genie’s upbeat, personal atmosphere. There’s an interactive game called Imagine Nation; the BBS areas are called roundtables; and there are plenty of useful services: the OAG airline ticketing system, a direct link to a discount stock brokerage, and several shopping systems. And Genie’s menu system is friendlier than those of most text-based systems; each numbered menu offers Help and an exit to the previous menu.

Still, Genie is a complicated network. You only begin to appreciate it—or any text-based service—after spending several intense evenings online. During my first online session, I struggled in vain to figure out how to read just the messages I wanted to see. Only after ordering the manual and asking questions of people online—who were, as online users usually are, witty and willing to help—did I begin to tap Genie’s vast potential. For instance, a novice has to plod, menu after menu, toward a particular service or BBS topic. The experienced Genie user, however, has learned that feature’s page number, and can jump directly to that page. (And if you’re really experienced, you’ll uncover a feature no other text-based service offers: real-time games you can play against other users, during which your screen shows video game–style graphics instead of text.)

Whether because System 6.0.5 had not been posted on Genie yet or because I still hadn’t figured out Genie’s file-finding system, I could not locate System 6.0.5 in Genie’s software libraries. So I rolled up my sleeves and decided to hook up with CompuServe, the granddaddy of the online networks.

**THURSDAY**

CompuServe is everything its reputation claims: vast, confusing, well-established, well connected to other services, and expensive. With 14,000 features and services, it could easily be the subject of an article—even an encyclopedia—unto itself. And, like Genie, CompuServe is a text-based service with numerous menus and numerous shortcuts.

In my quest for System 6.0.5, I proceeded through several menus. First I chose Computers/Technology;
sure enough, one of the choices on the next menu was Software Forums. I was certain I'd arrived. But after muddling around awhile, I discovered that to find Mac software, I'd have to go to a Hardware forum and from there to a Mac forum.

One of the choices in the Mac forum, File Finder, sounded good to me. I told it to search for System 6.0.5. After a moment, CompuServe told me, “No files located.” But when I searched for System 6.0.5, CompuServe found 234 files. I tried to narrow the search by date (only files posted within the last month), but this time CompuServe told me, “No files located.” After a few more fruitless searches, I gave up.

By now I was lost. In fact, I could find no way to escape the File Finder, and the CompuServe meter was running. I typed HELP, and the ensuing screenful of information told me that I could return to the main menu by typing TOP. To make a much longer story short, I spent an hour meandering around the CompuServe universe before I found System 6.0.5 in a forum called Macdev.

Help on the Way
That not-so-unusual anecdote demonstrates that CompuServe simply isn’t an informational cafeteria, where you can see what you want and take it. It’s a maze of dungeons, each stocked with treasure, but impossible to navigate with no map and no experience.

If you decide to undertake the quest, buy How to Get the Most out of CompuServe (Bantam Books, 1989) from CompuServe. Working through this book is a project in itself, but the well-explained navigational tips could save you plenty of time (that is, money) online. You might also try a program called Navigator 3.0 that automates getting mail, messages, and files from CompuServe, saving you plenty of money and expensive meandering. Navigator won’t, however, let you make plane reservations, shop, chat with other users, do research, or—most important of all—explore.

CompuServe’s administrators are working to address some of the system’s problems. They hope to soon finish the Information Manager, a graphic interface that’s designed to make the service less daunting for Mac users. CompuServe is currently the most complete, most well-stocked service in the country, but it’s also the most intimidating. Therefore, if this new interface lives up to its promises by making all that information easier to access, it will make CompuServe exceptionally useful. You’ll still pay through the nose, but—in theory at least—you’ll spend less time online.

FRIDAY

It’s almost a personal-computing cliche by now: I can make plane reservations right on my computer! Long intrigued by the specifics—and bored silly after a week in my apartment—I decided that it was time to escape. I began planning a trip to the West Coast.

Most of the services provide gateways to one of the three major airline-ticketing systems: the Online Airlines Guide, American Airline’s Easy Sabre, or the PARS Travel network. Delphi offers all three.

The Oracle

Of all the text-based services, Delphi is the most natural to use. Menus always offer you the chance to backtrack or to read context-appropriate help. And menu commands aren’t numbered, as they are on other services; you just type the first few letters of the command you want. This system involves more typing on your part—but using plain English to move around is surprisingly comforting. Then, too, when Delphi wants you to enter a command, it doesn’t simply draw a symbol (like the exclamation mark (!) on CompuServe or the greater-than sign (>) on GEnie); it asks. For example, it might say, “What would you like to do?”

Even without the Delphi manual—a model of clarity—I was able to find
all three of the airline reservation systems; at the main menu, I simply typed Travel. The two free airline services—PARS and Easy Sabre—show you what flights are available between any two cities on a given day. And you can also find out what the lowest fare is for a particular route. Unfortunately, it’s next to impossible to relate these two pieces of information—the schedule display doesn’t show the fares, and the fare display doesn’t show the schedule. That may be one reason the much superior OAG system carries a surcharge on schedule. That may be one reason the 204

...works. In any case, I eventually tracked down, and booked, a flight from New York to Los Angeles. The fare restrictions were clearly indicated on the screen, and a (human) travel agent later confirmed that I had secured the lowest fare available.

I became steadily more impressed with Delphi; a terrific introductory guided tour makes the service even easier to understand. Whereas CompuServe can seem hostile, and even GEnie seems a little alien, Delphi just feels honest. No doors are locked or hidden away. Even though the text that scrolls up the screen is the same old 9-point Monaco, it’s cleaner and less cluttered on Delphi than on other text-based services. There isn’t as large a Macintosh presence as there is on some other networks, but the general-purpose services (fax; E-mail; shopping; games; news, weather, and sports; movie reviews; real-time chatting) are first-rate.

**SATURDAY**

In my modern, happy, ruthless quest for electronic productivity, I realized that I’d overlooked one small aspect of life. I had faxed my faxes, mailed my mail, and booked my flights electronically, but I hadn’t really had fun—something not generally high on an online service’s priority list.

Any, that is, except America Online. This Macintosh-and-Apple II—exclusive service was the perfect end-of-the-week break. There’s not a single command to learn, not a page of manual to read, and not one navigational reason to keep a pencil and paper by your side. Like Connect, the America Online software provides an elegant graphic interface, complete with icons and windows. Instead of shoving the Macintosh interface to one side, as the text-based and Prol­igy-type services do, America Online embraces it.

**Attractive Interactive**

Because America Online’s most prominent attribute is its interactivity, you feel like you’re walking through a room filled with people instead of mainframes; you see what people type (in any of the interactive “rooms”), and they see what you type. As with the chat features of other networks, it’s liberating to attend a party without so much as combing your hair; but unlike those of other networks, America Online’s chat service is intuitive, easy to use, and extremely responsive.

During one discussion—about the woes of city living, as I recall—I ducked into the generously stocked Mac software folders. Downloading a program is as simple as double-clicking on its icon to see a description and then clicking on the Download button.

Call them trivial pursuits, but I also had fun playing America Online’s interactive games: word games, trivia quizzes, and even song-lyric tournaments. (Winners get free time online.) It’s not actually the games, but rather the wiseracking banter that takes place during each round that makes these events so enjoyable. As a matter of fact, during one game I met a Los Angeles urban planner who, when I eventually arrived in L.A. on my electronically booked flight,
And I was amazed at the information I couldn’t find online: TV listings; nationwide electronic banking; a dictionary; a zip-code finder; and an atlas. (When I needed to look up a city in Colorado one night, the only network that helped me was America Online. I walked into a roomful of people talking and said, “Hey! Anyone have an atlas?” Someone did.) And, of course, the information that is available is often hard—and expensive—to find.

Down the Line
But already the reasons to fear telecommunicating are fading. The graphic-interface services are so easy to use that you’ll be productive the first time you go online; any Mac user who hasn’t visited America Online is missing out on a great thing. Of the text-based services, nothing really compares with CompuServe for sheer informational majesty; despite its despised complexity and even less loved pricing, it’s a tremendous resource. GEnie has much in common with CompuServe, but is less prestigious, less intimidating, and less expensive. Or, for an even friendlier text-based experience, try Delphi.

As I burst out of the apartment on Saturday night, I was amazed at how much I’d accomplished. Business, amusement, and even a sort of surrogate social life are available electronically. Surely someday these great efficiency enhancers will be part of everyone’s everyday life. For the moment, however, it felt good to step back into the real world.

See Where to Buy for contact information.

David Pogue, a Macworld contributing editor, is also a composer, magician, and manual writer in New York City. He apologizes to everyone he jokingly tried to call during the preparation of this article.
A GUIDE TO VIDEO HARDWARE FOR THE MAC

by Peter S. Marx and Franklin N. Tessler

Amid the hype surrounding the promotion of desktop video and multimedia as the technical revolution of the 1990s, it's easy to forget that video applications are nearly as old as the Macintosh itself. Back in 1984, when Apple's most powerful CPU came with just 128K of memory, you could buy a digitizer to capture pictures from a video camera and display the dithered images on the Mac's 9-inch screen. (For a glossary of the italicized video terms, as well as some other terms commonly used in video, see "A Video Dictionary.") Development of higher-end video applications had to wait until the introduction of the Mac II in 1987. With their expanded memory, larger monitors, slots, and color, the Macintosh II and its successors are valued tools in the workshops of video amateurs and professionals alike. (For an extensive report on Mac applications in film and video, see "Star Quality," June 1989.) The Macintosh wasn't designed to work with the video signal used by television or professional broadcasting equipment, and you won't be able to accomplish much video production with even the fastest Macintosh by itself (see "Mac versus NTSC"). Fortunately, as in other areas, third-party developers have jumped in to fill the gap. Video add-on hardware is one of the fastest-growing segments of the Mac marketplace, and new products are introduced almost daily (see "Mac TV Tools," September 1989). In this article, we'll try to bring some order to the confusing array of video products for the Macintosh. Few individuals have the financial means of a professional TV-studio director, so we'll focus on Macintosh equipment suitable for three budget levels—
Wade Sisler, a television and motion-picture specialist at NASA's Ames Research Center in Moffett Field, California, takes advantage of the Mac to bridge the gap between still images and video.
low-end, midrange, and stratosphere. If you’re new to video, we suggest you begin by turning to Jim Heid’s primer, “Getting Started with Desktop Video,” in this issue.

**Budget Video**

For less than $1000, digitizers such as Koea Technologies’ MacVision or Digital Vision’s ComputerEyes let you import images from a video camera or VCR, and display or save them on the Mac. (Before you reach for that Indiana Jones tape, remember that the material on most videotapes is protected by copyright. The FBI warning tacked onto movie videos applies to any method of copying.) If you’re working with a Macintosh Plus or SE, you’ll only be able to view the images in dithered black and white, although the files you save retain up to 256 gray levels. While neither product captures color images, both work with color video sources. If you absolutely need color and have a Mac II at your disposal, but your budget is limited, you can digitize color images with ComputerEyes Professional for less than $500 (see “Video-Product Roundup”). A major limitation at this level is the amount of time required to capture an image—all three products just mentioned require at least six seconds to process an image. Consequently, if you’re working with moving subjects, a digitizer probably won’t do the trick.

Images taken from video often require touching up before they’re ready to print. Although the software that comes with video-capture hardware is sufficient for minor editing tasks, such as cropping and adjusting contrast, a dedicated image processing application lets you do much more. For example, the selecting, blending, and filtering tools found in image-editing programs can help compensate for poor lighting or composition of the original scene. Unfortunately, editing dithered images on a Macintosh Plus or SE isn’t easy. A Macintosh II makes life much simpler by showing you the captured image in true gray-scale or color.

Many late-model camcorders have character generators that let you superimpose multicolored titles on a video recording. That may be fine for family vacations, but what if you need to export Macintosh graphics to a videotape for training or sales? A new product from Mass Microsystems called the ColorSpace Plus/SE lets Macintosh Plus and SE users mix Mac graphics with any NTSC or S-Video source. While its $1895 cost isn’t exactly low-end, the ColorSpace Plus/SE brings video overlay capabilities to compact Macintoshes for the first time.

At press time, Generation X announced two lower-cost products for video output: the TV Board ($599), an 8-bit NTSC/PAL NuBus video board that will display 256 colors in the form of a standard composite video signal; and the TV Box ($399), an external device that outputs 24 bits per pixel when used in conjunction with 24-bit color boards.

**A Step Up**

Most of the video hardware available for the Mac falls into the middle range. Although more expensive than digitizers, the products in this category fall within the price range of many budgets; many school media labs can afford these, especially when educational discounts are applied. Let’s see what the extra money buys.

As we’ve said, digitizers usually take several seconds to capture video images, which makes digitizers useless for working with moving subjects. Frame grabbers like Advent Computer Products’ Neotech Image Grabber, Data Translation’s QuickCapture (for black and white) and ColorCapture (for color), RasterOps’ FrameGrabber 324/NC, and Personal Vision from Orange Micro all do their work within the 1/30 second allotted to each video frame, allowing you to work in real time. At press time, Mass Microsystems announced QuickImage 24 ($995), a NuBus board that captures NTSC or PAL video from any composite or S-Video source in real-time 24-bit color.

As long as your subject is moving slowly enough to appear sharp in individual frames, a frame grabber will do the job. (The ColorSnap-32 from Computer Friends takes 1/3 second to digitize each frame, fast enough for many applications.)

The frame grabbers listed in “Video-Product Roundup” all come with software that lets you preview live video in a window on the Mac screen and capture and store individual images on disk. Products in this category are all NuBus boards, so they’re only compatible with the Mac II. While extra RAM and a large hard disk are desirable...
for working with dithered images on a Mac Plus, they’re essential for working with a frame grabber. Plan on at least 4 megabytes of RAM, especially if you’re using MultiFinder. Also, even the best frame grabbers and image-editing applications go only so far in compensating for a poor video signal, so be sure that your camera or other video source is the best available. If you’re working with prerecorded material, try to use a laserdisc rather than videotape, and use sufficient lighting when shooting live scenes.

Surprising as it may seem, the one feature missing from all of the frame grabbers mentioned so far is the ability to display images on the Macintosh monitor. They’re all capable of converting an analog video signal into the digital format used by the Mac, but they rely on a separate video board to drive the Macintosh screen. While an extra NuBus board or two might not be an issue in a six-slot Macintosh II, IIfx, or IIfx, board space is at a premium in the compact IIfx and IIfx models. Until recently, combining video display and frame grabbing on one board came at a high price. But just as Mass Microsystems’ ColorSpace Plus/SE broke the price barrier for video overlay on the Mac Plus and SE, the ColorBoard 364 from RasterOps set a new standard for low-cost video display and image capture on the Macintosh II.

The ColorBoard 364 combines 24-bit color display and color frame-grabbing functions on one $1995 NuBus board. The board is compatible with any NTSC or S-Video input signal, and it can drive an Apple 13-inch or compatible monitor. An optional tuner module, which connects to an Apple Desktop Bus (ADB) port, lets you tune to standard television broadcasts, from cable or an antenna. Aapps Corporation’s DigiVideo is another NuBus board that provides live television in a Macintosh window. With a few mouse clicks, you can set the volume, change channels (yes, it’s cable-ready), and adjust brightness and contrast. DigiVideo also works in the background under MultiFinder. While we doubt that anyone would choose to replace a television set with DigiVideo, the product does offer an intriguing glimpse into the future of television.

Video In and Out
Another Mass Microsystems product, the ColorSpace III, lets Macintosh II users overlay graphics on a video signal. In contrast to the three-color limit of the ColorSpace Plus/SE, the ColorSpace III can incorporate up to 256 different colors at once, making it suitable for many professional video applications. The board is compatible with either composite or RGB video input. The ColorSpace III can capture images, but digitizing a single frame takes 20 seconds. The ColorSpace III can’t function as a Macintosh display board, since it can only drive composite video monitors.

IF YOU’RE INTENT ON WORKING WITH BROADCAST-QUALITY VIDEO, YOU’LL HAVE TO INVEST IN EQUIPMENT COSTING AT LEAST AS MUCH AS THE MACINTOSH ITSELF

Mass Microsystems offers another board called the ColorSpace FX, which works in tandem with the ColorSpace III to produce live video on an AppleColor monitor. Using a bit of electronic wizardry, the two boards act together to combine a standard video signal with Macintosh graphics into one compatible with the Apple monitor. The ColorSpace FX also lets you add a number of special effects to a video sequence, including pan, zoom, shrink, mirror, and spin. Unlike the ColorSpace III, the III-FX combination can perform true 24-bit frame grabbing in 1/50 second.

Workstation Technologies’ Moonraker is another board that can display live video on the Macintosh screen. Moonraker can handle two video signals at once, making it suitable for video presentations that take advantage of multiple sources. Frames digitized in real time are recorded directly into memory, so the board can digitize an uninterrupted video sequence. (The number of frames that can be digitized depends on how much memory is installed in the Macintosh.) Without another board, the Moonraker shouldn’t let you overlay video with graphics.

If you simply need to output Macintosh-generated graphics to video, and you don’t require overlay or image capture, you can save money by purchasing an encoder/decoder. In contrast to video-overlay boards like the ColorSpace III, encoder/decoders are usually separate devices that convert video from one format to another. For example, the VID/O Box from Truevision can take an RGB signal from a Macintosh display board and convert it to NTSC video for recording. The VID/O Box also provides S-Video input and output. All of these devices can be as inexpensive as Computer Video’s Video NTSC Encoder or as expensive as RGB Spectrum’s $9995 RGB/Videolink 600A. In addition to converting Macintosh RGB output to composite or RGB video, the RGB/Videolink 600A includes a filter to remove flicker from the video display and adds color-bar generation for adjusting monitors.

Into the High End
If you’re intent on working with broadcast-quality video, or if you need to coordinate multiple video and audio inputs, you’ll have to invest in equipment costing at least as much as the Macintosh itself. When people think of high-end video, they usually have professional or broadcast applications in mind.

If you’ve ever watched the nightly news, you’ve seen a video image overlaid with multicolored graphics. The Mac is ideal for creating video overlays for broadcast because the Mac supports a wide range of software products and fonts, and it is wonderfully easy to use. Higher-end, relatively expensive products such as the NuVista board from Truevision incorporate 24-bit color display, frame grabbing, and overlay functions on a single board.
# Video-Product Roundup

<table>
<thead>
<tr>
<th>Company</th>
<th>List Price</th>
<th>Minimum Configuration</th>
<th>Inputs</th>
<th>Outputs</th>
<th>Mac Interface</th>
<th>Number of Bits</th>
<th>Image Capture</th>
<th>Display</th>
<th>Video Overlay</th>
<th>Software</th>
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<tr>
<td><strong>DIGITIZERS</strong></td>
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<td>ComputerEyes</td>
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<td>512XE</td>
<td>A</td>
<td>A</td>
<td>Serial</td>
<td>8</td>
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<td>A, B</td>
<td>A, C, D</td>
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<td>MacVision</td>
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<td>A</td>
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<td><strong>FRAME GRABBERS</strong></td>
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<td>NuBus</td>
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<td>VideoDesk 1/24</td>
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<td>A, C, D</td>
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<td>NuBus</td>
<td>24</td>
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| **VIDEO OVERLAY**        |            |                       |        |         |               |                |               |         |              |          |
| ColorSpace II            | $2295      | Macintosh II          | A, C   | A       | NuBus         | 24             |               |         |              |          |
| ColorSpace Plus/SE       | $1996      | Macintosh II          | B, F   | A, B    | SCSI         | 8              |               |         |              |          |
| Genlock Converter        | $995       | Macintosh II          |        |         |               |                |               |         |              |          |
| SFX Option Board         | $1995      | Macintosh II          | A, B, C| A       | NuBus         | 8              |               |         |              |          |
| TV Producer Pro          | $1098      | Macintosh II          | A      | A       | Apple Video   | 8              |               |         |              |          |
| TV Producer RGB          | $1598      | Macintosh II          | A, C   | A       | Apple Video   | 8              |               |         |              |          |

| **VIDEO OUTPUT**         |            |                       |        |         |               |                |               |         |              |          |
| Macintosh Display Card 4+8| $648       | Macintosh II          | C, G   | A       | NuBus         | 8              |               |         |              |          |
| Macintosh Display Card 8+24| $1999    | Macintosh II          | C, G   | A       | NuBus         | 8              |               |         |              |          |
| ColorBoard 20B           | $415       | Macintosh II          | A, C   | A       | NuBus         | 8              |               |         |              |          |
| ColorBoard 264           | $745       | Macintosh II          | A, C   | A       | NuBus         | 24             |               |         |              |          |
| DigVideo                 | $595       | Macintosh II          | A, F   | A       | NuBus         | 8              |               |         |              |          |
| Display/Servo SE-TV      | $518       | Macintosh II          |        | A       | Installs on SE|                |               |         |              |          |

| **ENCODERS/DECODERS**    |            |                       |        |         |               |                |               |         |              |          |
| DT2876 60Hz             | $1495      | NA                    | A, C   | A       | NA            | NA             |               |         |              |          |
| NTSC Converter          |            |                       |        |         |               |                |               |         |              |          |
| Video NTSC Encoder      | $395       | NA                    | C      | A       | NA            | NA             |               |         |              |          |
| RGB/Videolink 600A       | $8995      | NA                    | A, B, C| A, B, C | NA            | NA             |               |         |              |          |

1-2-bit $2995, 3-bit $4995, 4-bit $6995. 2 Requires Converter Module to digitize color from NTSC. 3 Requires ColorBoard 224, 274, or 232 for display. 4 Requires RasterOps ColorBoard 20B, 20B, or 232 for display. 5 Requires RasterOps ColorBoard 224, 274, or 232 for display. 6 Includes graphics acceleration. 7 Produces noninterlaced video and needs converter for mixing with NTSC signals.
The NuVista comes in 1MB, 2MB, and 4MB versions; features genlock; and lets you program output resolution to ensure compatibility with a variety of monitors. In addition to the standard red, green, and blue channels, the 2MB and 4MB boards also incorporate a fourth channel, called the alpha channel. This 8-bit channel can be used to create special effects, and it's required for working with some types of studio video equipment.

The NuVista+ board should be on the shelves by the time you read this. In addition to the features above, the NuVista+ will include enhanced blending features; chroma keying abilities; and wipe and fade effects. The best news is that the board eliminates the need for a separate VID/0 box.

Another new player, RadiusTV, was announced as we were going to press. RadiusTV—a video processing engine, external audio/video input processor, and television tuner—will display and digitize live 16-bit video images in real-time in a resizable window of up to 640 by 480 pixels. It works with 24-bit color adapter boards that support the high-speed block-transfer mode of the NuBus. A software desk accessory shipped with the product allows the user to access RadiusTV from within a running application. Another software program included in the package allows special effects and limited image processing.

Keeping in Control

The Mac can control postproduction video equipment too. For example, SMPTE Time-Coding is incorporated into products from Interactive Media Technologies and Specialized Computer Systems for controlling 1/4-inch VCRs, high-end 1/3-inch VCRs, and multitrack audio systems. Interactive Media Technologies' IMTX 8000, first introduced at the April 1990 Macworld Expo, is capable of controlling up to 12 video and 20 audio sources for dubbing, mixing, and display. The familiar user interface is based on SuperCard from Silicon Beach. Although the device costs a minimum of $7000, it represents a price breakthrough in an industry where $100,000 workstations are commonplace. EditWorx, from Specialized Computer Systems, provides a similar function, permitting editors to assemble video sequences from multiple time-coded sources.

Measuring, Analyzing, and Dissecting

The Macintosh, as many researchers have discovered, is an excellent tool for scientific research. Video is now widely used in many areas of scientific research, including medicine. Extremely sensitive video cameras are often mounted on microscopes used to study blood and tissue samples. Perceptrics Corporation's NuVision boards—the Pixel Grabber, PixelPipeline, and Mega Grabber—can extract information from raw images and perform mathematical transformations on them in real time. The Mega Grabber, for example, can digitize 1320 by 1035 pixels from ultrahigh-quality slow-scan television images. Of course, systems with these capabilities often cost more than $25,000.

Putting the Squeeze On

One of the greatest challenges facing developers of video hardware and software is how to cope with the enormous quantity of data that their products generate. At about 1MB per 24-bit frame, even a few seconds of digitized video can consume hundreds of megabytes of disk space. Equally challenging is the problem of transmitting these vast amounts of digital information rapidly and cheaply. For years, Macintosh users have been able to reduce transmission costs and storage requirements by using file-compression utilities like Raymond Lau's popular application Stufflt (now available from Aladdin Systems). But while

![MAC VERSUS NTSC](image)

Macintosh displays are scanned in a single pass of the CRT's electron beam, starting at the top left and proceeding to the bottom right. For the Apple Video Card, the entire process takes 1/66 second, with each scan line corresponding to a row of pixels.

NTSC television displays are scanned at a slower rate in two separate passes, one for the odd-numbered scan lines followed by one for the even-numbered lines. A complete frame consists of 512 lines, but due to overscanning not all lines appear on the screen. Since the NTSC standard doesn't allow for sufficiently rapid modulation of the signal, computer-generated graphics do not appear as clear on a television monitor as they do on a Mac-compatible monitor.
achieve a tremendous reduction by saving a code describing the image as consisting of one black pixel followed by 999,999 white pixels. Stored in this way, the file would be reduced to just a few bytes in size. Most real-world images are far more intricate than this example. Still, using sophisticated image-analysis techniques, it's possible to achieve high compression ratios even with complex images.

An important factor that limits the degree to which an image can be compacted is the degree of compression loss. With many image-compression schemes, some details in the original image are lost when the file is compressed and decompressed. Compression algorithms that result in data loss are said to be destructive. For many video applications, the consi-
erable savings in file space is worth some minor image degradation. The **JPEG standard** is one destructive algorithm. The JPEG technique is sometimes referred to as discrete cosine transform compression. It relies on the fact that photographs and video images tend to change very little between neighboring pixels. Computer graphics, on the other hand, tend to change rapidly over small areas, such as in the black-to-white transitions between text characters and the surrounding space. Also, computerized data, such as bank records and computer programs, is extremely susceptible to destructive compression, which is why StuffIt obtains a compression ratio of only 2:1 or 3:1. By comparison, the JPEG algorithm achieves from 8:1 up to 25:1 compression.

Mac vendors are already exploring this technology. ImagePress, from Storm Technology of Palo Alto, uses JPEG in addition to other proprietary compression algorithms. Using software alone, ImagePress can compress a 1MB 24-bit file to 100K or less in under a minute. Also under development is a NuBus board that will achieve much faster compression times. C-Cube Microsystems also has software and a NuBus board based on JPEG. These boards will be exploited by software customized to work with them.

### On the Horizon

Despite the recent proliferation of video hardware for the Mac, you are unlikely to confuse a Macintosh with a TV set. Even if you view video on a studio monitor, image quality isn't nearly as good as it is on a Macintosh display. But that's about to change, thanks to the development of a new television system called HDTV, short for High Definition Television.

The subject of much public debate over the past few years, HDTV increases resolution by doubling the number of scan lines in an image. The improvement is stunning, especially when compared side-by-side with an NTSC picture. (Another benefit of HDTV is its wider aspect ratio, which is much closer to the shape of a movie screen.) Although implementation of an HDTV broadcasting system in the United States remains mired in controversy regarding NTSC compatibility and competing formats, industry watchers have little doubt that HDTV will arrive within five years. HDTV will, for the first time, make video monitors suitable for displaying unmodified computer graphics.

At the same time, consumer video equipment has become more computer-like, with remote controls and menus. Although forecasting is always risky, it's likely that a single monitor will someday replace today's separate video and computer monitors. And today's video tuners for the Macintosh may herald the development of hardware incorporating video and computer functions in one piece of equipment. Stay tuned.

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**Video Q. and A.**

1. Q. What is the least expensive way of producing NTSC video from a Mac?
   A. **If you have a standard Apple video board and a Macintosh II, Iic, Iicx, Ilic, or Ifx, you can produce low-quality, yet compatible, NTSC-compatible video for tape-recording. You need to have 32-bit QuickDraw and the NTSC INIT from Apple. Additionally, you must make your own output cable and be running in 1-bit graphics mode. As if this isn't hassle enough, you will also experience slower performance from the Mac.**

   The new generation of video boards from Apple, including the 8*24 and the 8*24GC boards, can produce video without the contortions needed in the above scenario. The Macintosh Portable is able to produce video with the addition of a video adapter available from Apple.

2. Q. How do you project onto a large screen from a Macintosh?
   A. **You need a Mac II, a multiscan projector (Sony, Panasonic, and Electrohome all produce these). You also need an encoder/decoder, to take the RGB signals from the Macintosh II's video board and convert them into signals compatible with the projector (see “Video-Product Roundup”). Typical rental on this equipment is $500-$700 per day in most large cities in the U.S.**

3. Q. Can I capture color from a black-and-white frame grabber?
   A. **Both the Neotech Image Grabber and the Data Translation QuickCapture are able to capture color, albeit slowly. Working from a still video image, these boards capture three successive frames—for the red, green, and blue components—for each image.**

   In the case of the Neotech board, you need to have the Neotech Color Adapter Module, which can accept color-composite video and produce color images on the Macintosh II. With Data Translation's ColorCapture, you need RGB NTSC signals produced from composite video with an encoder/decoder.

4. Q. My Macintosh graphics look terrible when projected on my TV monitor. What's wrong?
   A. **Even with the best equipment at your disposal, when displaying Mac graphics on a television you'll achieve better results if you plan ahead. First, to avoid flicker, make all lines in the image at least two pixels wide. Also, be aware that television monitors typically omit the outer edges of a video picture, a process known as overscanning. To make sure that your precious graphics aren't lost in the conversion to NTSC, confine them to the central 80 percent of the Mac screen. Finally, to ensure legibility, avoid text smaller than 18 points.**

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*Franklin N. Tessler, a radiologist and Macworld contributing editor, watches ultrasound images by day and television in his spare time.
In large corporations, the IBM mainframe—thanks to its abundance of processing power and disk storage space—is king. The mainframe holds all database information vital to the corporation, and often it acts as the central E-mail hub for companywide communication. But because the data on the mainframe is so important, users are always competing for computer resources. And sometimes even the most powerful IBM mainframe can’t provide enough power.

Enter personal computers like the Macintosh. By acting as intelligent terminals via terminal-emulation software, Macs can offload processing from the mainframe. Initially, using a Mac to access a mainframe just meant that the mainframe didn’t have to send as much information over the network to create a display. Now, thanks to more sophisticated Mac-to-IBM connectivity products, both the mainframe and the Mac can actually share the task of processing of data across a network.

Terminal Functionality
Like older IBM 3270, Centralized Unit Terminal (CUT) terminals, Macs traditionally connect to mainframes with a bulky coaxial cable in a one-to-one fashion. The coax plugs in to an interface board in the Mac—such as one of the MacMainFrames from Avatar, Digital Communication Associates (DCA) MacIrma, or the Apple Coax/Twinax Card—and into a coax port on an IBM 3174 cluster controller. Using a CUT-style terminal emulator, the connected Mac can run one host application, called a session, with the mainframe at a time.

An example of this traditional Mac-to-mainframe relationship is Simware’s SimMac, originally named Mac3270. SimMac, which previously offered 3270 CUT terminal emulation only over asynchronous connections, now supports a variety of hardware links, including protocol converters and Apple, Avatar, and DCA coax interface boards.

Other players in 3270 terminal emulation for the Mac—Apple, Avatar, and DCA—now offer terminal emulators that support IBM’s Distributed Function Terminal (DFT) specification. DFT terminals support multiple sessions over one peer-to-peer coax connection, so you can run more than one session at the same time.

In addition to multiple sessions, there’s another advantage to DFT-style terminals. DFT emulators reduce communications traffic between terminals and the mainframe. They require less supervision from the mainframe and cluster controller be-
Gateways reduce communications traffic and cable costs

IBM’S OTHER COMPUTERS

Even though primarily known for its mainframes and PCs, IBM also makes a line of midrange or departmental computers. Although many older System/3X computers (System/34, /36, and /38 machines) have been displaced by the new family of AS/400 midrange computers—offering similar capabilities but a newer architecture—options exist for connecting Macs to both System/3X and AS/400 computers.

Midrange connections are made similarly to mainframe connections. The main difference is that the majority of midrange computer applications depend on the IBM 5260 terminal—not the IBM 3270 terminal. Just as 3270 terminal emulation is a popular path to Mac-to-mainframe connectivity, IBM 5260 terminal emulation is a primary means of connecting a Mac to an IBM midrange computer.

Both Andrew/KMW Systems Corporation and IdeAssociates offer terminal-emulation and file-transfer software, as well as internal interface boards for Macs. In addition, Andrew/KMW recently merged with Emerald Technology, which also offers a 5260 board and software for the Mac.

Andrew/KMW, Perle Systems, and Protocol Computers produce external protocol converters. These devices convert the character strings from a Mac’s terminal emulator into characters and commands that the midrange computer can understand and respond to.

Unlike in the Mac-to-IBM mainframe world, gateways have yet to appear for Macs and the IBM midrange systems in great numbers. The only option is Andrew/KMW’s TwinAccess ApLINK, which allows a LocalTalk network of Macs running 5260 terminal emulators to share an interface board in a Mac II that in turn connects to an IBM midrange computer.

cause DFT terminals are more intelligent than CUT-style 3270 terminals. As a result, DFT terminals save computing resources on the host, enabling it to concentrate on running programs rather than on handling terminals.

Apple’s MacDFT, Avatar’s MacMainFrame family, and DCA’s MacMainFrame all let you open up to four session windows simultaneously on the Mac. In addition, you can dedicate a fifth session to a LaserWriter. That capability lets you print jobs from the mainframe on a LaserWriter that’s on an AppleTalk network.

Party Line

You can reduce communications traffic even more—not to mention coaxial cable installation costs—between a mainframe and connected Macs by using gateways. In contrast to the one-to-one connections offered by coax interface boards, gateways link entire AppleTalk networks of Macs to a mainframe. The gateway provides the one point of connection to the mainframe’s cluster control-

To use the gateway, Macs run the usual IBM terminal-emulation software discussed earlier. Thus the AppleTalk network serves not only as a way to connect multiple Macs, but also as a way for those Macs to access a mainframe.

When should you use a gateway instead of a traditional one-to-one coax connection? The most appropriate situation is when Macintosh users don’t require mainframe access all the time. For instance, a user who checks E-mail on the mainframe or sometimes downloads data from a database doesn’t need a permanent connection to the mainframe. A system programmer, however, might require access to the mainframe all the time. A gateway allows managers to distribute connections among users according to need. The gateway can replace hardwired coax links, without necessarily compromising the needs of full-time users.

Tri-Data Systems, with its Netway 1000AEX, was the first company to offer an IBM gateway for Mac. The Netway 1000AEX essentially took the place of an IBM 3174 cluster controller; it used the SDLC synchronous modem link to connect a network of Macs to the mainframe.

In the past year, however, four new gateways have appeared on the scene. Tri-Data’s Netway 2000 is a total redesign of the Netway 1000AEX built around a Sun Microsystems’ Scalar Processor ARCHitecture (SPARC) microprocessor. Thanks to the SPARC processing power, the Netway 2000 can handle four times as many sessions as before—64 versus 16. The Netway 2000 also supports AppleTalk connections other than LocalTalk, for example, TokenTalk and EtherTalk.

Unlike Tri-Data’s Netway 2000, Avatar’s MacMainFrame gateways use software running on a Mac II to link networked Macs to an IBM mainframe. The Mac II must, of course, connect to both AppleTalk and the mainframe to perform its gateway tasks. On the mainframe side, MacMainFrame gateways support coax, token ring, or SDLC links. To attach to the Mac network, you can either use the Mac’s built-in LocalTalk port, or add an Ethernet or token ring board.

One gateway Avatar offers, the MacMainFrame Coax Gateway, may seem strange because it’s a five-session coax gateway. Certainly, a single DFT user can use all five sessions on a Mac. However, the gateway also allows those five sessions to be distributed among a maximum of five users, without requiring each user to have a separate coax interface board.

DCA’s approach to gateways is similar to Avatar’s, with three notable exceptions. First, DCA’s MacMainLAN gateways don’t support a coax con-
connection to the mainframe—only token ring or SDLC. Second, Macs wanting to access Mac-IbmLAN gateways must be on either a LocalTalk or TokenTalk network; DCA currently does not support EtherTalk connections. Finally, because the gateways are based on existing IrmalAN technology, the company uses a PC, not a Mac, as the gateway computer. For Macs to use the gateway, you must install an interface board in the gateway PC.

Despite the PC requirement, I don't see DCA's PC implementation of MacIrmalAN as a significant hindrance to Mac-IBM connectivity. Companies with IBM mainframes tend to have Macs coexisting with PCs anyway. Using a PC clone as a gateway is cheaper than using a Mac II (as Avatar requires); in addition, PC token ring add-in boards are less expensive than their Mac counterparts.

From Novell comes yet another approach to gateway services—via IBM's grand plan for networking all types of computers, called Systems Application Architecture (SAA). Novell's Netware 386 Communication Services allows users of its Netware 386 network operating system to take advantage of SAA. Now that Novell also fully supports the Mac with Netware 386, anyone running a 3270 DFT-style terminal emulator on a Mac can access an IBM mainframe or AS/400 midrange computer via a token ring connection.

Another aspect of SAA is a scheme called Advanced Program-to-Program Communications (APPC). APPC allows computers on the network to communicate with each other as peers. APDA's MacAPPC provides programmers with the software tools necessary to develop APPC services for SAA networks. For example, by using MacAPPC, Mac applications can dynamically exchange information with IBM mainframe-based applications.

Improving the Characters

So far, all I've really discussed is how to make a relatively simple connection from a Mac to an IBM mainframe. But that really is the first step. The next is adapting the IBM user interface to better reflect the Mac interface.

Whether you use a direct coax link or a gateway, CLT- or DFT-style terminal emulation, you still face the standard character-based display of the IBM mainframe. Given enough time, dedicated users can master IBM mainframe commands. For occasional mainframe users, however, those arcane commands can be confusing and intimidating. The need for an easy-to-use interface, such as the Mac's, is therefore compelling one.

Even IBM has recognized this necessity. OfficeVision presents the same interface on mainframes, minicomputers, and PS/2 computers, and is IBM's attempt to integrate different types of machines and operating systems. IBM currently lacks tools for integrating Macs into OfficeVision.

However, there are many other ways to provide a Mac-style interface to a mainframe application—including OfficeVision. Apple, Avatar, DCA, and Tri-Data all provide standard application programming interfaces (APIs) that enable developers to write customized Mac programs that use their own hardware. In general, programs that take advantage of APIs preserve both the interface of the Mac and the integrity of the mainframe data. Users can automate routine operations like logging on and off the mainframe, accessing E-mail, even downloading information from a mainframe database to a Mac application for analysis.

To simplify the development process somewhat, the APIs from these four vendors include HyperCard support, which makes it easier to prototype interfaces and applications for use with an IBM mainframe. But until a single API is offered for all Mac-to-IBM hardware, programmers must write different code for each vendor's interface boards. Luckily, there is a trend to one sole API—not surprisingly, Apple's 3270 API—which has been endorsed by Avatar, DCA, and Tri-Data.

Higher-Level Tools

APIs aren't the only way to provide Mac interfaces to mainframe applications. Tools such as Mitem Corporation's MitemView, APDA's MacWorkStation, and Masquenade3270 from Connectivité Corporation fit the bill. In addition, Simware's SimMac offers a presentation capability that lets you design a more Mac-like interface to 3270 mainframe applications. Because these tools are more user-adaptable, they are often easier for both system programmers and end users to work with.

MitemView uses hardware-vendor APIs to
control communications between a Mac and a mainframe. However, MitemView allows programmers to make maximum use of HyperCard with a series of HyperCard external commands (XCMDs). You define patterns of characters from the mainframe for a stack to recognize and respond to. Those patterns and responses, which are stored in the HyperCard stack, can then control different HyperCard displays of mainframe applications; the Mac user sees only the HyperCard displays.

With MacWorkStation, the actual IBM mainframe application issues commands relating to a user interface. Those commands are in turn received by the Mac, where a Mac application accepts them and turns them into typical Mac interface elements: windows, menus, and dialog boxes. Because both computers share in the processing load—the mainframe runs its application, and the Mac runs its application—and because the two applications communicate with each other, MacWorkStation is an example of a distributed-processing approach to Mac-IBM mainframe connectivity.

Originally developed for asynchronous serial communications, MacWorkStation now supports the block-mode data-transmission method typically associated with IBM mainframe communications. IBM mainframes normally send data in blocks large enough to fill an entire terminal screen, rather than just character-by-character or line-by-line. MacWorkStation's support for block-mode data transfers makes it easier for developers to handle incoming data when working with IBM mainframe applications.

Like MitemView, Masquerade3270 uses APIs to talk to the mainframe. However, Masquerade3270 offers a different approach to creating Mac-like applications that communicate with an IBM mainframe. With Masquerade3270, the user controls the design process. First, you have Masquerade3270 save all the IBM screens from a session. Then, you define the appropriate inputs to those screens (for example, name and password for the log-on screen) and create dialog boxes for entering those inputs. Masquerade3270 even lets you design special icons for functions or windows for other data—such as an E-mail message—and combine those icons and windows in a stand-alone application.

SimMac's presentation capability, which Simware calls Views, allows programmers to associate a familiar Mac button, list, or pop-up menu with a script that carries out an entire series of mainframe commands. Scripts can automate communications, mainframe navigation, log-on procedures, and other tasks. As a result, Mac users don't have to work directly with the mainframe interface.

Other Pieces of the Puzzle
In addition to the distributed processing support offered by MacAPPC, which is designed to let corporate MIS departments create their own applications, access to E-mail and databases on IBM mainframes is becoming more distributed.

Anyone using a terminal emulator can readily access PROFS, IBM's popular mainframe E-mail system. CE Software, Microsoft, and TOPS have all announced gateways that allow their LAN-based E-mail systems to exchange messages with the PROFS mail system. CE Software is developing its own PROFS gateway for QuickMail 2.2, QM-Professional Gateway, while Soft-Switch is providing SNADS Gateway/MSMail, the PROFS gateways for Microsoft Mail 2.0, and is also developing a PROFS gateway for TOPS InBox 3.0.

Much of the corporate data in the United States resides on IBM mainframes. Accessing that data, however, isn't always simple or straightforward for Mac users. Using a product like Apple's Data Access Language (DAL, formerly known as CL/1), users of Excel, Wingz, 4th Dimension, and other databases and spreadsheets can request specific data from mainframe databases using Structured Query Language (SQL) and manipulate that data within their own Mac applications.
Oracle Corporation offers similar connections through the use of Oracle for the Mac.

**Keep Up with Big Blue**

If you only have a few Macs connected to a mainframe, all you probably need is a standard coax connection. That's particularly true if you use the Mac as your primary mainframe terminal. Whenever possible, stick with DFT-style emulation because it uses less of the mainframe's resources.

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**TALKING TO BIG IRON**

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<th>3270 Terminal Emulation</th>
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<tr>
<td>Apple Coax/Twinax Card with MacDFT, $1495</td>
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<td>Data Access Language (DAL) Server for MVS/TSO, $20,000</td>
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<td>Tri-Data Systems</td>
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<td>Netway API Developer's Toolkit, $495</td>
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At the University of Michigan in Ann Arbor, a campus-wide mail system is based around IBM mainframes. Programmers like Gordon Leacock used MacWorkStation so people could use the Mac's interface to access the mainframe.
On the other hand, if you have a network of Macs, all of which only occasionally access the mainframe, then a gateway—even a coax gateway—is a good choice. SDLC gateways are particularly useful for companies that need to connect regional offices to a centralized mainframe; with the right equipment, you can get connection speeds of up to 56 kilobits per second (kbps).

Terminal emulation and file transfers over a token ring connection are generally faster than over a coax connection, but I think that’s little reason to go out and install a token ring network. Token ring gateways for the Mac are aimed at installations that already have a token ring installed, say for connecting mainframes and PCs.

If you’re interested in changing the interface to IBM applications, MacWorkStation is probably the most powerful tool for creating a Mac interface to mainframe programs, but it requires writing code on both the Mac and the mainframe. Many corporations that use mainframes are reluctant to modify all of their existing programs in order to support MacWorkStation.

In such situations, MitemView, Masquerade 3270, or SimMac is a better solution, since these programs require no modification on the mainframe side. To the mainframe, a Mac appears as just another terminal; the Mac handles all interface elements.

MitemView’s intelligence revolves around recognizing strings of characters. Defining those strings and the appropriate responses in IBM communications is a task probably better left to a programmer than to an end user. However, MitemView also supports VAXes, and even bulletin boards, and can provide interface consistency for a large variety of connections.

SimMac’s big advantage is that it runs on a 1-megabyte Mac and over asynchronous connections with a mainframe. It also supports multiple windows, color, and large-screen monitors on the Mac. Simware offers a PC version of SimMac, SimPC, that features similar capabilities.

Masquerade 3270 deals with the IBM screens familiar to any user of an IBM terminal and has simple—but powerful—tools for linking user responses to those screens. You can use Masquerade 3270 to create stand-alone applications smaller than MitemView HyperCard stacks. Masquerade 3270 has my vote as the easiest tool with which users can define their own interface to an IBM mainframe.

Picking the right Mac-to-IBM solution isn’t easy, especially since so many new connectivity solutions have appeared in the past year. One thing is for sure, though: connectivity solutions between a Mac and IBM mainframe have improved. Just as software that makes it easier to use Macs as front ends to mainframe databases is coming into its own, so too are the hardware bridges that connect the Mac to corporate networks ruled by the IBM mainframe.

See Where to Buy under Mac to IBM for contact information.

Dave Koslar, a Macworld contributing editor, is the editor of Connections, a technical journal on Macintosh networking.
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ProSet was designed with your growing business in mind. Its RIP is modular, to allow for easy upgrades. And, like all our imagesetters, it's a true PostScript machine, not a clone. Which means you can spend more time running your files and less time trying to figure out why they won't run. PostScript process color is the next logical step, and ProSet 9800 is the imagesetter designed to do it justice. For more information, or to arrange a demonstration, call 1-800-227-2780 (in Canada call 1-800-387-9533), ext. 9800.

When you're at your demo, be sure to ask to see a sample proof of the image above. Because color like this, you have to see to believe.
OUTBOUND LAPTOP SYSTEM

Pros: Smallest, lightest, least expensive true Macintosh portable; backlit screen; good documentation; well-engineered removable battery system; great carrying case. Cons: Requires the chips from an SE or Mac Plus; some screen shadowing and cursor "submarining." Company: Outbound Systems. Requires: Mac Plus or Mac SE. List price: $2999 (with 1MB floppy drive); $3999 (with 40MB hard drive).

Everybody—even Apple—agrees that the Macintosh Portable isn’t the ideal portable Mac. It’s too expensive, too heavy, and too big to whip open in an airplane seat.

Yet without access to proprietary Apple technology, how is any third-party company expected to engineer a true Macintosh that’s smaller, lighter, and less expensive?

Outbound Systems’ approach is to commandeer the ROM chips from a Mac Plus or SE you already own. The result is an impressive 9-pound battery-powered laptop that runs for three hours per charge and is actually usable on a plane, in a cab, or even in a phone booth.

What You Pay

Becoming an Outbound owner isn’t quite as simple as picking one up at the local LaptopMart. First of all, you must own or buy the Mac Plus or Mac SE that’s going to donate its chips. Next, you purchase the Outbound itself—about $3000 with a floppy drive or $4000 with a 40MB hard drive. The price includes installation by a dealer who performs the ROM surgery and gives you an Outbound lesson.

After the operation, the donor Mac only runs when it’s docked, that is, when it’s connected by a cable to the Outbound. When the computers are docked, their screens act like dual monitors, they share whatever peripherals are connected to the Plus or SE, and the combined memory of both machines is available. Though the solidly click-locking Mac-to-Outbound cable transfers information about ten times as fast as SCSI cables, there’s still a slight delay when you open a window. Otherwise, you won’t notice any difference except perhaps that the original Mac now runs at the Outbound’s twice-as-fast processor speed.

What You Get

When the two computers are not docked, however, you’ll remember why you endured the hardware hassle. The Outbound is indeed a small, lightweight, truly portable Macintosh. Its removable, rechargeable battery lasts about three hours on a charge, and it’s automatically recharged whenever the AC adapter is connected (even when you’re using the Outbound). A desk accessory that keeps track of the remaining battery time and a series of alert boxes constitute an excellent early-warning system for letting you know when you’re running out of juice.

The detachable Outbound keyboard clips to the face of the CPU unit when you’re traveling. It’s a wireless infrared keyboard; there’s something magical about typing on it and watching letters appear on the screen a couple of feet away (a keyboard cable is provided in case the magic boggles your mind too much). Instead of a mouse, you use a thin rolling cylinder called an Isopoint, located just beneath the Spacebar. Slide this corrugated straw from side to side with your thumb for horizontal cursor movement, logroll it up or down for vertical cursor movement, or press down on it to click. Like any substitute pointing device, it’s not a mouse—for example, there’s no way it will work with MacPaint. In fact, it feels sort of cheap. But it certainly doesn’t consume any desk or lap space, and it generally gets the job done. (A mouse is available as an option, free if you order an Outbound by August 31.)

The Outbound’s super twist LCD display isn’t a big hit with Mac perfectionists. It suffers slightly from fading-cursor syndrome when you roll the Isopoint, and you see faint rectangular shadows of open windows. But it’s backlit, so you can see what you’re doing in darker places (and from wider angles) than you can using the non-backlit Mac Portable. When you’ve set the contrast properly from the Control Panel, the Outbound screen pixels are crisp and black. To save power, you can set the backlighting to go out and the hard drive to spin down when the Outbound has been idle for a certain number of minutes.

What You Sacrifice

The Outbound is incompatible with some copy-protected software (mainly games). There’s no SCSI port on the unit (“yet,” says the company). There are standard modem and printer ports, but the laptop doesn’t have normal Mac ADB jacks. So unless the Outbound is docked, you can’t use your regular Mac’s mouse or keyboard. And the Outbound keyboard lacks function keys and a numeric keypad—there’s no room. Remember, too, that if you have the hard disk-equipped Outbound, you can only load files onto the laptop when it’s docked to the Plus or SE; if you have the floppy drive Outbound, you can’t have a hard drive. However, either model can have a silicon disk—an internal RAM disk that
The Outbound Laptop System preserves data even when the computer is off—of up to 16MB.

Engineering Niceties
The Outbound isn't beautiful—especially compared with the Macintosh Portable. Holding an Outbound, you become aware of the engineering necessary to cram a complete Macintosh into something the size of the Manhattan phone book. Almost every surface is occupied by the screen, the ports, a flip-out foot (to hold the CPU upright), the handle, and so on.

When you actually use the laptop, however, you realize that its internal design is quite sophisticated. For example, the Outbound uses standard camcorder batteries that can be picked up at any electronics store, and no data is lost when you change batteries—theoretically, with enough of them, you could go all day without being near an outlet. Another example: the Outbound doesn't require special memory chips like the Macintosh Portable. Both system RAM and the RAM that constitutes the silicon disk use standard SIMMs. And in the attention-to-detail department, check out the $119 carrying case. It's one incredibly thoughtfully designed piece of luggage.

It would be safe to call the Outbound a rugged machine, designed to be toted and even operated under bumpy conditions. But not every Outbound is perfect when it rolls off the assembly line. Fortunately, you're shielded from getting an Outbound that has, for example, a defective screen; the dealer who sells you the unit is supposed to test every Outbound and sell it only if it works perfectly. The Outbound also has a one-year parts-and-labor warranty.

Outward Bound
We may as well accept that there is no such thing as a no-compromise laptop Macintosh: if the cost doesn't get you, the size and weight will. If you want a complete self-contained computer, your choices begin with the $5500 base-model Colby and run all the way to the $9000, AC-power-only Dynamac. None, especially the Macintosh Portable, hold a candle to the Outbound's portability, both in terms of size (12 by 8 by 3.6 inches) and weight (9 pounds including battery). And none costs less. You could buy a floppy-drive Outbound ($3000) and a Mac Plus (around $1000) and still come thousands under the least-expensive alternative.

The Outbound's particular set of compromises—a couple of nonstandard ports, a nonextended keyboard, and the mutual exclusivity of a floppy or hard drive—render it a satellite computer. That is, it's an exception-ally functional grab-and-go device that requires little fuss or thought but is best considered as the ultimate peripheral to a real Mac. Outbound Systems itself is run by very smart people who are obsessed with customer satisfaction, and they have plans for some terrific additions to the product line (such as a device that will enable your laptop to dial your postoperative Plus remotely to transfer files). Chances are good that once you try an Outbound, you'll want one—and once you have one, you'll be the happiest passenger on the plane.

—David Pogue

ALDUS PAGEMAKER 4.0

Pros: Improved typographic controls; improved text editing; new linking, indexing, and table-of-contents features; new version-control features; excellent manuals and online help. Cons: No dialog boxes for precise element positioning or resizing; allows only one open document at a time; text rotation in 90-degree increments only; no editing of tracking or kerning tables; online help doesn't work when a dialog box is open; uses 5MB to 6MB of hard disk space; some operations are sluggish on 1MB Mac Plus and SEs; disk errors can result in lost work. Company: Aldus Corporation. Requires: Mac Plus; hard disk. 2MB RAM recommended. List price: $795.

Aldus PageMaker, long a desktop publishing favorite, has also received its share of criticism, especially from people who prefer its closest competitor, QuarkXPress. The complaints are familiar: PageMaker can't handle lengthy publications. Its minimal word processing features make it impractical to extensively edit text that you've placed. It doesn't offer precise control over word and character spacing. It doesn't allow you to rotate, stretch, or condense text. It doesn't support fractional type sizes such as 10⅓ points.

With PageMaker version 4.0, Aldus has addressed the aforementioned shortcomings, but without sacrificing

(continues)
the program's appealing click-and-drag layout style. If you liked PageMaker before, you'll like it even more now—although you may want to upgrade your hardware to handle the program's increased girth. If you've been using QuarkXPress or Letraset's DesignStudio or ReadySetGo, you may want to give Aldus PageMaker a second look. And if you're shopping for your first publishing program, you'll find PageMaker's mix of power and simplicity hard to beat—provided your hardware can accommodate it.

Familiar Surroundings
Anyone familiar with previous versions will feel right at home with 4.0. The pasteboard—that electronic layout table upon which you place text and graphics—is identical, as are its surroundings: page-number icons line the bottom of the document window, and a toolbox of icons lets you edit text, crop graphics, and draw lines and various shapes. The menus are similar, too, although most have additional commands.

But you'll notice one big difference between PageMaker 4.0 and its predecessors before you even start the program. It uses a whopping 5MB of disk space—2MB more than version 3.0. PageMaker 4.0 has a healthier appetite for memory, too. It runs on a 1MB Mac, but slowly; 2MB is a more realistic configuration. And if you're working with long publications, compiling indexes and tables of contents, or doing extensive text editing with PageMaker, you'll probably want a 68020- or 030-based Mac.

What's the Story?
Previous versions of Aldus PageMaker seemed to ignore the fact that you often need to make last-minute edits after text is laid out. The story editor, a built-in mini-word processor, changes all that. Triple-clicking on a pasted-down text block or choosing the Edit Story command opens a window containing the text, displayed in a single font and size for fast scrolling (see "Changing Your Story"). Within the story editor, you can use PageMaker's new, 100,000-word spelling checker and its new search-and-replace commands, which also let you search for and change text attributes.

QuarkXPress and DesignStudio provide similar word processing features; indeed, DesignStudio also has a glossary for quick entry of often-used text. But only PageMaker provides a separate window for text editing, and it's a superior approach because it lets you access all the text from a given story by simply scrolling. You need not move between different pasted-up pages, for example, or scroll from the bottom of one column to the top of the next.

Better still, the story editor doesn't apply editing changes to the layout until you reactivate the layout window. And by showing all text in one font and size, the story editor makes it easier to edit tiny footnotes, tightly kerned headlines, and other text elements that are difficult to edit directly on a layout.

More Text-Tweaking Power
At last, PageMaker's basic text formatting features compare favorably to its competitors. You can choose point size and leading values in 1/10-point increments, versus the 1/2-point increments in PageMaker 3.0. PageMaker 4.0 supports a maximum font size of 650-point, versus 3.0's 127-point limit. QuarkXPress's maximum point size is 500; DesignStudio's is 327.

Like DesignStudio and QuarkXPress 2.1 and 3.0, Aldus PageMaker 4.0 provides a tracking feature for improving the spacing of text. Unlike the tracking features in earlier versions of QuarkXPress and ReadySetGo, which simply let you increase or reduce the space between characters, PageMaker 4.0 provides true tracking, which adjusts character spacing depending on the type size—the spacing of large sizes is altered more than that of small ones. PageMaker offers five levels of tracking, ranging from Very Loose to Very Tight. Unlike DesignStudio and QuarkXPress versions 2.1 and 3.0, PageMaker doesn't let you alter its tracking levels to suit your tastes, but it isn't a significant drawback. PageMaker's preset tracking levels yield excellent results. Between them and the program's manual-kerning features, which adjust spacing in increments as small as 1/10em, most users will have all the control over character spacing they need.

The Paragraph dialog box provides new options that let you automatically draw rules above and below a paragraph or line and specify that certain lines be kept together on a page or in a column. And now you can rotate text, albeit only in 90-degree increments; QuarkXPress and DesignStudio allow free rotation to any angle.

You Can Make Book on It
PageMaker 4.0's unique book-production features shatter the program's reputation for being suitable only for small jobs. Publications can have up to 999 pages (versus 3.0's 128-page limit), and the new Book command lets you define a list of individual publication files that, when combined, make up a book. PageMaker numbers pages appropriately across publication files, and at printing time lets you choose between printing just the open (continues)
Design with
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► StrataVision 3d
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Also unlike the competition, PageMaker 4.0 can generate indexes and tables of contents. You can designate index and table-of-contents entries within PageMaker, or you can import Microsoft Word 4.0 files containing existing entries. Compiling the entries is a matter of simply choosing the appropriate command and specifying the desired format. PageMaker then "loads" the mouse pointer with the index or table of contents, which you can place by clicking on the page.

For keeping large (and for that matter, small) publications up to date, PageMaker 4.0 adds several new commands that let you examine and change the links between external word processor and graphics files and the publication you place them in. You can tell PageMaker to update a publication automatically whenever you alter an original text or graphics file. DesignStudio offers no such options; QuarkXPress 3.0 can update a publication when you change an external graphics file, but not a text file.

**Other Goodies—And Not-So-Goodies**

The list of new features in PageMaker 4.0 goes on. Graphics can be placed so that they move with the text that's associated with them. Printing is more straightforward than before, with several new options that streamline printing at service bureaus or other remote sites. Color capabilities are improved, with support for the Pantone Matching System and Aldus's PrePrint application, which produces four-color separations. PageMaker includes a separate application, Table Editor, that simplifies creating tables, schedules, and forms. And a gateway to the Microsoft Mail electronic-mail software lets you send and receive publications directly within PageMaker.

But unlike its competitors, PageMaker still doesn't let you resize or reposition a graphic or block of text by typing measurement values into a dialog box. Those operations remain strictly mouse oriented. It's true that the mouse is a more responsive positioning and sizing tool, and it's true that PageMaker 4.0's rulers are extremely accurate positioning aids (accurate to within .0003 inch). But many users feel that typing in size and position values provides greater precision.

Finally, a couple of quirks—one annoying, one potentially devastating. The annoyance concerns PageMaker's online help. It's a great improvement over the help systems in earlier versions, but the help key sequences (Alt-? or the extended keyboard's Help key) don't work when a dialog box is open. To get help for such an option, you have to back your way out of the dialog boxes, then use the Help key.

A far more serious problem surfaces when a disk error occurs while PageMaker is saving a file. Instead of giving you a chance to save the file onto another disk, PageMaker simply reports the error and then quits, sending unsaved work into oblivion. Aldus says that's not a bug, but a feature designed to avoid corrupted publication files, and that you can usually recover work by opening the temporary file that PageMaker creates in the System Folder. Unfortunately, that's not mentioned in the otherwise excellent documentation.

These flaws aside, Aldus PageMaker 4.0 is a superb effort that balances industrial-strength text-handling features with a responsive and intuitive operating style. You'll be hard pressed to find another program that does so much so well. Just remember to save your work often.—Jim Heid

*See Winner to Buy or circle 706 on reader service card.*

**PUBLISH IT EASY 1.10**

**Pros:** Inexpensive; includes drawing, painting, writing, and page-layout tools; innovative, highly interactive interface; multiple levels of undo for text formatting;

**Cons:** Does not have fine typography, custom page sizes, automatic "continuous" lines, style sheets, or support for gray-scale TIFF; ruler guides are limited and unwieldy.

**Company:** Timeworks; **Requirements:** Mac 512K; **List price:** $199.95.

When writing about Publish It, it's always a challenge to avoid dropping into a straight feature list. Most people refer to it as the Swiss army knife of desktop publishing, and because it includes robust tools for page layout, text editing, drawing, and painting, that moniker is appropriate.

Almost in the same breath, though, people bemoan Publish It's clunky, cluttered interface. Clunkiness is hard to avoid with so many features, but it does make the program hard to use. Timeworks has addressed these complaints admirably in its latest product, a streamlined, pared-down, inexpensive version of Publish It by the name of Publish It Easy.

While removing features was one method of simplifying the program, Timeworks hasn't stripped it of its jack-of-all-trades ambiance. It still has a more-than-impressive toolbox and feature list—enough to keep most nonprofessional page makers happy. Its tools for drawing, object alignment, and rotation (text or graphics, in 1-degree increments), in particular, put it ahead of some of the big guns.

**Text Tools**

There's good text editing, including Find and Replace, a good spelling checker; and even a thesaurus (TheSaurus Rex). With Find and Replace you can search for and replace any character, word, phrase, or type style with any combination of character, word, phrase, and type style. Text formatting includes most of the controls that casual users need, plus some nice bells and whistles like automatic and manual kerning (in full-point increments only), baseline shifts, and ex-
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panded or condensed type (1 percent increments). There are import filters for MacWrite, Microsoft Word (3 and 4), WordPerfect for the Macintosh, WriteNow, and even Excel. Hyphenation is a batch, rather than an interactive, process—select the text and use the Insert Hyphens command—but it's speedy and pretty smart.

Publish It Easy imports all the standard graphics files, with the notable exception of gray-scale TIFF. It only offers seven standard colors, and even though you can print to a color printer, don’t expect spot color overlays; printing is basic and limited.

**Innovative Interface**

The most important changes aren’t really in what’s been left out; they’re in the interface. More than anything, Easy stands out for its interactivity. It’s great for casual users, who often find themselves trying things out on the page, rather than plotting everything in advance. As you resize a text frame, for instance, the text refloows inside the frame; it doesn’t wait for you to release the mouse button. Most dialog boxes let you see the results of your changes before you click on OK to close the box.

The text library is perhaps Publish It Easy’s most innovative feature. You can adjust almost every text-formatting command—font, size, leading, kerning—by selecting it in the library. Change your mind? Just click on Undo/Redo to get a list of your changes to that frame’s text so you can choose which to undo or redo. The feature is not entirely selective, though; if you undo the second-to-last change, for instance, you also undo the last one. When you come back to that frame later, the Undo/Redo list is still there.

**Seeing What You Do**

Easy is one of the few page-make-up programs that actually lets you see objects move as you drag them around on the page. This is one of PageMaker’s great strengths, and while Easy isn’t as fluid as PageMaker for moving objects—there's some halting jerkiness—it is smooth enough to be usable, except when dragging gray-scale PICTs. Bear in mind, though, that you’ll need 2MB or more (or a stripped-down System) to make this effective. Under MultiFinder, at least, with the 683K that’s recommended, Publish It Easy is constantly rebuilding the whole page as you move items.

**Few Failings**

So what’s wrong with Easy? Not a whole lot, especially considering the low (and heavily discounted) price. There are limitations—like its restriction to integral point sizes—that aren’t a great problem for general business users, but some other things are more than annoying. The ruler guides (one horizontal and one vertical per document) are just as clumsy and unusable as its older brother Publish It’s. You can’t create custom page sizes; you’re limited to the standard sizes offered in the printing dialog box. There are no “continues” lines and no style sheets.

One problem that cropped up in early versions of Publish It seems to be rearing its head in Easy—text selection and cursor positioning. The cursor often appears in the wrong place, and it behaves idiosyncratically when you use cursor-movement keys together with the Shift key.

Easy is also a bit slow in some operations (such as text selection), but, surprisingly, most operations aren’t a whole lot slower on a Mac Plus than on a II (hyphenation and other batch operations are notable exceptions). Easy runs well on Pluses and SEs, and the application itself weighs in at less that 290K on disk.

The problems with Publish It Easy are more annoyances than fatal flaws. Easy is a heck of a lot of page-layout program for a heck of a price. It’s a much better value than Springboard Publisher, at the same price, and it remains to be seen how it will compare with Silicon Beach’s soon-to-be-released Personal Press. Easy’s files are compatible with the full-blown version of Publish It, which is slated for an upgrade in the late fall. So there’s even an upgrade path if you start with Easy and find it doesn’t meet all your needs.—Steve Roth

See Where to Buy or circle 633 on reader service card.

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**Word Processing Application**

**WRITENOW 2.2**

**Pros:** Compact; fast; nearly bug free; extremely intuitive. **Cons:** No style sheets or endnotes; text can’t wrap around graphics. **Company:** T/Maker Company. **Requires:** Mac 512K. Second disk drive recommended. **List price:** $199.

WriteNow is generally considered a low-end word processor. True, it lacks many of the features of its bigger (and more expensive) cousins, but with WriteNow 2.2 the low end has gotten pretty high. Ever since version 2.0, WriteNow has had an impressive list of features: virtually no limit to the number of windows you can have open, the ability to handle documents of 1000 or more pages comfortably, the ability to import and export documents in many different formats, automatically paginated WYSIWYG editing of documents with one to four columns, automatically numbered footnotes, multiple headers and footers, mail merge, word counting, smart quotes, smart cut and paste, an extensive spelling checker, flexible formatting, and versatile graphics support.

Version 2.2 adds to these capabilities with a font menu that displays each font name in its own face; improved menu organization; a number of new ⌘-key equivalents for menu items, ruler choices, and dialog box buttons; the ability to copy and paste styles; the ability to directly import files created by Microsoft Word and Microsoft Word 3.0 and 4.0 (even files saved using Word’s Fast Save option); a spelling (continues)
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(*Macworld, Dec. 1989*)

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Good versus Great

The difference between a good word processor and a great word processor isn’t just the litany of features, it’s how well those features work for you. A great word processing application doesn’t send you scrambling to the manual or online help for basic operations, or make you navigate dialog boxes or key sequences when a single menu selection or keystroke should do, nor does it make you wait for operations you perform regularly. Though I own nearly all of the word processing programs available for the Mac, I rely on WriteNow far more than all the others. Most of the features I need are there. And when all I want is to type a term paper or a quick letter, WriteNow doesn’t get in my way.

WriteNow carries out critical functions blindingly fast (and it keeps up with the fastest typing, too). The 80,000-word spelling checker checks even large documents in seconds. It remembers which words have already been checked (so rechecking a document after editing is practically instantaneous), and it can learn or forget a selection of words, which is great for maintaining custom dictionaries. Saving a document is particularly fast (a boon for paranoids like me), and Undo is also rapid. Undo seems to always be there when I need it, and it does (undoes?) what I expect it to. In addition to providing Undo, WriteNow lets you revert to the previously saved version or to the version before that (and, yes, you can undo the rever- sion). WriteNow is lean (it runs on a 512K Mac with two floppy drives or under MultiFinder with only a megabyte of memory), reliable, and above all, consistent.

Though most of what WriteNow does is intuitive, a few functions are hidden. WriteNow can apply a font, size, or style change to all the text in a document that matches a certain style, but you would not know how to do it without reading the manual. (Use the Shift key while selecting the new style.) There is no online help.

There are almost nonexistent. WriteNow 2.2 did introduce a conflict with Stepping Out II version 2.02 when not running under MultiFinder. There also can be a problem with printing multiple documents from the Finder: WriteNow will print only as many pages as there are in the first document selected (documents print out in alphabetical order of their file names). So if you’re printing out the chapters of a manuscript and chapter one has only 10 pages but subsequent chapters are longer, WriteNow prints only the first 10 pages. To workaround this problem you should give your chapters new file names alphabetized in descending order of size. (T/Maker is aware of the problem and will fix it in the next version.) Otherwise, WriteNow 2.2 is rock solid.

This was definitely the toughest review I’ve ever written. Before writing this, I had never fully realized just how much I like WriteNow. I have much more difficulty finding the bad points of a program I really like than I have had searching for good things in programs I don’t care for. WriteNow 2.2 is simply the fastest, friendliest, most trouble-free word processing application I have ever used.

I’ve generated serious documents with MacWrite, Microsoft Word, WordMaker, FullWrite Professional, TeX, troff, WordPerfect, WordStar, and others. They all have features I’d like to have that are missing from WriteNow. But I noticed all of them—while I hardly noticed WriteNow at all before this review, though I’ve used it a lot more than any of the others. That’s the highest praise I can give any word processing application. I even composed a 96-page book with WriteNow, and it looks as though the publisher might go to film directly from the file.

—Ron Risley

See Where to Buy or circle 874 on reader service card.
Let's take a moment to fantasize.

Imagine administration software that lets you add, modify and delete users, groups and volumes on your Macintosh network. Imagine being able to backup local drives to the server. And publishing usage reports to monitor network activity and troubleshoot bottlenecks. And electronic mail that connects with any UNIX e-mail system. And a dual-processor architecture server, designed for intensive disk operations and demanding I/O processing.

All available at the click of a mouse.

Now let's talk fulfillment: uShare Plus™ software on the Sony NEWS™ fileserver. It offers all the above and more—installed, configured and administered from the comfort of your Macintosh environment. Fully AFP compliant, so all existing applications run without modification.

Click for yourself and find out. Call 1-800-624-8999, ext. 96, to arrange a demo.
High-Capacity Erasable Optical Drive

MACINSTOR ERASABLE OPTICAL

Pros: 53 percent more capacity than ANSI-standard 650MB systems; uses ANSI-standard cartridges; respectable selection of bundled disk-management software. Cons: Performance in ANSI mode is slow. Company: Storage Dimensions. Requires: Mac SE. List price: $7995 (includes one formatted 1GB cartridge); additional cartridges $395.

What's made in America, has 50 percent more interior room than any Japanese model, runs on either high-octane or regular, drag races past the competition, and features a price tag to match? One answer is the Cadillac of erasable opticals, the MacinStor Erasable Optical (EO) from Storage Dimensions.

Earlier this year Macworld reviewed erasable optical drives; all were Sony or Ricoh drive mechanisms with varying degrees of value added by American vendors (see "Erasable Opticals: New Light on Data," March 1990). The MacinStor EO, featuring a drive mechanism produced by Storage Dimensions' parent company Maxtor, offers some unique features that make it stand out from the clones.

Extras

The MacinStor EO is conceptually similar to its competitors; all use a magneto-optical mechanism in which a sharply focused laser heats tiny spots for writing magnetic data, and another laser reads the data spots by examining polarized light reflecting off of them. This complicated scheme helps explain why these drives are expensive. In addition, the System regards each side as a separate volume. You have to eject the cartridge and turn it over to use the other side.

The MacinStor EO, however, can use a proprietary high-capacity cartridge (the so-called Tahiti format) in which each side has a final usable capacity of 442 megabytes. This is a bit more than 50 percent larger than the 287MB capacity typically offered by the ISO-ANSI 650 standard. The MacinStor EO needs no physical or software modification to read 650-style cartridges, although you would normally take advantage of this capability only if you need to transfer data from drives that require standard cartridges. There's a read-write throughput slowdown of approximately 30 percent for ANSI cartridges.

Wide Open Spaces

Since the MacinStor drive comes with one preformatted cartridge, setup is effortless—you connect the drive, drag the MacinStor cdev into the System Folder, and restart. The first side of the cartridge now appears as a 442MB hard drive on the desktop. To manage these wide-open spaces, Storage Dimensions bundles Central Point Software's PC Tools Deluxe (an upgraded package, to be called Mac Tools Deluxe, should be out by the time you see this). A particularly helpful utility is Mirror/Rebuild, which stores directory information in special files that allow you to recover data in the event of a crash.

Data protection and crash insurance are, of course, crucial for storage systems of this size—if you worry about a modest 20MB hard disk failing, think about rebuilding half a gigabyte. At these prices, disk-management utilities must be adequate to the task, and it's comforting to see that Storage Dimensions takes this seriously.

A Matter of Time

MacinStor EO's capacity is certainly nice to have, but your purchasing decision is also likely to depend on speed. I ran the same benchmark on the MacinStor EO that I used in the March EO drive article; in four out of five tests the MacinStor EO is the fastest erasable optical now on the market.

On basic SCSI parameters, the MacinStor EO shows a faster read time than any other drive except the Pinnacle REO-650 equipped with an additional Opti-Cache SCSI accelerator, but the write time is comparable to that of an average Sony drive. In real-world tests, this combination gives the MacinStor first place in opening large PageMaker, Excel, and Illustrator files; another first in carrying out a search in 4th Dimension; but leaves the drive down in the lower half of the pack on copying 20MB of files from a hard disk. When the drive uses ANSI-650 cartridges instead of Storage Dimensions' high-capacity cartridges, however, the performance advantage diminishes.

Spin Control

The MacinStor EO is big, and it's fast, and it costs about $200 more than plain ANSI-650 erasable opticals (other manufacturers have recently announced 1GB opticals above and below the MacinStor's price). If you want the drive for a desktop application—storage and manipulation of color graphics, for example—speed and size are an important asset. If you are using erasable optical cartridges for interdepartment or interoffice data transfers, the MacinStor's size is again helpful, as you get the equivalent of three standard EO sides on a single cartridge. All in all, Storage Dimensions has done an impressive job of making an expensive product that's worth the money. —Charles Seiter

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See Where to Buy or circle 783 on reader service card.
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 MacWrite II. 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.
Grammar Checkers

CORRECT GRAMMAR FOR THE MACINTOSH 1.0.1


GRAMMATIK MAC 1.0


RIGHTWRITER FOR THE MAC 3.1


Just how good a job can an automated grammar and style checker do? Three companies have introduced programs that are intended to help Macintosh users improve their writing. All three programs claim to find grammatical errors and flag stylistic problems, deliver a statistical analysis of the text and offer writing tips, all can read plain ASCII (or text) files, and all were previously available in DOS versions. Each, however, takes a slightly different approach.

Correct Grammar
Correct Grammar for the Macintosh checks the spelling and grammar of documents created on a wide variety of word processors, including Word 4.0, MacWrite II, and WordPerfect. When you start the program, a dialog box prompts you to choose which word processing file to open, and the program immediately begins checking the selected document. Your text is displayed in one window, warnings and advice in another.

A row of buttons between the two windows lets you perform various functions or access more information (see "Correct Grammar Screen"). In many cases you can correct a problem with the click of a button, but you may want to move the cursor to the Edit Window to make additional changes. The text in Correct Grammar's Edit Window appears one paragraph at a time in 12-point Geneva, making it easy to read and edit. You can skip a problem, use the Quiet button to turn off a rule, or get more information about a grammar question by clicking on Tutorial. If you previously checked the appropriate menu options, Correct Grammar automatically saves a backup copy of your original document and produces a readability analysis of your text. You can customize Correct Grammar by turning off and on grammar and style rules and by changing the readability parameters.

Correct Grammar claims to be 95 percent accurate, but I found that figure to be misleading. I used all three programs on text that was doctored for an editing course—an admittedly tough text—and on a half page of simple ungrammatical sentences. Correct Grammar identified some of the trickier problems that the other programs missed, but it ignored plenty of others and suggested "corrections" that would have made sentences incorrect. For example, it flagged the noun aide in the appropriate context, suggesting that the verb aided was needed, but ignored aid used improperly. It also flagged several subject-verb agreement problems when the words were neither subjects nor verbs.

Grammatik
Grammatik Mac, which supports a shorter list of word processors, uses bundled utilities to convert files into a form it can read. (The new version will offer a much wider variety of word processors.) Like Correct Grammar, Grammatik can be customized for different writing styles, and specific rules can be turned off. You start the program by clicking on the icon for a preference file that you have set up with the options you want, including word processor format and appropriate writing style for your intended audience. On-screen buttons prompt you to open a file and designate a different file name for saving the revised text.

Grammatik offers several methods for copy editing (referred to throughout as proofreading). You can examine grammar, style, and spelling interactively, or you can produce marked-up copy, with or without explanatory notes added to the text, and (continues)

RightWriter Marked-Up Copy
RightWriter missed most of the errors in these sentences, displayed in MacWrite II. When you are finished editing, you can go back to RightWriter and have it delete all of its comments from the text.
For a limited time, the B and A in BASF stand for Bon Appetit.

A good appetite will come in handy with BASF's "Wine and Dine" Game. Because every time you buy BASF diskettes, you could win prizes you can really sink your teeth into.

You could be one of the Grand Prize winners who'll enjoy an all-expenses-paid trip for two to the restaurant of your choice, anywhere in the U.S. It includes all transportation, meals and hotel for 6 nights. Or one of the thousands of 2nd Prize winners who'll dine in style with an American Express "Be My Guest" Restaurant Certificate worth $100.00. There's even a second-chance drawing for a 3-day, 2-night mini-vacation. Look for game tickets in specially marked packages.

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Try it. Depend on it. ♦ BASF
return to your word processor to edit or print it. In the interactive mode, text is displayed in the upper window and advice and function buttons in the lower window (see "Grammatik Screen"). With some problems, you have the option of replacing a word or phrase with one suggested by the program. You can also ignore a phrase or class of problem for the rest of the session or skip to the next problem. A question button takes you to the program's grammar and style rules.

You can also activate the Edit Window and make your own changes. The program provides access to about two half-screen windows of text in the 9-point Monaco font, which can be murder on the eyes and difficult to highlight precisely with the I-beam cursor. When the session is finished, Grammatik displays a readability analysis that includes charts comparing your text to three standard works.

Whether or not Grammatik manages to catch complex problems, such as verb agreement, depends on the construction of the sentence. It identified the error in the sentence "The boys, who found a ten dollar bill in the street, is buying their mothers flowers." But take away the commas to make the who clause restrictive, and Grammatik sees no error. Also, the program sometimes recognizes that its or it's has been used incorrectly, but other times it lets the mistake slide.

**RightWriter**

RightWriter is a noninteractive program that produces a marked-up copy of your text. The comments that intersperse the marked-up text are coded (see "RightWriter Marked-Up Copy"), and if you want more of an explanation you can look up the code in the manual. Following the marked-up text is a readability analysis that features a list of words that may be problematic, for example, sexist language, possible jargon, and negative vocabulary. Accident, demanding, protest, and fault are only a few of the many words that the program flags as negative. Fortunately, RightWriter's dictionary, the list of words the program will flag and identify as problems, can be modified, but the process involves importing lists of words from a text file. When it came to spotting actual grammatical errors, RightWriter was the weakest of the three programs.

**Which, If Any, to Buy?**

As style checkers, these and similar programs can be useful for pointing out weaknesses in your writing, such as too much use of the passive voice or too many long sentences. As grammar checkers they can help you catch some errors, but you have to wade through repetitive warnings, look for the problems the program missed, and know enough about grammar to identify erroneous corrections. If you can live with the shortcomings inherent in the current generation of Macintosh grammar checkers, consider the features that distinguish one program from another.

Interactive editing is easier with Correct Grammar, which offers larger print, the ability to work forward as well as backward in each paragraph, and the chance to go back and check any changes you've made in a sentence. Grammatik offers more flexibility for people who want the choice of editing interactively within the program, or in their word processor, or on paper. RightWriter requires only 512K of memory, and the all-caps advice that it inserts into the text is easier to find than Grammatik's mostly lowercase notes.—Gerry Lukes

See Where to Buy or circle 748 (Grammatik Mac), 842 (RightWriter for the Mac) on reader service card.

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**ICON-IT 2.0**

**Pros:** Easy to customize appearance and function of icons; works well with macros; offers wide range of prefab icon bars.

**Cons:** Creates barrier on the screen; shape of icon bars limited; lacks drawing tools.

**Company:** Tactic Software. **Requires:** Mac 512K. **List price:** Version 2.1 $89.

If you'd like to customize your Mac's interface but are unwilling to brave the complexities and hazards of ResEdit, you may find that Icon-It 2.0 (formerly published by Olduvai) can create functional icons much more easily. For instance, this INIT can overlay icons with functions onto applications—unlike ResEdit, which requires programming to add icons with functions to applications. However, Icon-It's icons have some idiosyncrasies that leave their own stamp on the Macintosh interface.

**Icon Buttons**

Icon-It's icons are really buttons that appear on screen either solo or as a part of an icon bar. You can create your own bar of icons and customize each icon's function and appearance, or you can take advantage of preset, application-specific functions found in the more than 100 templates that come with the program.

Selecting Icon-It from the Apple menu makes the Icon Bar editor appear. With the Icon Bar editor you can open up one of the templates and install or remove a bar. Once you've selected a bar, you can use the editor to set its shape and position, and orient it vertically or horizontally.

Version 2.0 adds the handy ability to create vertical icon bars, but they are still limited to a rectangle shape instead of shapes that would be more useful on a small screen—such as a pattern that would fit into a corner.

One idiosyncrasy is that if you drag a window over an icon bar, the window disappears where the icon bar and the window overlap. The unlucky window that gets its title bar or close box dragged behind an icon bar can only be moved or closed by holding down the Option key as you click or drag.

The functions provided by the icon-bar templates are mostly menu commands. For instance, the Full Template for Microsoft Word 4.0 includes buttons for saving, printing, getting a ruler, and quitting. While these functions may save a few steps,
the inconvenience of having a wall of buttons covering a large portion of your screen may make you want to go back to doing it the old-fashioned way.

Customizing
Icon-It becomes more useful when you begin customizing bars and icons. For instance, if you often change between fonts and styles, you will find Icon-It's on-screen buttons easier to use than menus or command keys. Customizing icons to perform a single menu command is as easy as opening up the Icon Function editor and selecting that function from a menu. Once you have assigned a function to an icon, you can use the Icon Function editor to doctor its appearance. While this editor lacks some tools that might be useful (invert, graphics rotation, text entry, and marquee) its PaintBrute canvas is adequate for creating small images quickly. In addition, images for icons can be pasted in from paint programs (though getting the icon images to be the correct size is a bit tricky).

Creating Icons from Scratch
Just as customizing buttons for specific functions makes Icon-It more useful, creating icon bars from scratch makes it more convenient. When you start with a blank icon bar you can set the height and width of your buttons, so you can reduce them to a very small size and make the icon bar less of an obstacle on screen.

Icon-It is especially useful when used to activate macros. With buttons that indicate the function of the macro being activated, even the most complex macro can be made intuitive and simple. Icon-It can activate Tempo, QuickKeys, MacroMaker, Excel, and Automac III macros.

Unfortunately, the new online help system adds little to Icon-It's rather skimpy user manual, providing only a short description of the functions of the buttons and fields in the Icon Bar editor and the Icon Function editor.

But overall, despite its quirks and inconveniences, Icon-It will probably be a permanent addition to my Finder and to my favorite applications. And it certainly is a stepping stone along the way to ultimate customization.

—Jonathan Cassell
See Where to Buy or circle 180 on reader service card.

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**Puzzle Game**

**JIGSAW 1.0**

**Pros:** Many levels of play available; makes new puzzles from imported paint and PICT files. **Cons:** No interesting puzzle-piece shapes; gray-scale graphics are fairly dull.

**Company:** Britannica Software.

**Requires:** Mac 512K. **List price:** $39.95.

Sure, we all know the Mac is a tool not a toy, and yet one of the things that Mac programmers are particularly good at is devising games. There are by now countless ways to divert yourself from that project budget you were plugging into a spreadsheet, the sales presentation you were outlining, or the article you were writing—without ever moving from your computer. Certain games, like Tetris or Pipe Dream or Klondike, are addictive pastimes—games you can play while chatting on the phone or while someone's got you on interminable hold. Jigsaw is definitely this type of game. And like others of its type, its simplicity is deceptive.

**Child's Play**

The basic play couldn't be simpler. Jigsaw is perhaps a misnomer; each puzzle is composed of uniformly sized rectangular tiles—8, 15, 40, or 60 pieces, depending on the selected level of difficulty. You click on the piece you want to move, highlighting it, and then click on the one occupying the spot where you want to place the first piece; the program instantly switches the positions of the two pieces. A clock keeps track of your playing time. When all the pieces are correctly assembled, the clock stops and your score appears in a pop-up window along with other time records for that challenge level.

In addition to letting you choose the number of pieces, Jigsaw offers several other options for adjusting the degree of difficulty. In standard operation, you can study the puzzle picture as long as you like before clicking the mouse button to scramble the pieces and start the timer. You can also sneak a peek at the picture during play if you need to refresh your memory, although Jigsaw penalizes you each time by adding ten seconds to your score. If you check Hard Way in the Goodies menu, the puzzle appears on screen already scrambled, with the clock running. Hard Way also disables the Show Picture option, so you've either got to tough it out or give up. If you quit before finishing, Jigsaw lets you save the puzzle so you can come back to it later. (If you want to look busy for a minute, you can choose Hide window, and the timer waits until you decide it's safe to switch back to Show window.)

**Give Me a Hint**

The program also comments on your progress as you play. If you make a good move, Jigsaw signals with whatever sound you have set in the Control Panel; otherwise it remains silently noncommittal. This can be a little confusing, since an unrewarded move is (continues)
Put More
Into These Computers
Than Apple.

195 Megabytes.

They're today's most powerful personal computers. And to handle really demanding applications, you need to put more into them than 40 or 80 megabytes. Applications like databases, multimedia, graphics, publishing, CAD/CAM/CAE. That's where the MacinStor™ 195i comes in.

The 195i has been performance matched to deliver total Macintosh® power to every application. With 195 megabytes of capacity. With top performance specs—such as 15ms average seek time and 13 Mbits/sec average data transfer rate. With a clean, 3.5" drive installation that eliminates power supply and cooling concerns. With comprehensive software utilities that let you easily manage and secure your data. And with 50,000 hours MTBF for long haul reliability.

As with every MacinStor product—internal or external, hard disk or optical, 40 megabytes to a gigabyte—the 195i is a high performance solution no competitor can match. So call up all of the Macintosh power at your fingertips. Call up (408) 879-0300 for MacinStor reseller locations. Or write Storage Dimensions, 2145 Hamilton Avenue, San Jose, CA 95125.
A Rose by Any Other Name
Selecting Hard way (no hints and no peeking)
from the Goodies menu and 40 pieces under Level
should provide more than enough challenge for
most puzzle enthusiasts.

not necessarily a mistake. You can turn
the sound off if you prefer to do without Jigsaw's kibitzing. There's also a
small window at the top of the screen
that keeps constant track of the per-
centage of the puzzle you've completed
correctly, sort of the way children
say "warmer . . . warmer."

Jigsaw comes with eight gray-scale
images and three color images plus
the ability to import your own. Some
of the puzzles are clearly meant
for children—an illustrated ABC
and three Wizard of Oz characters, for example. The rest are a grab bag—an American
flag, a butterfly, a landscape, and so
on—suitable for any age player, but
not especially engaging. The color
images are more appealing, but with-
out a color monitor the difference is
academic. Color also makes the
puzzles easier to complete. Just try out
the impressionistic bathing scene
(which, curiously, comes in gray scale
only). Even with audio hints and only
8 pieces it's tough; choose 40 or 60
pieces and—you've got to have more
patience than I do. The colorful
rose and freckle-faced red-haired child
are more rewarding (see "A Rose by
Any Other Name").

Jigsaw has a couple of annoying
quirks. For one, my copy of the pro-
gram crashed a few times when clos-
ing a completed puzzle and moving
quickly to open a new one. A more
perplexing problem is that with im-
ported images, the percent-completed
display sometimes seems not to ac-
knowledge a finished picture, which
of course means the clock stays on,
running up the score. The problem
turns out to be that the white space
surrounding the picture is also
scrambled, although invisibly. That's
never, Encore comes with a hefty price
tag and a couple of persistent bugs.
 Encore's strength is that its overall
design and operation are very similar
to Pro 4's, Passport's tried-and-true
sequencing program. Both packages
have similar windows for setting up
tracks, and many of the MIDI func-
tions and editing commands are near-
ly identical. Both programs use a
simple set of three cursors (the arrow,
pencil, and eraser) to accomplish se-
lecting, entering, and deleting data
with the mouse, but Encore displays
the musical data in note form, while
Pro 4 uses a piano-roll graphic display.

By borrowing so heavily from the
strengths of Pro 4, Passport has en-
dowed Encore with a clean, easy-to-
understand design, as well as the most
functional sequencer ever to appear
in a notation program. While it's never
going to replace a conventional se-
quencer, Encore allows you to tweak
a score's underlying data with se-
quencer-like editing commands. Its
capabilities lie somewhere between
professional sequencers and other
notation programs that support MIDI.

Simple Import
Notes can be imported from Pro 4 or
standard MIDI files, can be recorded
in real time via MIDI, or can be input
by using the Mac keyboard to select
note durations and using the mouse
to specify placement. Encore lets you
create, import, and edit a tempo map,
so that you can record a performance
over a changing set of temps; but
unlike some of the competition En-
core doesn't let you tap a foot switch
to control tempo as you're recording.
However, entry is usually speedy, since
the program doesn't check durations
or beam groups of notes as they're
input; you must select a region with
the arrow cursor and perform the
Guess Durations and Beam on Beat
commands to see something that re-
sembles correct notation.

Despite Encore's functional track
sheet and input filters, real-time re-
cordings are often transcribed raggedy-
ly, and the program's simple quantiza-
tion controls don't completely cure
the problem. The best method of real-time
input seems to be to use a sequencing
program to record and edit the data
(continues)
It is the supreme irony of modern business. That until now, it has been impractical—and often unprofitable—for a business to treat its people’s time with the same respect automatically accorded its money.

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before importing it into Encore. I got good results by quantizing note attacks and releases and otherwise cleaning up my performances before letting Encore chew on them; with a little outside help, Encore's guessing routines fare a lot better than they do on music played directly into Encore.

You enter symbols, lyrics, and ornaments by choosing them from palettes and clicking on the desired location, although the default placement for some symbols is not very useful. Many notation programs operate like drawing programs; Encore does not. It provides no way to magnify the view, click on an object to make its handles appear, or move and resize objects. A program in this price range should at least have a Zoom command.

Encore's simple layout commands let you quickly set up systems of up to 64 staves, with fully controllable bracketing and bar lines. Menu commands let you set the number of measures and systems displayed on any page, and page icons at the top of the screen allow you to move quickly to any page. Any range of notes can have one of four alternate note heads. You can display and print any staff at one of four sizes, or you can hide a staff on specified pages. Simple and flexible measure numbering and fields for title, header, footer, and copyright notice on each page round out the program's basic yet sufficient set of layout tools.

A Problem of Positioning

Some of Encore's best-executed features are the ones that few notation programs have, like a command for creating crescendos that play back by ramping up note velocities across a region, or a command that sets note durations to play back at a percentage of their on-screen value. With a little manipulation, you can create a fairly decent sequence using Encore, so that even without a separate sequencer the program provides fairly listenable playback for proofing purposes. But given the problems with real-time transcriptions, I think it unlikely that Encore will be used as a stand-alone solution to a composer's needs.

Anybody who needs Encore's transcription functions as well as its ability to record and play back (but not edit) MIDI data would be much better off using a simple $100 sequencer that can export MIDI files (such as Passport Designs' Master Tracks Jr. or Opcode Systems' EZ Vision) as an input module for Encore. This brings up the big question: if you're going to use another program for input, why use a notation program that has MIDI input functions? Why not use a simpler, drawing-style program for transcribing and editing the scores?

I've had the best results so far using Coda's MusicProse (which has limited MIDI capabilities, but can follow live tempos via a foot switch) to edit and print files created in a sequencing program (see Reviews, Macworld, April 1990).

Encore's main problem is market positioning. It handles 64 staves and it transcribes real-time performances, so it's positioned as a high-end product. Given Encore's simple layout and lack of drawing-style tools, it's probably best suited to MIDI musicians who need to print horn charts and lead sheets, of reasonable—if not of publishable quality—with a minimum of hassle. In this situation, Encore performs excellently—for a program at, say, $295. At $595 it doesn't look any better than the competition.—Charles Clouser

See Where to Buy or circle 735 on reader service card.

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**EASY COLOR PAINT 1.1**

**Pros:** Full 256-color support; standard MacPaint-like paint tools with enhanced functionality; variable document size; good speed; extremely low price; runs in black and white on Mac Plus; compatible with 32-bit QuickDraw. **Cons:** Relatively few special effects; no color-separating capability. **Company:** Creative Software. **Requires:** Mac Plus. Mac II and System 6.0.2 or later for color operation. **List price:** $79.

Mac II owners may have faster computers with dazzling color displays, but they lack something every buyer of a Mac 128K took for granted—basic painting software.

Enter Easy Color Paint, the MacPaint for the color age. Concentrating on simplicity, economy, and fun, Easy Color Paint extends the painting fundamentals originated by Apple's first graphics program to the realm of color computing. But Easy Color Paint doesn't stop there. Though it avoids bells-and-whistles excess, Easy Color Paint improves on MacPaint with numerous additions and refinements, even a few special effects. The result is a satisfyingly strong yet incredibly inexpensive color paint program that casual computer artists—and their kids—will enjoy for hours on end.

Easy Color Paint takes full advantage of the standard Mac II's 8-bit color mode, meaning that you have access to 256 separate colors in each piece of art (if you want to save memory or if you have a less-capable computer, you can choose black-and-white, 4-color, or 16-color modes instead). Yet aside from a few variations in screen layout, the Easy Color Paint working environment is faithful to the archetype established long ago by MacPaint (see "Artist's Tools"). The painting tools now occupy a rectangular window instead of a vertical palette, but you'll (continues)
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incredibly simple, it runs in black and white on a Mac Plus. It immediately recognizes most of the icons. Another window contains a familiar smorgasbord of bitmap patterns. There is one obvious addition to the screen, however: the large palette from which you select foreground and background colors for your artwork.

**Basic Color Painting**

At its most basic, color painting with Easy Color Paint is as straightforward as painting in black and white with MacPaint, and it’s even more fun. Pick a color and pattern, choose a tool, and start painting—if you like MacPaint, you’ll be spellbound when you see what intense stabs of red or peaceful pastel washes add to your artwork. The program is fast and responsive, even with all those colors to keep track of, and it functions flawlessly. All of the traditional painting tools (paintbrush, spray can, paint bucket, pencil, and so on) work just as you’d expect.

Easy Color Paint offers a healthy set of enhancements, some of them having to do with color per se, some representing improvements on the fundamental painting tools. In the color department, your first advanced choice is which of six 256-color palettes you want to paint with (my favorite is Winter Forest, a selection of icy grays, blues, and pinks). You can also decide how the colors on the electronic brush get applied to the screen. In the standard method, the new colors obliterate whatever was there before. Five other options combine what’s on the brush with the colors it passes over in various ways for a broad range of useful effects. There’s even something called wacky color rotation, which automatically switches to new foreground and background colors several times a second. Like PixelPaint and Studio 8, Easy Color Paint comes with an eyedropper tool. This tool lets you switch to a color that’s already on the screen; you don’t have to find it on the palette.

**MacPaint Extended**

Color aside, Easy Color Paint’s biggest accomplishment is the way it extends the capabilities of the basic MacPaint tools without sacrificing simplicity. As in PixelPaint, nearly every tool has a menu of its own, but these only appear when that particular tool is active. In the Brush menu, for example, you can choose the size of the brush over a wider range than MacPaint permits and select from a list of brush shapes. Likewise, the Eraser menu lets you choose the size of the eraser—a welcome improvement over MacPaint—and also lets you determine whether the erased areas are filled with white or the background color. The Marquee (sic) menu allows you to select a rectangular, circular, or oval shape for the marquee, it also lets you specify how a marquee is defined with the mouse (by dragging from one corner to the opposite corner, by dragging out from the center, and so on).

Since Easy Color Paint stores its files in PICT format, you’ll have no trouble exchanging files with most other Mac graphics applications. The program can also open MacPaint files and accept pasted images from the Clipboard. Ordinarily, Easy Color Paint paintings are sized to match either the standard MacPaint document or a full Mac II screen, but the program lets you define a custom size and will also adjust automatically to match any PICT document you read in. Although the manual is clear, it spans just 32 pages, lacks illustrations, and neglects coverage of special option and # key tricks. But that hardly matters, since this modestly named program sports a surprisingly complete help system.

**Not the Final Word**

Easy Color Paint doesn’t claim to be the final word in color paint programs, so it’s not surprising that some fancy features are missing. As in MacPaint, you get only one magnified view size for FatBits editing, and there’s no grid for precision positioning. While you can rotate an entire painting or a selected region in 90-degree increments, free rotation isn’t permitted. Nor does the program let you alter selected areas with perspective, skewing, or distortion effects. I particularly miss the brush mirrors feature—color kaleidoscopes would be a lot of fun. But probably the most serious drawback for professional illustrators is that this program can’t do color separations (but Easy Color Paint does print to Mac-compatible color printers).

Easy Color Paint won’t replace high-end, high-priced color paint programs, and serious artists should look elsewhere. But if you’re happy with a color paint program that has the low price, solid performance, and good-natured appeal of MacPaint, buy Easy Color Paint—it’s even better, and it’s less expensive. —Steve Cummings

See Where to Buy or circle 729 on reader service card.

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**PHOTOLINK**

**Pros:** Easy to reconfigure networks; easy to set up; can be used in almost any environment. **Cons:** None.

**Company:** Photonics Corporation.

**Requires:** LocalTalk or equivalent connectors from Mac to Photolink. **List price:** $1195.

What looks a bit like ET, sits atop your cubicle, and keeps you connected to the file server? It’s Photolink. And it could certainly change the way office networks are connected. Rather than depend completely on Apple’s LocalTalk cables (continues).
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The Photo link is an AppleTalk replacement network. A green light on the back of a sect to exchange data. Point on Mac to the Photo link with the LocalTalk cabling. Attach a minimum of two electronics and includes a C-clamp cubicle wall), aim them at a common on, and aim it at roughly the same spot. A green light on the back of the unit blinks slowly and then more rapidly as the signal received from the other Photolink increases in strength. Pick the Photolink orientation that gives the most rapid blinking and you're all set.

Setup Rules
The Photolink is versatile. You can point from 2 to 32 units at the same spot to exchange networked data. All the Photolinks should be located within 35 feet of the target spot in a typical office environment (9-foot ceilings with 5-foot-high partitions). If you have higher ceilings, you can extend the range of the Photolinks.

The Photolink's infrared beam doesn't work well with highly reflective surfaces; it requires a diffuse reflection of the signal from another Photonics (surfaces like acoustical ceiling tiles and regular walls work just fine as target areas). On the other hand, because the Photolink uses an infrared wavelength that is just outside the normal range of visible light, you can use ordinary mirrors to reflect a Photolink's beam around corners to connect to other rooms. Transmitting the infrared beam through an interior window (between an office and the hallway) also had no adverse effect on the Photolink's performance.

Each Photolink has four network ports. If you're using Apple's LocalTalk cabling, you can connect one device per port, according to Photonics. The company also suggests daisy-chaining a maximum of two devices per port if you're using PhoneNet wiring. However, I tested the Photolinks with a daisy chain of five devices on one port without problems. In most cases, it's wise to stay away from long daisy chains when designing a network, so Photonics' rules are more an extension of the principles of good network design than a limitation specific to the Photolink.

Ready, Aim, Network
Networks change: people move; new equipment comes in; cubicles are added or removed. In a cabled network, these changes might require rewiring. This can take days to accomplish. Photonics offer a much easier, simpler form of networking while playing musical cubicles. Regular wiring schemes such as LocalTalk and PhoneNet are good for established networks that don't change much, but Photolink is a good choice for large offices where cubicles or offices change location and require frequent rewiring. At a price of $150 per device (two devices per port for a total of eight devices per Photolink), the Photolink is also a cost-effective solution to rewiring a network; it'll probably pay for itself after the first reorganization. —Dave Kusiak
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Which Database?

4th DIMENSION now offers the easiest-to-implement relational capabilities; its overall functionality and programming capabilities may make it the first real Macintosh database standard.
INFOWORLD, September 1989

4th DIMENSION outshines all the other databases with its number of features and rich database development environment (...) Of the current programs, 4th DIMENSION is the most complete and powerful.
BYTE, January 1990

Given that 4 D was the first program to allow database designers to build a Macintosh interface, Acius has the advantage of experience over its competition.
MacWEEK, June 1989

ACIUS has created a rich environment for database users at all levels.
MACWORLD, January 1990

4th DIMENSION 2.0 is a rare treat (...) You really can create powerful multfile database systems without getting involved in coding at all.
MACUSER, February 1990

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Professional MIDI Interfaces

**MIDI TIME PIECE**

Pros: Eight independent MIDI inputs and outputs provide up to 128 MIDI channels; can attach to three additional MIDI Time Pieces to accommodate extremely large MIDI networks; desk accessory provides versatile routing and filtering options for MIDI data; synchronizes reliably; excellent manual.

Cons: Uses external power adapter.

Company: Mark of the Unicorn.


**STUDIO 3**

Pros: Accepts optional foot switches for real-time control of certain MIDI data; provides rear-panel modem and printer ports; synchronizes reliably.

Cons: Only two MIDI inputs; minimal MIDI routing options; weak documentation.

Company: Opcode Systems.


The musical instrument digital interface (MIDI) lets you connect one or more electronic instruments to a computer. Once that’s done you can use sequencing software to create multipart arrangements and use editing software to alter and manage the instruments’ sounds (see “Getting Started with MIDI,” *Macworld*, August 1990).

But before you can create a silicon symphony on a Mac, you need the interface itself—a box that connects MIDI instruments to the Mac’s modem or printer port. For simple MIDI setups, consider one of the low-cost ($100 to $200) MIDI interfaces available from Apple, Opcode Systems, Passport Designs, or J. L. Cooper Electronics. If you want to connect more than three instruments to the Mac—or if you need to synchronize sequencer software to external devices—you’ll want a more sophisticated MIDI interface, such as Mark of the Unicorn’s MIDI Time Piece (MTP) or Opcode Systems’ Studio 3.

These high-end devices provide several MIDI In and one MIDI Out connector. This lets you create large MIDI networks withoutaisy-chaining (connecting one instrument’s output to another instrument’s input), which can lead to delays in MIDI data transmission when numerous MIDI devices are interconnected.

Both the MTP and the Studio 3 interfaces also let you synchronize sequencer software with an audio or video tape recorder. The interface can record a synchronizing, or sync, tone, which carries timing information, on one track of an audio or video recording (a process often called striping). When you play back the recorded sync tone, the interface interprets it and generates MIDI Time Code signals that a sequencer program locks on to, thereby ensuring that the sequencer and the audio recorder play back at the same pace.

**Ins and Outs**

Both the MTP and the Studio 3 work well and provide similar features, but the MIDI Time Piece takes first place. For starters, it offers 8 MIDI In and 8 MIDI Out connectors; the Studio 3 offers just 2 MIDI Ins and 6 MIDI Outs. The MTP gives you a total of 128 independent MIDI channels—in theory, at least. The MTP’s cabling scheme is currently supported by only one sequencer—version 3.4 of Mark of the Unicorn’s Performer. If you don’t use Performer, the MTP provides 32 independent MIDI channels. Mark of the Unicorn reports that other companies plan to update their software to take advantage of this capability.

You can connect up to four MTPs to provide a whopping 512 MIDI channels. What’s more, the cables that interconnect MTPs can be up to 1000 feet long, versus the roughly 50-foot maximum length for MIDI cabling. That extra 950 feet could be significant if you’re wiring an auditorium or large recording studio for MIDI.

Both the MTP and the Studio 3 come in 19-inch cases designed to fit standard equipment racks. To save you from snaking your arm around the back of a rack, the MTP provides one MIDI In and one MIDI Out on the front panel—a nice touch.

Like most MIDI interfaces, both the MTP and the Studio 3 run at a 1MHz clock rate. The MTP, however, also has a fast mode that lets it run faster when connected to a Mac with a 68020 or 68030 processor. The fast mode boosts performance and reduces the chance of timing delays when the Mac is transmitting large amounts of MIDI data.

Inexpensive MIDI interfaces monopolize a Mac’s modem or printer port. To use a modem or printer, you must disconnect the MIDI interface and connect the modem or printer. Not so with the MTP and the Studio 3. The MTP provides a second modem port, while the Studio 3 provides a modem and a printer port. Both interfaces let you choose between MIDI and standard serial-port operation by flicking a front-panel switch.

**Sync or Swim**

In the sync department, the MTC and Studio 3 provide similar features—both can interpret and generate the industry-standard SMPTE (Society for Motion Picture and Television Engineers) time code, in all four of its formats. Both can also convert incoming (continues)
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SMPTE to MIDI Time Code, and both provide jam syncing, in which the interface regenerates incoming SMPTE code in real time to avoid a weak sync signal that could result in the loss of synchronization.

Both interfaces provide a desk accessory that allows you to specify sync settings and begin striping a tape. The MTP comes out ahead here, too. Its desk accessory lets you adjust the output volume of the sync tone; the Studio 3's output volume can't be adjusted.

As sync boxes, both the MTC and Studio 3 performed beautifully, tolerating weak or poorly recorded sync tones and occasional dropouts. Both boxes were even able to interpret sync tones recorded on an aged stereo cassette deck whose heads are out of alignment.

Routing and Mutting
Most MIDI interfaces, including the Studio 3, simply act as conduits for MIDI data, shuttling it between the electronic instruments and the Mac. The MTP is more versatile. Its desk accessory lets you change the MIDI channel assignments for each input and output cable, route any input cable to any output cable, and selectively filter certain kinds of incoming or outgoing MIDI data (see "Manipulating MIDI"). These features spare you the effort of plugging and unplugging MIDI cables and twiddling dials on the MIDI equipment. Best of all, the DA can save a given configuration on disk.

Studio 3's routing options are minimal. You can route each of its MIDI Outs to the Mac's modem or printer port, but you can't rechannel or filter MIDI data. You can save and restore its settings by copying a Studio 3 startup document to the System Folder, but you can't save several sets of settings and switch between them.

Choosing an Interface
Although the MTP beats the Studio 3 in several areas, the Studio 3 does have some noteworthy pluses. It accepts up to three foot switches that you can use to generate MIDI data or remotely control a sequencer program. Two of the foot-switch jacks work with on/off foot switches, while the third accepts a continuous-control pedal. Using the latter, you can control a MIDI device's volume or any other setting that uses continuous data.

Another plus for the Studio 3 is its internal power supply; the MTP uses an AC-to-9-volt adapter that seems out of place on a piece of professional MIDI equipment. If I were subjecting an MTP to the rigors of the road, I'd carry along a spare adapter or two.

The sequencer software you use may also influence your choice. The MTP works best with Performer, and the Studio 3's manual contains numerous references to Studio 3 features that will work with future versions of Opcode's Vision. It stands to reason that each company will make its hardware and software work well together, so if you've bought into one camp already, you may want to stay there. (And incidentally, if you already have a simple MIDI interface and you just need sync features, consider Opcode's $199 Timecode Machine.)

In the end, however, the MTP's eight MIDI Ins and eight MIDI Outs, its versatile routing, muting, and channeling options, its elegantly designed desk accessory, and its tutorial-laden manual give it the edge. If you can live without the Studio 3's foot-switch options and internal power supply, the MTP is the better buy.—Jim Heid

See Where to Buy or circle 816 (MIDI Time Piece), 645 (Studio 3) on reader service card.

ACCOUNTANT, INC. PROFESSIONAL 1.03
Pros: Highly competent; menu-driven; includes both Inventory and Payroll segments; good supporting documentation.
Cons: Does not make optimum use of Mac interface; annual payroll-tax updates must be purchased from publisher.

Accountant, Inc. Professional (AIP) is an updated version of Accountant, Inc., which contained General Ledger (G/L), Accounts Receivable (A/R), Accounts Payable (A/P), and Inventory Management modules in a single program. Although the program has been improved in many areas, the major change is that a Payroll module and a Job Costing feature have been added, making the program equivalent to Computer Associates International's Simply Accounting. (Layered atOne is in the same price range but does not include an Inventory module. CheckMark Software's MultiLedger, also in the same range, offers Inventory but not Job Costing.) AIP, like Simply Accounting, is a single-user package, although it can be shared on an AppleShare or TOPS network.

AIP works through conventional bookkeeping methods rather than in real time. This means that you must post G/L entries at appropriate intervals; they cannot be entered automatically each time you close an entry screen. In addition, the program has a data-saving facility that maintains data integrity should the system crash before posting. Unlike Simply Accounting's fixed 12 periods, AIP allows you to choose either a 12- or 13-period fiscal year, and the entire year's books remain continuously open so that you can make entries in any period. Unlike atOne and other programs that allow more than a year's worth of periods to remain open, AIP entries are confined to the current year. And, AIP does not allow you to lock designated periods to prevent entries in the wrong month.

(continues)
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Although the terms *debit* and *credit* appear occasionally, the program demands little bookkeeping knowledge outside of the training provided in the documentation and tutorial.

**Making AIP Entries**

A/R and A/P entries are made from either the Journals or Forms submenus. Any A/R or A/P entry that affects Inventory must be made from one of the electronic forms in the Forms submenu—an Invoice (for A/R sales), a Credit Memo (for returns), or a Purchase Order (for A/P items purchased for Inventory). There is also a fourth form for preparing, printing, and storing job quotations or estimates.

When you access the invoice form, you enter the customer ID, which can be either made up of letters, numbers, or a combination (see “AIP’s Electronic Invoice Form”). If you press Tab or Return in the ID field, a list of customers appears; you can click to select one. (You can also call up the Lists submenu, type the first few letters or numbers of the ID, and hit return; the program selects the closest match.) AIP fills in all billing and shipping information, along with any default information such as credit terms.

You can also use a scrolling list to pick inventory items to be shipped and billed. If there’s a problem with a selected inventory item—such as insufficient stock to fill an order—AIP alerts you. The program also tracks customer credit limits, warns you of sales over the limit, allows you to override the credit limit or cancel the order.

The program allows either balance-forward or open-account billing and provides separate forms for billing (or crediting) for merchandise or services. The Inventory module allows you to bundle separate merchandise items into a single inventory item that can be billed at a discount. The A/P module works in a similar way to prepare Purchase Order forms for vendors; it adds items to inventory.

You also make A/P, A/R, and General Journal entries—such as preparing a General Journal adjustment or recording a cash sale—from the Journals submenu, but these entries do not affect inventory activities. You also enter customer payments, credits, and refunds, and print customer statements at the end of each period from the Journals submenu.

**AIP’s A/R Module**

AIP’s A/R module automatically calculates finance charges and early-payment discounts and allows partial payments on account. Simply Accounting’s A/R does not. Also, AIP allows direct printing of checks from the GA, while Simply Accounting doesn’t.

**Payroll**

The new integrated AIP Payroll module is similar to Simply Accounting’s, but AIP’s allows up to 50 defined deductions instead of only 3, and adds sales-commission tracking. You maintain the Employee list (like the Inventory, Customer, and Vendor lists) from the Edit submenu, where you add, delete, and update records. You can override individual items or deductions. Unlike MultiLedger’s Payroll program, AIP posts hours to the employee records rather than in a single screen.

If you keep books for a small business with constantly changing employees and employee hours, you would be better off with MultiLedger (although you would lose job costing). If your work force and its hours are fairly stable, however, the Accountant, Inc. Professional process should present no problems. AIP provides all the necessary payroll reports, such as 940, FUTA, and SUTA, along with standard reports such as check registers, earnings summaries, and pay-period summaries. You can also print employee W-2 forms at the end of the year.

Following what appears to be the current trend in bookkeeping programs, AIP provides payroll-tax update programs each year for $95 (a discount certificate is provided for the first update). I hope MultiLedger’s Payroll program, which allows the user to update tax tables, will inspire other publishers to do the same or at least give them that option.

**Other Features of AIP**

Neither Simply Accounting nor AIP allows you to create true custom reports, but AIP does offer far more kinds of reports and limited customization. AIP also provides detailed reports on such things as which customers are ordering what inventory items, what inventory items are low, when did a customer last place an order, and what is his or her available credit. AIP can produce detailed reports on posted data that give you a much better audit trail than Simply Accounting. In addition, AIP lets you export reports to a word processor, spreadsheet, or database.

AIP offers Average or LIFO valuation of Inventory compared to Simply Accounting’s Average method only. AIP provides horizontal password protection, which restricts certain users to specific segments of the program.

**The Bottom Line**

AIP is a full-featured and comprehensive bookkeeping program that does a highly competent job of managing the books for a small business. The documentation is thorough. With AIP, Softsync includes a HyperCard tutorial stack, along with six sets of sample Charts of Accounts representing a variety of retail, service, and manufacturing businesses. The program, unfortunately, lacks the smooth and well-integrated Mac interface of a program like atOnce. The slick atOnce, however, does not offer integrated Inventory control.

In a nutshell, AIP offers you a direct alternative to the comparable but somewhat lower priced Simply Accounting. And Softsync has expanded Accountant, Inc. Professional to provide a much wider range of features and capabilities, thus justifying the price differential.—Alan L. Slay

*See Where to Buy or circle 701 on reader service card.*
Six Simple Steps To Create Your Own Software

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2. **Launch the Program…**
   - Launch the Serius application, then start your work.
   - You build your programs by clicking and dragging object-based icons.

3. **Choose the Objects…**
   - Objects are completely operational, bug free parts of applications. Simply choose which ones you want in your program by dragging them from the library palette.

4. **Edit the Objects…**
   - Once you have chosen the objects, simply double-click on each object. Windows and dialogs appear that allow you to set up the objects. The Animation Object is shown here.

5. **Connect the Functions…**
   - The functions instruct your program how to operate. Connect functions to a Button Object, for example, instructing your program what to do when the button is pressed.

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Watch this corner for information about the Serius Object Library.

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- Palette
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- Sound
- Terminal
- Text
- Window
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**New Objects for August-October:**
- Database 3.0
- Workstation 3.0
- Application 3.0
- Word Publisher
- Spreadsheet
- Graph
- Page Layout
- Bundle

**New Objects for November-December:**
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- Cash Register
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Circle 423 on reader service card
The object of the game is to successfully convey as many pieces as possible to the bottom of the well. When a complete line of eight squares is formed, it disappears, and the adjacent row fills in the space it leaves, as in Tetris. Your score depends on how many lines you make, how fast you move the pieces, how high you drop the pieces from, and other factors.

At the first level of difficulty the pieces travel down the walls at a steady pace, giving you enough time to figure out how to position them. Keyboard commands move and rotate the pieces. You choose between two move modes: one moves the pieces up and down, right and left; the other moves the pieces clockwise and counterclockwise. Using the default mode (up/down, right/left), it took me a long time to get the hang of moving around the walls—you have to switch from using the left-to-right keys along the bottom and top walls to using the up-and-down keys on the side walls. As hard as it is to explain or comprehend in words, it's even trickier to actually do. The clockwise-and-counterclockwise move mode seems more straightforward and intuitive.

At first it's relatively easy to fill in spaces on the grid. But it takes a lot of concentration to figure out where a piece is going to end up—and often there are two or three ways to get a piece into a particular space. Just to make things more complicated, if a piece is straddling a corner when it hits bottom it splits into two pieces, each of which zooms off in a different direction. Both of the pieces travel until one of them hits an obstruction; you have to think fast to figure out where they will stop.

As you continue to play, the pieces fall faster and faster. When the bottom of the wall is obstructed and a falling piece comes to rest entirely or partly on the wall itself, the wall turns white and becomes inactive—no new pieces will fall down that side, and movement along that wall is prohibited. A blocked wall is reactivated after three successive pieces (from the remaining walls) have been placed correctly. If all four walls become obstructed, the game is over. The game also ends if pieces are stacked to the top on one of the walls.

Welltris shares one annoying habit with Tetris. At one point—suddenly—just a few pieces from the simplest beginner's level, the game starts going too fast and the pieces fall with unmanageable speed. Within seconds most players are vanquished! I never got very far past this point (it has taken me about a year to progress past the comparable point in Tetris). A portrait of a beaming Alexey Pajitnov appears on screen just when the game gets near impossible (around 7500 points).

This is a tough, demanding game. I don't see it becoming a hit on Nintendo Gameboy or in video arcades. But you never know—my 14-year-old son tripled my high score easily on his first try. —Felicity O'Meara

See Where to Buy or circle 871 on reader service card.

Tashkent Is the Capital of Uzbekistan

Welltris uses an interesting quasi-copy-protection scheme. To begin a game, you must first answer a quiz question about one of the Soviet republics whose flags are pictured in the manual. Unless you are a Soviet scholar, and maybe even if you are, you need a copy of the manual to answer the questions. "What is the population of the republic whose flag is shown below?" asks Welltris, adding helpfully "(answer on p. 12 of manual)." Play enough and you will know the capitals and flags, if not the populations, of Estonia, Azerbaijan, and so on.

Welltris my neck hurt—from peering into the well—and the muscles in my right hand and arm were ready for physical therapy. So stand up, walk around the room, stretch between games. I mean it.

And Welltris is worth it. A follow-up to the wildly successful Tetris—which was also created by Alexey Pajitnov, of the Soviet Academy of Sciences—Welltris presents a similar mix of cerebral puzzle and reflex-testing action game, accompanied by folk music and intriguing scenes from Soviet life. While you play, the right side of the screen has a changing slide show of scenery and buildings and even rock musicians. The high-score screen shows a jolly family sitting around a big table holding wine glasses up as if to toast the winners.

Playing Welltris

As in Tetris, arrangements of squares—comprising from two to five squares each—are falling. In Welltris your job is to adjust their orientation as they fall so that they fill in the spaces in a 64-square grid at the bottom of a well. The pieces come into the game by sliding down one of the well's four sides. When a piece hits bottom it scoots across to land on the opposite side of the well (unless progress is impeded by pieces already in the grid).

The object of the game is to successfully convey as many pieces as possible to the bottom of the well. When a complete line of eight squares is formed, it disappears, and the adjacent row fills in the space it leaves, as in Tetris. Your score depends on how many lines you make, how fast you
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Interactive Videodisc Packages

DREAM MACHINE: THE VISUAL COMPUTER

Pros: Provides detailed background information and tools for creating custom presentations; video material is entertaining and educational. Cons: Some clips are incomplete when called up out of context. Company: The Voyager Company. Requires: Mac Plus; hard disk; videodisc interface cable; HyperCard. List price: Videodiscs $49.95 each; LaserStack software $59.95.

MARTIN LUTHER KING JR.

Pros: Videodisc includes a wealth of historical footage; provides hypertext support material and tools for creating custom presentations; documentation includes teaching aids. Cons: Expensive. Company: ABC Interactive, distributed by Optical Data Corporation. Requires: Mac Plus; hard disk with 2MB free space; videodisc interface cable (included for Pioneer LD-V2200 or LD-V4200 model videodisc players). List price: $395.

Videotapes are fine if you want to view a sequence from beginning to end, but they're terribly inconvenient when you want to study just one frame, examine a particular scene, watch a group of nonsequential events, or just skip a few scenes. Videodiscs, however, allow you to do all of these things easily, because they allow random access. They also provide a higher-quality picture using the same kind of optical digital storage technology that gives audio CDs their superior sound. For applications that require nonsequential access to video clips and don't involve recording new information, videodiscs are the way to go.

But the true power of a random access storage device isn't available without a computer to control its logic. That's why the industrial (as opposed to consumer) videodisc players like the Sony 1200 and the Pioneer 4200 have RS-232 interfaces built in. When the appropriate cable connects this port to one of the Macintosh's serial ports, controlling a videodisc can be as simple as navigating a HyperCard stack.

There are a number of products on the market that take advantage of the HyperCard-videodisc connection. Among the best are those from the Voyager Company and Optical Data Corporation.

Dream Machine

Voyager's Dream Machine package is built around a pair of hour-long videodiscs. Volume I: The Visual Computer is an overview of the uses of computer graphics in entertainment, business, education, science, and graphic arts, with behind-the-scenes looks at how many of these powerful images are created. It's a fast-paced, highly entertaining hour of stunning images accompanied by an electronic musical score. Volume II: Computer Dreams is even more electrifying, with less commentary and longer animation sequences.

Because they're designed to stand alone, it's best to view each disc at least once from start to finish. When you're ready to take a second look at the clips, you can use LaserStack, the HyperCard guide and index, to quickly find what you want.

But first you need to connect the videodisc player to the Mac and adjust settings in the stack for player type and baud rate. The next step is to tell the LaserStack, using familiar HyperCard buttons, which disk and which side you're viewing. The rest is completely up to you.

Dream It Again, Sam

If you want to find out more about any of the clips on the disc or view any of the clips again (at regular, fast, slow, or step speed; forward or backward), you can click on the appropriate buttons in the Video Clips section of the stack. You can browse through the clips in order or retrieve them from a Clip Index in which they're sorted either by title or by source. If you prefer, you can see all clips related to a particular topic while listening to the related audio commentary. Or you can use the glossary to learn about a particular graphic technique while viewing video illustrations of that word. The LaserStack software turns the two videodiscs into a customizable short course in computer graphics.

As you're exploring clips, you can click on an icon to add the current clip to your personal video clip list, just as you might note a page number of a book for future reference. Whenever you like you can examine, edit, or print your clip list. What's more, you can show all of the clips in your list in order with the click of a button. Working with a clip list is almost like creating your own custom videos.

Of course, you're limited to the material on the discs; and many of the segments, edited to be part of a video collage, seem to be too short and to end abruptly when pulled out of context. Still, the possibilities for teachers and students are staggering.

News, Interactive

Unlike the Dream Machine videodiscs, the discs in the ABC News Interactive series are designed specifically for use with the accompanying HyperCard stacks. ABC's Martin Luther King Jr. package is a good example of the ways computer technology plus video archives can bring history to life.

(continues)
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The HyperCard stack is a series of picture menus that enable you to use a mixture of film clips, still photographs, maps, and documents to explore King's life, times, work, philosophy, and impact on civil rights in the United States. The disc is divided into several sections, each of which is controlled by a HyperCard picture menu.

After hearing an optional audio overview by Ted Koppel, you are free to explore the disc. Listen to a portion of a speech on the philosophy of nonviolence, for example, then read the accompanying HyperCard screen about King's visit with Gandhi in India, then bring up a map on the video monitor showing the two endpoints of the trip, and so on. Listen to part or all of the "I Have a Dream" speech on the TV while following the text on the Mac screen. You can also take notes on the Mac for future reference. Put together your own minidocumentary from the wealth of materials packed on the disc, and then have them play back in order. You can even switch to the second audio channel, which translates everything to Spanish.

Once you become familiar with the stack's icons and its hierarchical structure, you'll find this package easy to master. My 12-year-old son put together an impressive video collage after just a couple of hours.

Adob e Type Reunion
Adob e's new Type Reunion is an INIT that groups all available styles of a font by familiar name in a hierarchical menu. This not only drastically reduces the size of the font menu, but makes it much easier to see and select the exact style you want.

Many typefaces are available in more than the basic plain, bold, italic, and bold italic styles; some have ten or more different styles of varying weights. Until now, Ad ob e's convention of beginning the name of each variant with an abbreviation representing its style has made it impossible to tell at a glance which font styles, and how many, are installed. For example, the bold versions of Adob e fonts are all preceded by the letter B and are listed together on the alphabetized font menu, regardless of the base font's name. Say you have tons of fonts installed, and you want to change Americana Bold (listed as B Americana Bold) to Americana ExtraBold (XB Americana ExtraBold). You'd have to scroll from one end of the menu to the other, assuming that Americana ExtraBold is indeed available.

Type Reunion reunites what Adobe's naming convention has rent asunder. If you want to select a particular weight of Avenir, for example, you just scroll to the Avenir entry, and select the style you want from Avenir's hierarchical menu (see "Style Hierarchy"). Type Reunion is even smart enough to order styles by weight, with the heaviest on the bottom.

Type Reunion, however, poses a few problems of its own. It won't list styles contained in font families that have been merged using utilities such...
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as Fifth Generation Systems’ Font Harmony (bundled with Suitcase II) or AlSoft’s Font/DA Utility (part of Masterjuggler). So getting the full effect of Type Reunion requires unmerged font files. As a result, many power users who jumped at the opportunity to shorten their font menus by merging font files are now faced with the daunting prospect of creating new, unmerged files of hundreds of fonts. The task is probably worthwhile, though, because Type Reunion consolidates all styles of a font, not just the standard four, and shortens font menus more thoroughly than merging does. And by selecting styles through Type Reunion’s hierarchical menus, you never have to worry about choosing a style that’s not really there. If necessary, you can still apply standard styling commands to text (handy if you want to change the base font of a document quickly, without finding and changing the font for every instance of bold or italic text, for example).

Type Reunion causes a slight delay whenever you select a menu from the menu bar, even if it’s not the font menu. You can bypass Type Reunion and access the standard font menu at any time by holding down the Shift key as you select the font menu.

Fontina
Where Type Reunion makes using multiple fonts easier by shrinking the font menu, Eastgate Systems’ Fontina version Albuquerque 12 (the company uses names, not numbers, to label versions) does it by enlarging the font menu from a single column to as many columns as are necessary to fit all the available font names onto the Mac’s screen at once (see “What You See Is What You’ve Got”). No scrolling is necessary—you just drag the cursor to the font you want to select.

Fontina is a combination INIT and cdev. You drag it into the System Folder and restart to activate it, then use the Control Panel to configure it and turn it off or on. You can display the menu in any font and at 6, 9, 10, or 12 points—and if you have hundreds of fonts, you’ll want to select the smallest size you can read. The standard Apple bitmap fonts generally work best; Geneva is particularly legible at small sizes.

Like Type Reunion, Fontina lists all available styles of a family together, but without the hierarchical menus. This family grouping is not available in certain temperamental programs, such as Microsoft Word.

Fontina displays all active fonts at once, narrowing every column, adding more columns as necessary, and truncating the display of each font’s name. This could be a problem as names proliferate, except that as you drag the cursor over the menu, Fontina always displays the full name of each font at the top of its list, both in the selected font and in its own font, so you can get a preview of each one.

MenuFonts 3.0
Dubl-Click Software’s MenuFonts 3.0 is the latest version of one of the earliest enhancements to the Macintosh font menu. Like Fontina, it’s an INIT and a cdev, but MenuFonts doesn’t affect the size of the font menu, merely its appearance. The cdev lets you specify the exact font and size used to display the name of any font in the menu—usually its own screen font, so you know what a font looks like before selecting it (see “MenuFonts”). You can, however, change the display for letterless fonts like Zapf Dingbats. You can also configure MenuFonts to display a submenu of a selected font at sizes from 9 to 24 points.

MenuFonts 3.0 is compatible with most applications; you can use the cdev to deactivate it if you encounter any problem applications.

Decisions, Decisions
All three of these products are reasonably priced. MenuFonts, while making the menu prettier, doesn’t solve the problem of overly long menus with dispersed font-family members. If typographical niceties are your prime consideration, Type Reunion is the obvious choice because of the way it brings order to the most chaotic font menu and clearly presents a font family’s relative weights. For the rest of us, Fontina is probably the choice. It combines font-family names, although not quite as elegantly as Type Reunion, and displays font names in their own screen font without MenuFonts’ many configuration options. Fontina lets you see at a glance everything that’s available to you, and it enables you to select any font with a minimum of mouse travel.

Because Type Reunion and Fontina are reasonably priced and are compatible with each other, you might want to use both together. If you do, you can select Type Reunion’s font menu and, by holding down the Shift key, also be able to use Fontina’s menu. It’s the best of both worlds.

—Eric Taub
See Where to Buy circle 704 (Adobe Type Reunion), 743 (Fontina), 814 (MenuFonts) on reader service card.
What a wonderful time to be a human being. First, they tear down the Berlin Wall. Then, Macintosh ® becomes one of the most powerful personal computer systems in the whole world. What a great way to start a decade. Humanity is in vogue. Glasnost is in the papers. And the computer for the rest of us has become the computer for all of us. Scientists, engineers, teachers and students. CFOs, CEOs and CPAs. The sales force and the secretarial pool. Anywhere you find people who prefer actually getting things done instead of figuring out rigid, intimidating computers. Which is to say, almost everywhere.

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Of course, the best way to understand the power of Macintosh is to sit down and use one.

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FILE FORCE 1.0.1

**Pros:** Good examples, tutorial, and manuals; good networking features; easily customizable, with a variety of programming facilities. **Cons:** Still more complex than flat-file database managers.

**Company:** ACIUS. **Requires:** Mac Plus; System 6.0.3; hard disk. **List price:** $395.

4th Dimension is probably the best-known Macintosh database. Part of 4D’s fame, however, is its reputation for complexity; it has never been a first choice for database novices with simple mailing-list chores, for example. With File Force, ACIUS hopes to reach a wider market of users who don’t require all the facilities and complication of 4D, but who need a networkable, relational database.

**4D Lite**

Is File Force the long-awaited “4D Lite”? That depends. At one level, it can be used as a straightforward list manager, and there’s a mailing-list example that can get you started right away. If you use the program only in this basic way, however, you’re not getting much for $395. At another level, you can make File Force perform a dazzling array of automated custom functions, but you’ll have to study the manual’s section on “passing values to global procedures using special local variables.” Used this way, File Force gives you your money’s worth, but it’s unlikely that nonprogrammers will be able to puzzle out all the nuances of advanced usage.

**Goodies**

ACIUS’s experience as a Mac database vendor clearly helped design this product. Simply because a relational database with separate data files and structure files takes more planning than a flat-file one, relational databases tend to be a more formidable challenge for beginners. ACIUS has helped flatten this barrier by providing a set of example databases that cover most common applications, from mailing lists and invoices through expense reports and phone messages. Many database chores can be handled directly with these examples or through a few easy extensions. To keep you happy at the entry level, the program has one of the nicest label-making facilities ever included in a mainstream database product (see “Playing Tag”). If you intend to graduate to a relational database from the flat-file manager you are now using, you can import existing files into the examples (with a bit of tailoring) and may never need to do anything fancier than this.

If you want fancy, File Force can provide that too. Sample layouts to use or modify are also provided in profusion, including multipage data input and output. A palette of drawing tools lets you customize output forms. Forms can include not only the expected PICT files as fields but 8-bit color pictures as well. Output and data reporting are both enhanced by the availability of eight types of File Force-generated graphs, updated with each change in data. Since you can write scripts to automate common functions (validating data entry on input layouts, for example), File Force offers not only buttons for running the scripts but a selection of nifty clip art buttons. There are also Global, Layout, and File procedures, produced with a procedure editor that contains the equivalent of a menu-driven modern programming language.

**Sure and Fast**

File Force has two more desirable traits: there’s a complete security system and respectable search-sort speed. Security proceeds through Designer, Administrator, Owner, and User/Group levels, defining authority to change data, layouts, report forms, and passwords on a multiuser system. As a network product File Force is perfectly straightforward, requiring only that you buy a copy of the program for each participating Mac and keep your data files on the network server (and structure-file copies on each local hard disk).

File Force 1.0.1 posted faster results on most types of searches than 4th Dimension 2.0 itself, although 4D version 2.1 will use the new database-engine tricks already included in File Force. This means, approximately, that simple searches over 1000 records take four to six seconds, depending on the data. Curiously, complex searches using logical conditions and “contains” instead of the equal sign (=) were as fast or faster. Users who are accustomed to the nearly instantaneous search results seen in the leading flat-file managers (FileMaker II, Panorama, Microsoft FoxBase+) may find this poky, but it means that throughput won’t be a serious problem except for data files larger than 20,000 or so records.

**File Under...?**

Most Macintosh users who want a database for a single computer don’t need all the features of a relational database. Conversely, Mac users at large corporations will find that a relational database like File Force doesn’t offer enough (there’s no way to program connectivity, for example). File Force is an appealing package for a small office with three to six connected Macs. At this level, a relational database is important; but simplicity is equally important in practice, since there usually isn’t a programmer available. Unfortunately, there is probably a certain population of 4D purchasers in this small-office setting that would have been better served by File Force, if it had been available. Although ACIUS can’t make the inherent conceptual work of relational-database design disappear altogether, the examples, tutorials, and documentation in this package make you believe you’re more likely to succeed in automating a small-office work load with File Force than with its big-brother 4D or with 4D’s competitors.

—Charles Seiter

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Suitcase II: A Matter of Being In the Right Face At the Right Time

Suitcase II is the award-winning software that gives you unlimited access to all your fonts and desk accessories, all the time. Without having to use Font/DA Mover to install and deinstall them. Without cluttering up your system file.

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ON LOCATION 1.0


Information is useless if you can't find it. As hard disk capacity has increased, being able to locate data on the disk has become more difficult. And often, finding files just isn't enough; you need to find text within documents. On Location, the first product from On Technology, is a desk accessory that finds files by name and finds text in files, at speeds that are nothing short of incredible. And once it finds what you're looking for, you can view, copy, and print the document from the DA.

Setting up On Location is easy. You simply copy three files and a folder into the System Folder on the hard disk and use Font/DA Mover to install the On Location desk accessory. You can, if you prefer, access the DA with Suitcase II or MasterJuggler. Restarting completes the installation.

After opening the On Location DA, you select Create Index from the On Location menu. First-time index creation can take a fair amount of time, especially if you have more than one hard disk. The program indexed files names and text in files on my 140MB hard disk (133MB used, 1,505 files in 187 folders) in just under 33 minutes. The size of the index was 438K, well under the 2 percent index size On Technology says is typical (partly due to the fact that there are more applications than documents on my disk).

Zeroing In

You can choose to search for file names or for the text in files. If you don't enter any search text, On Location finds all files; but as you enter search criteria, it narrows the search with each keystroke. You can further narrow the search criteria using pop-up menus; when searching for files by name, you can search for files that contain, match exactly, start with, or end with the search criteria. When searching for text in files, you can tell On Location to look for exact matches or text that matches the root of the search text. This feature usually worked well, but it could use some improvement. When I searched for run with root matching, On Location found files that contained running, but not files that contained run. Past-tense forms of words were usually missed by the root-matching option. The program never took more than a few seconds to find by file name, and searches of text in files were invariably complete within ten seconds.

As On Location finds files, it adds the results to its own file list. Double-clicking on a file in the file list opens a View window that shows the contents of the file, which can be copied to the Clipboard. You can also find other text within the View window using the Find and Find Next buttons. On Technology has licensed Claris Corporation's XTND file-reading technology, which allows you to view the text in the original fonts and styles, whether or not you have the application that created the file. On Location ships with file readers for 14 Mac and IBM-PC applications; text from other applications is displayed in 9-point Geneva. From the file list, you can also print, copy, move, delete, and rename files and create new folders.

Interface Wars

Despite its ease-of-use, On Location is certain to annoy Macintosh-interface purists. It uses window, button, and dialog-box treatments that remind us of the Next computer system. What's worse, by creating its own windows and buttons, On Technology has made On Location incompatible with some common utilities. For example, my Page up and Page down QuickKeys don't work with On Location's nonstandard scroll bars. User-interface innovations should be applauded when they result in bringing better ways of doing things to the desktop, but On Location's interface is a triumph of style without any added substance.

Finding Faults

On Location has a few minor quirks that should be addressed. The current version doesn't always find numbers, although combinations of letters and numbers seem to work fine. Automatic updating of indexes in the background is designed to occur when the Mac isn't busy. Unfortunately, the program's definition of busy includes only keyboard use, mouse movements, and times when the menu bar is highlighted (some applications highlight the File menu while printing, for example). Serial-port activity isn't taken into account by On Location. So if you're using a modem to download information when On Location begins updating automatically, the transfer speed is significantly reduced—costing you time and money. It's possible to turn the Autoupdating feature off, but doing so before every online session is inconvenient. On Location should check to see if serial ports are in use before it begins background operations and delay updating if they are.

Like many other new programs, On Location's performance suffers in slow-memory environments. Creating indexes and autoupdating on a 1MB Mac can be very slow, although finding files is acceptably speedy. Apple has stated that 2MB of RAM will be required to use the upcoming System 7.0, and it is apparent that many software manufacturers are already optimizing their programs for Macs with more than 1MB of RAM.

Stacked up against On Location's strengths, however, these problems are not terribly important. It's an inexpensive utility that's easy to use and works exceptionally well. It far outdistances its competition in speed, does things that no other utility does, and brings the functions of several utilities together in one well-thought-out package. — Tom Negri

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As CD ROM gained in popularity, Apple continued to play through just line. As it is now, the only easy way to tell that the drive is on is by pushing a CD into the unit; if it slides in easily, the drive is on. The drive has no preamp audio-out jacks; so to use the drive as an audio CD player, you have to use speakers or an adapter with your headphones.

There are two SCSI connectors on the rear panel, the drive is not terminated, and the SCSI ID can be changed via DIP switches. The drive requires an expensive ($130), separately priced Macintosh compatibility kit, which consists of the driver software and the necessary SCSI cables.

Toshiba doesn’t write its own software drivers, it purchases them from OMI. The version I reviewed, 1.2, worked fine for the most part, but has a bug that prevents it from seeking and accessing a portion of an audio CD longer than one hour. The driver ignores requests to seek to positions higher than 60000; although if you start playing before the 60000 mark, it will continue to play through just fine. Another drawback of the 1.2 driver is that it will not mount a CD ROM as an AppleShare volume. At press time Toshiba had promised to ship a bug fix by fall.

The Toshiba and CD Technology drives share the same Toshiba drive mechanism, and this mechanism is the winner in speed tests among currently shipping CD ROM drives, easily beating drives from NEC and Apple. An average hard disk, however, delivers access times of 28 milliseconds; a blazingly fast CD ROM unit’s access time is measured in hundreds of milliseconds. I used two simple, real-world tests; copying a large (4MB) HyperCard stack to a hard disk, and opening the same stack from the Finder. I did each test several times, with the Mac’s RAM cache turned off.

CD Technology Porta-Drive T3201
As its name says, the Porta-Drive is designed to be carried with you. It’s the smallest and lightest of the three drives tested, partly because the AC power supply is a separate box that you plug into the drive’s rear panel.

The Porta-Drive shares the same drive mechanism as the Toshiba, hence the same performance figures. However, the Porta-Drive comes with a later version of the OMI software driver (1.3), which allows it to randomly access an audio CD longer than 60 minutes and fixes the AppleShare problem. At press time, CD Technology stated that it plans to revise its drive hardware to include stereo preamp jacks, a push-button SCSI-ID setting switch, and a power indicator.

Disappointingly, CD Technology sells the SCSI cable and terminator separately for $40, rather than includ-
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Oh, yes—where's the proof positive? This complete page is peppered with it. (Scanned and separated by the Nikon LS-3500 from a photo shot by Michael Pruzan with a Nikon camera.) Impressed? Phone or write for complete details: Nikon Electronic Imaging, Dept. EB-1, 101 Cleveland Ave., Bayshore, NY 11706, (516) 222-0200 Ext. 324. Or call 1-800-NIKON-US for the dealer nearest you.
ing it with the drive, although driver software is included with the player. An optional $200 battery pack and a $60 carrying bag are also available.

The $895 Porta-Drive is offered in a bundle with the Microsoft Office CD ROM for another $400. The CD ROM includes Microsoft Excel, Word, PowerPoint, and Mail, plus an extensive HyperCard-based documentation system, a complete set of Adobe screen fonts, and megabytes of other goodies (see Macworld, Reviews, June 1990.) Microsoft Office lists for $949, so bundled with Porta-Drive it’s a great deal. CD Technology has extended this offer indefinitely but could change this policy at any time, so check with the company before you buy.

NEC Intersect CDR-72

The NEC CD ROM drive is nicely designed, with a front-panel headphone jack and a rotary volume control that’s much more convenient than the three-position volume switch on the other two drives. It also has a power switch and a power indicator on the front panel. The rear panel sports audio-out jacks, a switch to set the drive to accept either 110 or 220 volts, a set of DIP switches that set the SCSI ID, and the two SCSI connectors. The drive is not terminated.

NEC, however, sells the driver software necessary to use the CD as a drive, although the NEC driver also supports Apple’s Audio CD Access INIT and CD Remote DA.

The NEC drive was quite a bit slower than the other two, taking twice as long to open my HyperCard test stack (the Communications stack from Broderbund’s Whole Earth Catalog CD). NEC’s stack-copying speed was also slower than the other drives’ (see “CD ROM Drives Compared”).

The Final Spin

The state of the CD ROM drive market seems to be much like that of Macintosh hard disks a few years ago. Because there aren’t that many to choose from, manufacturers can get away with charging extra for required components like driver software and SCSI cables. And prices for these drives are still high.

The NEC drive wins points over the Toshiba and CD Technology units for its better audio facilities, but falls to the rear of the group because of its slower speed and expensive “optional” software. The Toshiba and CD Technology drives are both good units, but I’d pick the CD Technology unit if a nose because it’s less expensive, can be made portable with the accessory battery pack, and takes up less space when it’s on the desktop. And if you need the applications in Microsoft Office, the Porta-Drive’s bundling offer makes it an excellent value.

—Tom Negri

See Where to Buy or circle 715 (CD Technology PortaDrive), 819 (NEC Intersect CDR-72), 859 (TXML-201A1 Mac) on reader service card.

CD ROM Dictionary

WEBSER’S NINTH NEW COLLEGIATE DICTIONARY, CD ROM EDITION

Pros: Contains complete text of Webster’s Ninth New Collegiate Dictionary; plays recorded pronunciations for all words in main dictionary, networkable (with multiple copies or site license). Cons: Does not operate with word processors; requires 770K MultiFinder partition; poorly designed, often frustrating interface.


Like everyone else who’s shelled out some money for a CD ROM drive, I’ve been waiting for a product that justifies all the hype (and expense). In my case, I keep looking at my volumes of writer’s reference books and wondering when I’ll be able to replace them with a single, well-designed, carefully integrated CD. Thus it was with some anticipation that I received the Webster’s Ninth New Collegiate Dictionary, CD ROM Edition. Although the disc is the electronic equivalent of just one reference book, it is the first complete dictionary for the Macintosh in any medium, and I was eager to see how well it fulfilled its CD ROM potential.

Webster’s Ninth

Webster’s Ninth is composed of the CD ROM disc itself and the engine that runs it. The disc contains an exact copy of the print edition of Webster’s Ninth New Collegiate Dictionary, published by Merriam-Webster, with complete entries (including pronunciation, etymology, definitions, and examples), all illustrations and tables, a style manual, a list of U.S. and Canadian colleges and universities, and dictionaries of abbreviations, geographical locations, foreign words and phrases, and biographical information, plus recorded pronunciations for the words in the main dictionary. All of this is quite a bit more than the nearest competitor in Macintosh online dictionaries, Deneba’s Spelling Coach Pro.

(continues)
Dr. Productivity Says:

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"Reviewers have spared no keystrokes in praise of QuicKeys."

"MacUser gave QuicKeys a four-mouse rating and an Editor's Choice Award. Robert Wiggins, of MacUser, says 'It could send your mouse to retirement.' MacWorld named QuicKeys as one of the Goodies You Can't Be Without. MacGuide readers awarded it the Golden Gavel. Byte says, 'QuicKeys is right up there with sliced bread, the Great Pyramid of Cheops, and other wonders.' The raves go on and on."

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fessional, which contains no pronunciation guide (written or spoken), etymology, or examples. On the other hand, for about the same price, Spelling Coach Professional includes a name-brand, online thesaurus and spelling checker.

The engine that puts Webster's Ninth on screen and plays the recorded words is a stand-alone application provided on an accompanying floppy disk. Your print dictionary doesn't force you to clear everything off your desk each time you use it and neither should an electronic dictionary, but this one does. If you are running under the Finder, you must quit the program currently running and launch the dictionary just to look up a word. If you are working under MultiFinder, you can run the dictionary as well as other programs and switch between them. But since Webster's Ninth requires a remarkably greedy 770K, your Mac must have at least 2MB of RAM to be able to run it.

Poorly Designed
The main window of Webster's Ninth is a two-column listing of the words—without definitions—in the currently selected dictionary (the main dictionary or any of the secondary dictionaries). You can thumb through the list page by page (as if browsing printed pages) in any of the dictionaries. You can also skip forward or back to the start of a specific letter in the main dictionary. Although the main window may be useful to browsers and encourage the kind of discoveries that often occur in print dictionaries, it is poorly designed: there is no indication anywhere of which dictionary is in view (you have to figure it out from the words in the list); the window itself cannot be moved, resized, or closed; you cannot skip to a specific letter in any of the secondary dictionaries, which makes word lists for these dictionaries difficult to flip through quickly; the biographical dictionary lists only last names; and in standard-size type (you can set the program to display all text windows in standard or large type) there's way too much wasted space.

The definitions themselves are stored in separate windows. To open a definition window, click on a word in the main window or use the dictionary's Find command. It can search one or more dictionaries in a single sweep and can recognize irregular verb forms (it will tell you to look up see if you ask for saw, for example). But surprisingly, if you enter an incorrectly spelled word, and frequently if you ask for a regular verb form such as searched instead of search or the plural form of a noun, Webster's Ninth won't even hazard a guess. Instead, it merely scrolls to the word-list page containing the closest match and leaves the rest up to you. Also, the Find command searches only for words in the main word-list window; it won't search for words contained within a definition (such as all entries with success in the definition) or for etymology (such as all words based on machina).

When a definition window opens, the Mac plays the recorded pronunciation. If a table or illustration is connected to the entry, separate windows for these open as well. Illustration and table windows can be resized; but when you zoom in on them, they fill the entire screen and cover the definition window.

You can click on any word in a definition and use the Find command to open its definition window (see "The Definition Window"). Also, you can copy and paste any illustration and part or all of a definition into another application (a copyright notice is added automatically where you paste). However, you can open only one definition window at a time, and although you can easily move to the next or previous definition in the word list, there's no trail to take you back through previously opened definition windows.

You access the many explanatory sections in Webster's Ninth via the Reference menu (and its rather daunting array of submenus and subsubmenus, each of which is displayed in a separate window). Reference-section windows are not resizable, however, and since the scroll bars in both reference and definition windows do not operate correctly, you can scroll only by line, not page by page.

Reference Toll
All told, I found Webster's Ninth to be a significant disappointment. After all, the print edition costs less than one-tenth the price of the CD ROM version, contains the same text, tables, and graphics, is highly portable, doesn't require electricity, a Mac, or a CD Rom player, and can always be used with my word processor. Against these indisputable advantages, the CD ROM version must offer significant benefits of its own.

The recorded pronunciations clearly distinguish the CD ROM from the print version, but they are not, for me at any rate, anywhere near enough. And not only does Webster's Ninth not offer other major advances over the print edition, it doesn't even have features typically found in less expensive, more modest programs, such as resizable windows, efficient use of RAM, a well-designed Mac interface, and the ability to work within word processors and guess misspelled words. Until its many deficiencies are rectified, I'll save my money and continue to wait, either for a significantly improved Webster's Ninth or for the CD ROM version of the Oxford English Dictionary.—Robert C. Eckhardt

See Where to Buy or circle 870 on reader service card

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The Definition Window
A definition window in Webster's Ninth opens atop the main word list. Definition windows are relatively narrow and, frustratingly, cannot be resized; you must scroll through long definitions to see them in their entirety.
FileMaker Pro
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Mac Label Pro
( Avery ) Avery labels just got “Mac Easy.” Now you can transform your Mac into a “Label Publisher.” Features include: Preset layouts for numbered labels; easy mail merge and graphic importing. $49.

Vocabulearn
( Penton Overseas, Inc. ) The ideal language learning tool. Vocabulearn stores the building blocks of language in versatile, interactive hypercard stacks to make language learning both simple and exciting. Includes 290 minutes audio cassettes, over 500 useful words & expressions and Hypercard V. 1.2. Available in five languages and two skill levels...Bravissimo Vocabulearn! French, Spanish, German, Italian $35 ea. Japanese $35.

NEW! The DataDesk Switchboard
(Datadest International) The first user-configurable keyboard. The Switchboard’s unique, modular design allows arrangement of the Alpha, Cursor and Numeric keypads into comfortable positions best suited for individual computing needs. Additional input devices (trackball, vertical function keys, digitizer tablet & macro keys) replace existing keypads or can be added to the keyboard. Modules available. $175.

Circle 440 on reader service card
**Smart One 9600 bps V.32 modem**

*Best Data* This 9600 bps modem has MNP protocol (levels 1-5) for error correction and data compression (allows throughput up to 19.200 bps). It's compatible with CCITT protocols for transmission rates from 300 to 9600 bps and with the Hayes AT commands. Includes software/cable. Comes with manufacturer's five-year warranty. **$695.**

**Trackball ADB**

(Mouse Systems) Mouse functionality in a fraction of the space. Ergonomically designed for hours of comfort while providing smooth, accurate, cursor positioning. **$69.**

**Little Mouse**

Because it's easier to maneuver a sports car than a bus. Little Mouse combines advanced optical technology with the latest CMOS analog/digital chip design to produce the smallest, lightest, most accurate mouse possible. **$75.**

**Metro ImageBase Electronic Art**

(Metro ImageBase) High-quality 300 dpi electronic art from one of the world's leading publishers ready to use art. Enhance brochures, menus, reports, newsletters and presentations. One large image per file - 100 per package. Packages available: Newsletter Maker, Business Graphics, Computers & Technology, ReportMaker, Borders & Boxes and 9 others. **$85. each.**

**After Dark 2.0**

(Berkeley Systems) After Dark prevents screen burning – and does it with style! In fact any style you like. Choose from its library of over 30 different displays including lightning bolts, meteors, abstract art, crawling worms, a jump to light speed and a basic dimmer. Or use your own artwork to create custom screensavers. After Dark also offers password protection for your screen. **$24.**

**interFACE**

*(Interactive Facial Animation Construction Environment)*

(Bright Star) This new multi-media animation product enables users to create agents for a host of software applications including corporate training, directional kiosk education and softsides. interFACE works with Macromind Director, Wings, Foxbase, 4th Dimension, SuperCard, HyperCard, Media Tracks, MacRecorder, and most construction environments which support external commands. **$249.**

**MacPro Keyboard**

(KeyTronic) The Mac Pro keyboard feels better, lasts longer and offers more features for your money. KeyTronic's new ADB-compatible 105-key MacPro features an enlarged L-shaped Return key and Dual-legend keycaps for faster, more accurate data entry. Includes FREE copy of award winning macro package Tempo II. Backed by a three year Manufacturer's warranty. **$118.**

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This month I review three programs that can lighten teachers' administrative duties.

**EPS Teacher's Assistant 1.1**
During my ten years of teaching, the complaint I heard most frequently from colleagues, besides the antics of the ubiquitous class clown, was about the torrent of paperwork. Teachers typically do not relish entering grades, completing incident reports, keeping attendance logs, or typing formalized lesson plans.

EPS Teacher's Assistant ($99 from Executive Productivity Systems) is a lush set of HyperCard stacks that can lighten the teacher's administrative duties. It has calendars, a memo editor, student record cards, grade and attendance sheets, and an incoming and outgoing telephone log.

When the individual modules of EPS Teacher's Assistant are compared to stand-alone applications that perform the same functions, Teacher's Assistant unfortunately falls a bit short. However, the wide range of applications and, more important, the ability to automatically distribute data through those applications, brings this program to the head of the class.

Appointment listings in EPS Teacher's Assistant can be automatically transferred among the daily, weekly, and monthly calendars, and to-do items can be carried over to future dates. If you can cajole your school secretary into providing the year's events—marking periods, school trips, and so on—in ASCII form, you can paste the data into a Dateplacer field. Then click on the Distribute the Dates button, and all the events are posted to the correct day.

The Classlist stack contains student records, including name, address, emergency telephone numbers, room number, and ethnicity. Aside from the fact that you can sort the student records in different ways, there is nothing remarkable about the Classlist stack in itself. What is remarkable is that you can transfer information from any other stack in EPS Teacher's Assistant into the Record of Contacts, a scrollable field on each student's Classlist card. So if you use the Phone stack to record a call to a student's parent or the Marks stack to record a grade, all the information can be transferred to the student's Classlist card with a few mouse-clicks (see "Incremental Grading").

EPS gives you a wonderful smorgasbord but, like most all-in-one specials, only if you use all the modules. If you need no more than one or two modules and you're not interested in the ability to transfer data, you will be better off with a dedicated grading, calendar, or database application that will probably have more features, be more flexible, and will certainly run faster. (Like most HyperCard applications, EPS School Assistant is slow.)

On the other hand, once you've taken the time to set up this program, it runs like a dream. If your school has yet to relieve you of administrative duties, and if you have a Mac in your office, EPS Teacher's Assistant can greatly lighten your load.

**Grade Machine 3.0**
If your administrative duties are not broad enough for you to need EPS Teacher's Assistant or if you want a more powerful tool for computing and storing students' grades, there's Grade Machine ($49.95 from Misty City Software).

Grade Machine makes grading and attendance record keeping relatively painless by figuring averages, entering comments in reports to students, and translating numeric averages to letter equivalents.

Most of your administrative work is done at the beginning of the semester. You specify the relative weight of each assignment, the number of assignments in each grading period, and the format of reports.

Grade Machine consists of four windows: Scores, Assignments, Students, and Summary. You spend most

(continues)
of your beginning planning time in the Assignments window (see “Tracking Assignments”). For each assignment or test you specify the maximum raw score (total number of correct answers) and how the score should be translated into a percentage score. You enter the students’ raw scores in the Scores window. The program then calculates the percentage score and the student’s class average.

You can also designate up to five categories of assignments, such as lab work, homework, or quiz, and indicate the weight each assignment has in determining the final grade.

The Students window is your roster. You identify each student both by name and confidential ID name or number. The ID allows you to post class reports on a bulletin board and maintain students’ anonymity.

The Summary window lists all students, their total averages, averages by category of assignment, and students’ letter grades.

My only complaint is that although Grade Machine is set up in rows and columns, it lacks rudimentary spreadsheet editing functions such as fill down or copy and paste. And its limited use of Undo can be maddening.

Still, Grade Machine is much better at maintaining grades than EPS Teacher’s Assistant. Teacher’s Assistant doesn’t translate raw scores and will only tally up averages from seven assignments or tests. Grade Machine tracks an unlimited number of scores.

Schools vary in the amount of responsibilities teachers must carry. If you attend committee meetings, make frequent calls to parents, constantly run to the office to look up student records, and have trouble organizing your lesson plans, you should buy EPS Teacher’s Assistant. If, on the other hand, your heaviest responsibility is grading tests and tallying averages, Grade Machine is your best bet.

MakeTest 1.1.1
MakeTest ($149 from Mountain Lake Software) won’t eliminate the need to type test questions, although it does help with formatting multiple-choice and true-or-false questions. Its main advantage is that once your questions are typed, you can easily find, select, and place them into any test.

You enter all the test questions in the Question panel, which contains two fields, a Question Panel and an Answer Panel. You can either type or paste in text and graphics into the Question Panel. If a question is multiple choice, the Answer Panel displays as many alphabetically labeled check boxes as you specify. You type the answer next to each box, signifying the correct response by clicking on the appropriate box. The Answer Panel for true-or-false questions displays two check boxes labeled True and False; you indicate the answer by selecting one. The Answer Panel for other types of questions allows you to type the correct answer in paragraph form.

Using pop-up menus, you specify a topic (you can define as many topics as you want), type (fill-in, essay, true-or-false, or multiple choice), and difficulty (easy, intermediate, or hard) for each question.

Your questions are stored in a Question file. To make a test, you simply select questions from this file using the Test editor screen (see “Creating a Test”). The left side of the Test Editor screen contains the first few words of each of your test questions in a scrollable list. When you select a question by clicking on it, most or all of the text appears at the bottom of the screen.

To include a question in your test, select Add. The question then appears on the right side of the Test Editor screen. Alternatively, MakeTest can randomly select any number of questions for you, by type, difficulty and topic.

The biggest shortcoming of MakeTest is that you cannot see how the printed test will look. You only see a tiny scrollable panel that lists the questions you’ve selected along with the first few words of any headings or instructions. So if you’ve formatted the test using various fonts and alignments on different sections, you’ll have to print out a hard copy to see how the test looks. It’s a shame that such a good program lacks a WYSIWYG interface.

Still, MakeTest provides the best way I have seen to store and categorize test questions. Of course, if you already have a lot of questions in a word processor file, it can take a long time to copy and paste them into MakeTest. An importing capability would be a nice addition. But after the input is finished, creating new tests can be almost as easy as choosing team members in a school-yard softball game.

With MakeTest and either EPS Teacher’s Assistant or Grade Machine, most of your nonpedagogical duties will be automated. Your paperwork time will be reduced, and you’ll have more energy to devote to being creative and more patience in dealing with the ubiquitous class clown.

See Where to Buy or circle 740 (EPS Teacher’s Assistant), 741 (Grade Machine), 817 (MakeTest) on reader service card.
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Circle 34 on reader service card
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

96E4 Mac-Pac
Modem package that consists of the Anchor 96E4 9600-bps modem, Macinterconnecting cable, and Quick Link II communications software. Compatible with all modems that use the CCITT V.32 full-duplex protocol. $995. Anchor Automation, 818/998-6100.

400 DPI Grayscale Scanner
Mac-compatible 400-dpi gray-scale hand-held scanner with a scan width of 4 1/8 inches and can scan a page 14 inches long. Scanner has built-in window for visual scan alignment and has multiple rollers for one-pass scanning accuracy at a scan speed of 1 inch per second. 1MB min. memory. With SC/SI controller $599; with NuBus controller $499. Asuka Technologies, 714/757-1212.

Access 650 WORM Subsystem

CAMM-1 Desktop Sign Maker
Peripheral designed for the vinyl sign-making industry. Supports all Mac models and peripherals: supports graphics and text software such as Adobe Illustrator, Adobe Streamline, Aldus FreeHand, Letraset's Letrastudio, and Broderbund's TypeStyler. Also supports EPS to convert PostScript format to HPGL-format for output. Enables sign to be displayed on the monitor before printing. $4495. Roland Digital Group, 714/975-0560.

Color Presentation System
Bundled system that includes a Sharp JX-750 color ink-jet printer, automatic cut-sheet feeder, Chooser-level driver, and JFT Parallel interface. $2395. Sharp Electronics, 201/529-9500, 800/223-2121.

ColorSpace Plus/SE
Multimedia system for the Mac Plus and SE. Proprietary keying technology overlays black-and-white Mac-generated text or graphics in color on full-motion, full-color, live or recorded composite NTSC or S-Video output. Also supports a variety of output modes user-selectable from front panel switches or through software. $1895; adapter cable $100. Mass Microsystems, 408/522-1200.

DSP and Data Acquisition Card
Self-contained data-acquisition board for the SE/30. Includes a floating-point DSP chip. Runs at 32 MFLOPS and can do a 1024-point FFT (fast Fourier transform) in 2 milliseconds. $2695. Spectral Innovations, 408/727-1514.

FilmPrinter Turbo Slide
Slide maker that can produce 36 slides from Mac screen images in about one hour. Prints each pixel with a 56-bit color resolution and supports the Mac and IBM PC-compatible platforms when used with the appropriate MiruImage accessory software package. $2995. Mirus, 408/944-9770.

ImageScript and 411P Memory
Upgrade boards that enable the LaserJet II to do PostScript printing. ImageScript requires 1.5MB of RAM to operate. 411P Memory add-ons include a 1MB RAM board. 411P Memory $349; ImageScript $595. PCPI, 213/670-5606.

IPLab Image Grabber System
Image processing system that includes a Neotech Image Grabber NuBus board bundled with IPLab image processing software, and technical support service. Images digitized with the system can be ex- (continues)
changed with minicomputers and mainframes without translation. Supports standard NTSC and European PAL video standards. 2MB min. memory. $2099. Signal-Analytics, 703/281-3277.

KX-P 4455 Laser Partner

LView Multi-Mode
19-inch monochrome display system that offers a choice of six different resolutions: 120, 92, 72, 60, 46, and 36 dpi. Has refresh rates of up to 92Hz. Utilities software comes with pop-up menus, screen capture, enlarged menu bar, multiple cursor sizes, and a screen saver. $1999. Sigma Designs, 415/770-0100.

MacPacq Model MP100
Laboratory data-acquisition and control system for the Mac that is designed to replace strip-chart recorders, tape-based data loggers, and oscilloscopes. Can simultaneously record from 16 analog and 16 digital channels. Bundled with software driver and HyperCard interface. $2295. Biopac Systems, 805/967-5615.

Mobius One Page Display
Full-page-size display for use with the SE that contains an accelerator board that doubles the speed of a standard SE. Supports dual screen use so the SE screen can be used to hold desk accessories, open multiple documents, or display tool palettes while you work on the One Page Display. $795. Mobius Technologies, 415/654-0556.

The MousePen/ADB Version
Mouse-like input device that is shaped like a pen. Designed for graphics-intensive applications such as freehand drawing, CAD, and desktop publishing.

NuCarrier System
Data-acquisition system for the Mac II based on the modular I/O concept. Plugs in to a NuBus slot in the Mac. Standard on-board capabilities include 16 single-ended or 8 differential analog-input channels with 12-bit resolution at sampling rates up to 70kHz; 16 digital I/O channels; two in-

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Plus, HP stands behind all their products with exceptional service and support. And a one year warranty. It doesn't get much better than that.

There is a better way.
dependent counters/timers; and a burst generator. $995. Intelligent Instrumentation, 602/624-2434.

NuCarrier System

Pacific MacPage
PostScript emulation cartridge that can be inserted into the HP LaserJet printer to give it Macintosh PostScript compatibility. For HP LaserJet II $795; for HP LaserJet III, III D, III D $599. Pacific Data Products, 619/552-0880.

QuickImage 24
NuBus frame-grabber board designed to capture an NTSC (or PAL) video frame in 1/30 second for use in desktop publishing, technical documentation, creating published material from videotapes, or for creating special artwork effects. Accepts input from any composite or S-Video source. $995. Mass Microsystems, 408/522-1200.

RE0-130 Optical Drive
3½-inch erasable optical drive with a 28-millisecond seek time. Holds 128MB of data and has a shelf life of 10 years. $2995; cartridges $129. Pinnacle Micro, 714/727-3300, 800/553-7070.

SCSI Bus Multiplexers
Multiplexer products for use with fault-tolerant and high-reliability computer configurations to switch between backup peripheral devices. Can also be used to connect up to 21 peripherals to a single SCSI initiator in applications such as production testing, burn-in, process control, and robotics. SM-90/12 $2480; SM-90/13 or SM-90/22 $2840. Ancot, 415/363-0667.

SCSI Dart
RAM disk that contains an embedded SCSI controller and emulates a hard disk drive. Contains 32 slots for memory expansion. Comes bundled with 2MB of RAM and a UPS battery backup system. Average seek time is under 0.1 millisecond using standard hard disk tests. Unit has no moving parts. $3395. Newer Technology, 516/695-4904.

UltraDrive 430S and 430Si
430MB external and internal drives that use the Seagate Wren VI half-height drive mechanisms. Capable of 16-millisecond average access time, GCC Ultra-Ware disk software, GCC Partitions, QuickSpool II, and QuickEnvelope. External $2699; internal $2549. GCC Technologies, 800/422-7777.

VGA Monitor
14-inch VGA-resolution monitor with 31.5 and 35.5kHz horizontal scan (continues)
frequencies and a 45MHz video bandwidth. Compatible with the Mac and IBM PC compatibles. $599. Power II Technologies, 213/697-3969.

SOFTWARE

3D Modeler
Three-dimensional modeling program that enables free-form modeling with handles for editing curves and surfaces, creating smooth surfaces across various cross sections, extruding and lathing at any angle, and autosurfacing with options for handling holes. 1MB min. memory. $595. Visual Information Development, 818/918-8834.

3D Producer
Animation software that is compatible with modeling programs such as Super3D, AutoCAD, MacBravo, and

Accession
Software for managing museum collections. Organizes catalog entries, accession and donor information, and additional nonarchival data. Versions are available for history, natural history, archaeology, geology, and other disciplines. 1MB min. memory. $795; contact vendor for site license. Oak Tree Software, 407/359-5855.

Color MacCheese
32-bit paint application includes anti-aliasing, a translucent Paint feature that lets you set the level of paint transparency, an interactive help function, linear and radial gradient fills, and customizable color patterns. Lets you use 32-bit color with an 8-bit video board. 1MB min. memory. $99. Delta Tao, 408/730-9336.

The Computer Glossary
Computer glossary that defines over 4000 terms for novice computer users.

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HP color printers let you draw splashy color from your Macintosh.

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Print on paper or transparencies with 18 scalable outline fonts. And for shared use, the PaintWriter XL offers AppleTalk, faster speed, and auto sheet feed. For sample output and the name of your authorized HP dealer, call 1-800-752-0900, Ext. 1167.

There is a better way.
Covers personal computing, computer graphics, LANS, and DTP. 1MB min. memory. $59.95. The Computer Language Company, 215/297-5999.

**Earl Weaver Baseball**

Baseball-simulation game with two levels of play, Arcade and Strategic. Arcade mode uses graphics and digitized sound to evoke the sense of an actual ball game. Strategic level enables the player to act as team manager, keeping tabs on injuries, setting pitching rotations, and monitoring the accumulated stats using a built-in compiler. Co-authored by Earl Weaver, former manager of the Baltimore Orioles. 1MB min. memory. $49.95. Electronic Arts, 415/571-7171.

**Flostat**

Entry-level statistical-analysis mapping and graphics software, capable of linking data to maps or exporting tables and graphs to page-layout software. 1MB min. memory. $99. PSRC Software, 419/372-8648.

**Fontina**

Application that displays a multicolored menu for fonts installed in the system, and groups related typefaces where possible. 512KE min. memory. $69.95; 10-pack $295. Eastgate Systems, 617/924-9044, 800/562-1638.

**Ghoster**

Application to produce electronic screen tints in 10 percent gradients for desktop-published documents. Output prints on any PostScript printer. Tint screens are printed in position for black and color-separated images. 1MB min. memory. $29. Sparkle, 619/455-7048.

**If:8 Forms Designer**

Forms-design package. Forms structure consists of cells that automatically stretch or shrink to accommodate text input. 1MB min. memory. $279. SoftView, 805/385-5000.

**Informed Mini-Manager**

Application for filling in forms created with Shana Corporation's Informed Designer. User creates forms with Informed Designer and can fill them in with the information database provided by Informed Mini-Manager. Database supports searching from any field and has multiple printing options. 1MB min. memory. $99. Shana Corporation, 403/453-3330.

**Jack Nicklaus' Greatest 18 Holes of Major Championship Golf**

Golf-simulation game that features 18 holes from courses where the four major championships have been contested. User plays against image of Jack Nick- (continues)
laus that possesses skills patterned after his own game. User chooses Skins scoring or Stroke play. Has beginner and expert level. 1MB min. memory. $59.95. Accolade, 408/985-1700.

**Jack Nicklaus Presents the International Course Disk**
Add-on to Jack Nicklaus’ complete collection. Simulates three internationally known golf courses: one in Japan, one in Australia, and one in England. 1MB min. memory. $21.95. Accolade, 408/985-1700.

**Learn to Speak English**
HyperCard-based English-language tutorial. Includes 36 HyperCard lessons, interactive drills for English grammar, a grammar reference, and cultural notes about life in America. Four native speakers of English read dialogues either on CD or audiotape. Available in CD ROM, audio CD, and cassette versions. 1MB min. memory. CD ROM $249.95; audio CD with 15 discs $249.95; cassette with 15 discs $149.95. The Hyper-Glot Software Company, 615/558-8270.

**List Learner**
Application used to build lists of information on any subject and test recall of that information using flashcard or multiple-choice quizzing. 1MB min. memory. $39.95. Selective Memory, 408/371-5595.

**Mac Headlines**
Volumes of EPS or PICT format headlines. Can be used with word processor or desktop publishing program. Each volume has a selection of titles for holidays, business use, flyers, schools. 1MB min. memory. EPS $19.95 per volume; PICT $14.95. Asgard Software, 703/255-3085.

**Mac Wire Frame**
3-D wire-frame editor. Objects can be moved, scaled, rotated, and viewed from various angles. Includes a developer’s toolbox with complete Pascal source code; data types; procedures and functions used to create the editor program; and the source code used to create the editor program itself. 2MB min. memory. $499.95. Amplified Intelligence, 916/737-1550.

**MailMaker**
Local-area mail utility that lets electronic mail users

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**With the HP DeskWriter, you can**

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*The Paradise Times*

**VOL. 10**

**SPRING, 1990**

**WANDERING TOURS LTD.**

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**This month's featured destination:**

**Akumal**

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**Relax under the long stretches of wind-blow coconut trees which set off the luscious white sands of Akumal's sweeping beaches.**

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send formatted faxes from their desks. Lets the user transmit files created in most Mac applications via data or fax modem. Available in Microsoft Mail and QuickMail versions. 1MB min. memory. Single user $40; five-pack $195; ten-pack $345; twenty-pack $595; fifty-pack $1250. Solutions International, 802/658-5506.

Music Mouse
Application for creating music on the Mac. Supports MIDI and the Mac's internal sounds. 1MB min. memory. $79. Dr. T's Music Software, 617/244-6954.

NanoDisc
Memory-enhancement software that comes bundled with 16MB or 32MB of Technology Works SIMM modules. System enables the Mac to access all available internal memory, expanding accessible memory to 32MB. 1MB min. memory. $1995. The Technology Works, 512/794-8533.

NeuralWorks Explorer
Software tutorial that gives the novice user a method of learning neural-network theory as well as an environment in which to build practical applications. 2MB min. memory. $199. NeuralWare, 412/787-8222.

NeuralWorks Professional II
Neural-network development environment for advanced technology groups and application developers within the neural-network community. Designed for solving problems such as credit card fraud and for insurance underwriting and bond or stock portfolio management. InstaNet feature enables users to access another network from a user-configurable list. 2MB min. memory. $129.95. NeuralWare, 412/787-8222.

PlayMaker
Football-simulation software that re-creates the actions of an 11-man football squad with animated graphics. Allows you to assume the role of head coach and design custom plays and strategies for your team. Can be played individually or over a network. 512K min. memory. $49.95. Broderbund, 415/492-3200.

QuickGIF Plus
GIF decoder that runs three to four times faster than existing utilities and is able to play GIF animated images in real time. Program also has the ability to display PICT images (including 32-bit PICT files), MacPaint, and ReadMac (PC MacPaint) files. Enables the user to create a "slide show" of graphics and sound files within a folder. 1MB min. memory. $30. AmariISoft, 415/455-0424.

On Location
Desk accessory reduces the time it takes to find and view files. Indexes the name and text of files on any volume, and combines digital signature compression technology, Claris/DataViz file translators for displaying text stored in most word processing formats, and automatic background indexing. $129.95. On Technology, 617/224-2545.

The HP DeskWriter printer puts laser-quality printing right at your fingertips.

With a small size and a $995* price tag, the DeskWriter printer easily fits on your desk and in your budget. And its advanced 300 dpi inkjet technology lets you print sparkling text and detailed graphics.

The DeskWriter is also designed for easy use with your Macintosh, and has both serial and AppleTalk interfaces. It even includes scalable and outline fonts. Combine that with the DeskWriter's whisper-quiet operation, and keeping it to yourself will be that much easier. So call 1-800-752-0900, Ext. 1004 for your authorized HP dealer.

There is a better way.
Recognize for the Macintosh

Reflection 2 Plus
Mac-to-VAX terminal-emulation software that emulates VAX model VT320. Works with MultiFinder; comes with command language so users automate functions such as dialing in to hosts and transferring files between machines. 1MB min. memory. $249. Walker, Richer & Quinn, 206/324-0350.

Shapes
Add-on module for Letraset's ColorStudio that adds outline drawing and antialiased rendering tools to the paintbox capabilities of ColorStudio. Enables users to render any object or font as antialiased. 5MB min. memory. $295. Letraset, 201/845-6100, 800/343-8973.

Sound Manager Package
Sound-management application that contains Sound Mover, which allows user to copy, remove, and edit sounds in the System or any other file; and SndControl, which lets you assign a different sound to the start-up beep (as well as to other actions such as disk eject, insert, restart, and shut down) from the Control Panel. 512KB min. memory. $25. Riccardo Etore, 67 rue de la limite, 19970, W-Oppeem, Belgium.

StickyBusiness Plus
Label-designing and -printing software that incorporates bar coding and postal formatting. Enables the user to create, position, size, and rotate bar codes; includes built-in address formats that meet all United States Postal Service standards for addressing business mail to be read and sorted by postal machinery. 1MB min. memory. $170. Williams & Maxis, 509/458-6312, 800/752-4400.

SpeedLink Ethernet Adapters
Ethernet adapter for the Mac II, SE, and SE/30. Board plugs in to existing bus slots to provide transparent connectivity to existing networks using EtherTalk, DECnet, TCP/IP, and other protocols running over Ethernet. $449. EMAC, 415/683-2222.

Studio/32
Color paint program that has all the features of Electronic Arts' Studio/8 and supports 1-, 4-, 8-, 16-, and 32-bit color. Includes a scanner utility; Pantone Matching System; four-color separation utility; three-dimensional perspective; file input and output for PICT, MacPaint, TIFF.

With the HP ScanJet Plus, you've
The HP ScanJet Plus scanner provides 8-bit photographic-quality scanning.

That means 256 shades of gray for the hottest-looking output from your Mac. And it's so easy, too. At the click of a mouse, you can get negative or mirror images, as well as scaling in 1% increments from 4-200%. All for $2,190—about what you would expect to pay for a 4-bit scanner.

So if you want the richest, most detailed images from your Mac, you've got it made with Hewlett-Packard. Call 1-800-752-0900, Ext. 1005 for your authorized HP dealer.

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For all its amenities, ease of use, good image quality and low price, Publish! recommends the HP ScanJet Plus as their 'Best Buy'.
and EPS files; and online help. Requires a 24- or 32-bit color video board for true color display. 2MB min. memory. $695. Electronic Arts, 415/571-7171.

Stufflt Deluxe
Enhanced version of the original Stufflt file-compression utility; includes the Magic Menu Finder Extension for point-and-click stuffing and unstuffing and for electronic mail transmission from the Finder. Has standard and expert operating modes. 1MB min. memory. $99.95. Aladdin Systems, 408/685-9175.

Swivel 3D Professional
3-D sculpting and animation program based on the Swivel 3D interface with increased capabilities such as new smooth shading using a proprietary version of the Phong system; environment mapping, which allows the user to bring in any PICT file as an environment map that can be used to create reflective textures; eight independent light sources of varying intensity. Has 24-bit color output to a full screen or a 24-bit PICT file; also has DXF and RenderMan output. 4MB min. memory. $695. Paracom, 415/543-3848.

Techbase
Relational database-management system that enables the user to generate maps that can be used to graphically differentiate geological formations, property ownership, and mineral bodies, through the use of patterns and colors. Also has an applications generator that lets the user construct a data-input screen designed to meet a prescribed format. 1MB min. memory. $2030. Microsoft, 303/292-6449.

TrakHur
Hurricane tracking system intended for tracking typhoons and hurricanes worldwide. Has more than 15 maps including the Atlantic and Pacific basins and surrounding coastal areas, Caribbean and Northwest Gulf areas, and others. User can input data as a storm is brewing; program calculates number of hours it would take the storm to arrive at a specific location at its current speed. Also can be used to display tracks from past hurricanes. 512K min. memory. $39.95. Hurricane Research Service, 512/836-7888.

WPduet and 100duet
WPduet enables users to connect the Macintosh directly to the WP-2 Tandy portable word processor for the purpose of file transfers. Includes file translators that convert WP-2 documents (continues)
New Products

- Mac SE30 Power!
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To have your product considered for inclusion in New Products, send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number (and two copies of software) to New Products Editor, Macworld, 501 Second St, San Francisco, CA 94107. We reserve the right to edit submissions.
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Quick Tips
Finding missing disk space, arranging pamphlet pages, handling incidental charges, and more

BY LON POOLE

The standard colors for the z-axis (height) of a 3-D surface or contour plot in Wingz are none too charming. A tip published here in April featured a Wingz script for converting the haphazard color scheme to a smooth gradation of gray shades.

Christopher Caswer of West Henrietta, New York, modified that script to produce smooth multicolor shading (see "Color Variations"). Colors range from dark blue for the lowest values on the z-axis to light blue, green, yellow, orange, and red (see "Color Shading"). Caswer also suggests turning on chart smoothing. First select the chart and choose the Chart Info command (Format menu). Then in the dialog box select the Smoothing option and enter the number of segments you want. Smoothing results in a smoother plot but one that takes longer to draw. The more segments you specify, the longer the drawing process. You can make Wingz stop redrawing at any time by pressing #. (period).

RAM Advantages

My lab is purchasing a Mac IIci with 5MB of RAM. What are the advantages of all this memory? I know it will let me use MultiFinder, but what else can I do? What effect does increasing the RAM cache setting in the Control Panel have? I use Microsoft Word quite a bit. Should I increase the RAM cache and have the program loaded into memory?

Leonard Malkin
Detroit, Michigan

Unless you use only one application, I think you'll find the ability to run under MultiFinder a major benefit. MultiFinder lets you have two or more programs open at once and switch instantly from one open program to another. This quick switching makes cutting and pasting between programs a snap. With MultiFinder active, the Finder remains open for tasks like naming and copying disks, folders, and files. You also get better memory management—fewer system crashes—with MultiFinder active.

With or without MultiFinder active, programs like ColorStudio, Illustrator 88, PhotoMac, Photoshop, and PixelPaint require 2MB to 4MB. These programs, as well as others with more modest memory requirements, take advantage of additional available memory to let you open more documents at once, to work on larger documents, or to do both. Programs that place few restrictions on the number of open documents may operate faster because more of the application and the open documents fit into memory simultaneously, reducing the need for disk accessing.

You can always use extra memory for system software enhancements besides MultiFinder. Adding goodies to the System Folder—Adobe Type Manager, After Dark, MasterJuggler, QuickMail, TOPS, Virtual, and so on—can easily increase system memory beyond 1MB. What's more, System 7.0 will require at least 2MB—double the minimum you need for System 6.0.5.

Turning on the Control Panel's RAM Cache option sets aside some RAM as a storage area for information recently retrieved from disk. If that information is needed again, it can be copied quickly from the RAM cache instead of more slowly from disk. A cache of moderate size, say 128K, speeds up program operation, though not dramatically. I have heard, but have been unable to substantiate, that a cache of 256K or larger may actually slow down program operation. Some programs work as well or better with the RAM cache set to Off. HyperCard, for example, has its own cache and works faster when the Control Panel RAM Cache is set to Off.

Microsoft Word has its own special options for keeping the whole program, document, or both in memory. To set these options, use Word's Preferences command (Edit menu).

Lost Space

Although my hard disk indicates it has 9945K in use, when I add up the space actually used by each file,
Quick Tips

How To

Color Shading

Standard colors in Wingz surface and contour graphs don’t provide useful shading information (left). Applying the script in “Color Variations” to those graphs achieves smooth color shading (right).

Color Variations

This Wingz script applies smooth color shading to a surface or contour graph. The script remaps the z-axis to have 20 zones or divisions. Each zone is a slightly different color than the zones immediately above and below it. You can set any number of zones between 6 and 50 by editing the line ZONE = 20.

(Define the)
{variables needed}
{for the script}

("chartnum" refers to)
{the selected chart}
DEFINE chartnum
{prevent redrawing the}
{graph}
REPAINT OFF

("min" and "max" are the)
{minimum and maximum}
{values on the Z-axis}
DEFINE min, max
{get the number of the}
{selected chart}
chartnum = number()

("Z" and "Z1" are)
{the current Z-axis)
{division and subdivision}
DEFINE Z, Z1

("R", "G", and "B" are the)
{the red, green, and blue}
{color components for the}
{current Z-axis division}
DEFINE R, G, B

("zones" is the number of)
{color zones (divisions)}
{on the Z-axis}
DEFINE zones
zones = 20

("gain" is the amount to)
{change a color’s intensity}
DEFINE gain
gain = 1275/zones/10

("chartnum" refers to)
{the selected chart}
DEFINE chartnum
{prevent redrawing the}
{graph}
REPAINT OFF

("min" and "max" are the)
{minimum and maximum}
{values on the Z-axis}
DEFINE min, max
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{graph}
REPAINT OFF

("min" and "max" are the)
{minimum and maximum}
{values on the Z-axis}
DEFINE min, max
{get the number of the}
{selected chart}
chartnum = number()

("Z" and "Z1" are)
{the current Z-axis)
{division and subdivision}
DEFINE Z, Z1

("R", "G", and "B" are the)
{the red, green, and blue}
{color components for the}
{current Z-axis division}
DEFINE R, G, B

("zones" is the number of)
{color zones (divisions)}
{on the Z-axis}
DEFINE zones
zones = 20

("chartnum" refers to)
{the selected chart}
DEFINE chartnum
{prevent redrawing the}
{graph}
REPAINT OFF

("min" and "max" are the)
{minimum and maximum}
{values on the Z-axis}
DEFINE min, max
{get the number of the}
{selected chart}
chartnum = number()

("Z" and "Z1" are)
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{division and subdivision}
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("R", "G", and "B" are the)
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{prevent redrawing the}
{graph}
REPAINT OFF

("min" and "max" are the)
{minimum and maximum}
{values on the Z-axis}
DEFINE min, max
{get the number of the}
{selected chart}
chartnum = number()
"White Knight looks and feels very similar to Red Ryder 10, but when you take a close look you discover that many things have changed. The number of new features is fairly large. There are also some improvements to old ones. Red Ryder may be gone but White Knight continues a tradition of excellence."

AUSTRALIAN MACWORLD

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CRAIG CROSSMAN, TECHNO-FILE

"For Mac novices, White Knight is the best all-around telecommunication program. For procedure writing, it is the simplest. For ease of use I strongly recommend this program."

ACTIVE WINDOW

"White Knight is probably the best communications program on the market, combining technical sophistication, flexibility, user-friendliness and a bargain basement price - $139. It deserves more than an unqualified recommendation. It should be a mandatory buy for anyone with a Macintosh and a modem. Watson is a former writer-editor and the manual is the best read I've seen in computer documentation."

COMPUTER COMMENT

BY JACK LESAR, UNITED PRESS INT'L

"White Knight is one of the best values in communications software, and with Okyto thrown in (a $39.95 value when purchased separately), it's an even better bargain. White Knight continues the tradition of supporting every possible feature that its users could want and then some and with RCMRs you can add features even Scott Watson couldn't think of."

MACUSER

"In the halls of Macintosh telecommunication, there is no name greater than Red Ryder... but now it's called White Knight 11. Many of the changes in this metamorphosis to White Knight will help the special-needs user... you'll find a lot of things to make your time online easier. While reading the expanded manual, you'll see dozens of features you may not think you'll use. Once you try them, however, they'll become indispensable. If you're new to the telecom adventure, you'll appreciate the thought that went into making things easier to learn; White Knight will even write procedures for you, if you'd like."

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QUICK TIPS
HOW TO

800K disk, 11.5K on a blank 1440K floppy disk, 32K on a blank 15MB hard disk, and so on. Not surprisingly, a disk’s Desktop file grows if you add lots of files to the disk. However, an enlarged Desktop file does not shrink when you remove files. Icons belonging to deleted files may needlessly enlarge the Desktop file.

You can reduce a disk’s Desktop file to its minimum size by pressing the ⌘ and Option keys before the disk’s icon appears on the desktop. That occurs when starting up, when quitting a program with MultiFinder inactive, and when inserting a floppy disk. The Mac asks if you’re sure you want to rebuild the desktop. Warning: If you answer yes, any comments you have entered in Get Info boxes will be lost. To preserve Get Info comments, use a special utility program such as DiskExpress from ALSoft (713/353-4090) to rebuild the Desktop file.

If rebuilding the Desktop file does not recover most of the missing space, then your disk may contain other invisible files. A few applications also create invisible files that could be using space on your disk. To see all files on a disk, including invisible ones, use a utility program like DiskTop from CE Software (515/224-1995).

Paired Marks
TIP: Microsoft Word 4.0 doesn’t have a command for putting paired quotation marks, parentheses, or brackets around the current text selection, but you can use MacroMaker to create that missing command.

1. Select some text in Word and choose Start Recording from the MacroMaker menu.

2. Press ⌘-X and then ⌘-Z to delete and then restore the selected text. This teaches Word where the selection starts and ends.

3. Press the right-arrow key to go to the end of the selection. Type a closing quotation mark (Shift-Option-[ in most fonts), right parenthesis, or other ending punctuation mark.

4. Press 0 on the numeric keypad or ⌘-Option-Z to go back to the beginning of the selected text. Type an opening quotation mark (Option-]), left bracket, or other beginning punctuation mark.

(continues)
Swivel 3D™, the award-winning 3D graphics program, helped Dan Klitsner from Klitsner design land a major project with Discovery Toys. His ideas were quickly brought to life on the Macintosh and ready for his clients to view. Using Swivel 3D, Dan built a working model of the rattle that behaved just like the final product. Convincing each department was easy ... Marketing understood how to sell the product, engineering saw how the parts would fit together and move, and the product development team was able to efficiently move the project along to completion. First conceived with Swivel 3D, the elephant rattle -- Tons of Fun -- has become one of Discovery Toys' top-selling products.

"With Swivel 3D, I designed an elephant-shaped rattle for Discovery Toys. Created to help the coordination and two-handed development of infants, the design needed to have moving, linking parts. Swivel 3D was my tool of choice."

—Dan Klitsner, Klitsner design

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Requires 1MB of memory. Format compatible with: MacWrite 4.6 and 5.0, MacWrite II 1.0, Microsoft Word 4.0, MindWrite 1.0 and 2.0, PageMaker 3.0. (Requires 2MB for PageMaker.) Check with Expertise for further information on product compatibility. Trademarks belong to their respective manufacturers.

Circle 183 on reader service card
QUICK TIPS
HOW TO

PRINTING CARDS BY LASER

Alex Narvey of Winnipeg, Manitoba, devised this quick and easy way to print durable plastic-covered cards using a LaserWriter. You can use them for name tags, address change notices, cabinet labels, and so on. The toner is protected from cracking by being sandwiched between sticky label stock and transparency film. The price per hundred is about $5.

Using a graphics program, lay out an 8½-by-11 page with as many cards as you can fit (here we show business cards). Be sure to leave a ⅛-inch margin on all four sides of the sheet.

Using the Apple LaserWriter driver, print a mirror image of your cards on a sheet of transparency film. Choose the Page Setup command (File menu), click on the Options button, and check the Flip Horizontal and Larger Print Area options. Using PageMaker 3.02, check Spot Color Overlays in the Print dialog box (File menu). Click on the Changes button and Mirror option.

Peel the backing off a sheet of solid, sticky-back label stock (Avery #5353 or equivalent). Carefully press the toner, or wrong-reading, side of the transparency sheet to the sticky side of the label stock.

Cut out the individual cards using a pair of scissors, a paper cutter, or an X-Accto knife. Remember to trim away the ⅛-inch margin.

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5. Choose Stop Recording from the MacroMaker menu. Name and store the macro and then close the MacroMaker window.

A similar macro removes paired punctuation marks from the beginning and end of the current text selection.

Follow the steps above, but in step 3 press Delete or Backspace instead of typing a closing punctuation mark, and in step 4 press Shift instead of typing an opening punctuation mark.

John Broadbent
Golden Valley, Minnesota

Pamphlet Page Arrangements

**TIP:** Arranging pages of pamphlets, catalogs, and other small publications in the correct sequence can be tricky if you’re printing two pages per sheet of paper. Each page should fill half the sheet so that when the paper is folded and stapled you’ll have a little booklet. In Microsoft Word with Full Menus selected, choose the Page Setup command (File menu). In the resulting dialog box, set landscape (sideways) orientation and then click the Document button. In the dialog box that appears, turn on the Mirror Even/Odd Margins option. If you wish, turn on the Even/Odd Headers option. Enter the top, bottom, and outside margins you want. Then add 5 1/2 inches (the width of one page) to the size of the inside margin. Click OK as needed to dismiss the Document format and Page Setup dialog boxes.

If you set the Even/Odd Headers option, the Document menu will have separate commands for even and odd headers and footers. Typically, you would align the page numbers in the odd header or footer on the right and align the page numbers in the even header or footer on the left. If you’re using section breaks in a document to separate different chapters, you may wish to set the Start option to Odd Page using the Section command (Format menu) for each section.

You print the pamphlet in two passes. To determine the number of pages to print in the first pass, take the smallest multiple of four that is higher than or equal to the total number of pages in the pamphlet and divide that multiple by 2. For example, if your pamphlet has 17 pages, the smallest multiple of 4 containing 17 is 20. In this case, you would print the first 10 pages (20 divided by 2). Then for the second pass, arrange those pages face up in reverse order (page 1 on the bottom), return them face up to the paper tray, and print the remaining (in this case, 7) pages. (Note: a LaserWriter Plus automatically puts pages in reverse order; a LaserWriter II does so if you open its face-up exit.)

You now have a set of single-sided originals, each bearing two pamphlet pages. By appropriate double-sided copying, you can prepare copies of your pamphlet ready for folding and stapling.

David S. Allan
Ann Arbor, Michigan

This method works with any word processing or page-layout program that can automatically adjust page margins for double-sided printing. In MacWrite II, for example, set the Left/Right Pages option of the Pages command (Format menu). In PageMaker use the Page Setup command (File menu) to turn on the Double-sided option and to turn off the Facing Pages option. In QuarkXPress, use the Page Guides command (View menu) to set the Double Sided option, to set margins, and if printing in landscape orientation, to specify paper dimensions (such as 11 by 8 1/2 inches). In ReadySetGo, choose Design Grids from the Special menu, select Grid Setup, click on OK, and then set the Double Sided option and enter the margin settings. —L.P.

(continues)
Introducing the Kodak Diconix M150 plus printer. Don't take a Mac anywhere without one. Now you can print out a sudden revision, a quick letter, an instant overhead anywhere!

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Expediting WriteNow 2.2's Thesaurus

TIP: The version of WordMaster Thesaurus that comes with WriteNow 2.2 doesn't work with other programs. It shows up in the Apple menu even when it's not usable. Worse, if MultiFinder is active, an annoying alert reminds you of this restriction whenever you choose WordFinder from the Apple menu—even if you're using WriteNow at the time. After dismissing the alert, you must switch from the DA layer to WriteNow before using the thesaurus, Ugly.

You can eliminate these problems by installing WordMaster directly into the WriteNow program instead of into the System file. Here's how:

1. After installing WordMaster as instructed in the WriteNow manual, open Font/DA Mover (there's a copy on WriteNow Disk 3). Select the Desk Accessory option at the top of the Font/DA Mover window. On the left side of the window is a list of the DAs installed in the System file. WordMaster should be on the list.

2. Press the Option key while clicking the Open button on the right side of the window. Open your working copy of WriteNow 2.2. (If you can't find WriteNow, you didn't press the Option key while clicking Open.)

3. Select WordMaster on the right-hand side of the window and click the Copy button. After Font/DA Mover copies WordMaster into WriteNow, click the Close button on the right side of the window.

4. With WordMaster still selected on the left side of the window, click the Remove button. Authorize removal of this copy of WordMaster when asked to do so. Click the Quit button and you're done.

Caution: If you later install another desk accessory in the System file, it may conflict with the copy of WordMaster in WriteNow. This can happen because the Font/DA Mover doesn't correlate the ID numbers of desk accessories in multiple files. Anything may happen if you try to use a desk accessory that has the same ID number as another desk accessory you're already using. To eliminate conflicts after installing a new desk accessory, copy WordMaster from WriteNow to the System file, remove WordMaster from WriteNow, copy WordMaster back to WriteNow from the System file, and remove it from the System file. You can also eliminate conflicts by putting Suitcase II or Masterjuggler in your System Folder.

Ron Risley
San Diego, California

Computing Incidental Charges

TIP: If you use FileMaker for invoices or purchase orders, you may want to list incidental charges such as sales tax and shipping in the same repeating field as the deliverable items (see "Incidentally"). For aesthetic reasons, you don't want to enter a quantity of 1 for an incidental charge. (Who ever heard of one sales tax?) If you leave the quantity blank, however, FileMaker computes the total cost of the incidental charge as 0. (Total cost equals quantity times unit cost.) To avoid the problem, use the following formula to calculate total cost:

\[
\text{IF(Quantity} = 0, \text{Unit Cost} \times \text{Quantity}, \text{Unit Cost})
\]

The formula stipulates that nothing (""") be put in the Total Cost field if there is nothing in the Item field. If there is something in the Item field but nothing in the Quantity field, then the Total Cost field equals the Unit Cost field. If the Quantity field is not empty, then the total cost equals the quantity times the unit cost.

Peter Theodoroff
Coral Springs, Florida

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Lon Poole answers readers' questions and selects their tips for this monthly column. He has written many personal computer books, including the quick reference HyperTalk (Microsoft Press, 1988) and a new book of Mac tips (to be published soon by Microsoft Press), Amazing Mac Facts.
Introducing the Metro with SCSI Sentry

EMAC has found a way to prevent unnecessary Macintosh hard drive fatalities with SCSI Sentry; an engineering breakthrough in disk drive reliability. It protects your disk drive from damaging shorts that can trap data inside your hard disk. Which makes any drive with the SCSI Sentry substantially more reliable.

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Getting Started with Desktop Video

HOW TO PUT YOUR MAC ON TV—CHEAPLY

BY JIM HEID

What looks like a television, but isn’t? A computer screen. On the surface, the Mac’s screen seems similar to a television set’s—it uses a video tube that you definitely do not want to break, and it creates images by drawing hundreds of narrow horizontal lines.

But beyond that, the Mac and a TV set take very different approaches to creating images. Normally, you don’t need to worry about these differences. Your Mac and your TV lead separate lives, with little in common between them.

But then the day comes when, for reasons I’ll describe shortly, you would like to videotape what you see on the Mac’s screen. It’s then that the differences between Macintosh video and broadcast video become critical.

This month, I’ll explain some of the technical differences between Mac video and broadcast video, and I’ll let you in on one of the best-kept secrets in the Macintosh world—a free Apple utility that lets you attach a standard Macintosh II Video Card directly to a video recorder using a simple cable, which you can make yourself or have a TV technician make for you. The results aren’t 100 percent broadcast quality, as they say in TV, but they’re quite close. In any case, it’s a wonderful way to try your hand at videotaping Mac images and to learn a bit about how television works. (For details on Mac hardware products that produce broadcast-quality video, see “Prime-Time Video” in this issue.)

Why Mac TV?
Before we look at the hows and what’s of recording Mac screens, it might be useful to spotlight the whys. Here are some project ideas to stimulate the TV producer within you:

Record a presentation Perhaps you’d like your employees in the field to see that presentation you gave to the home office. Create your visuals using a presentation program such as Microsoft PowerPoint or Aldus Persuasion, and then use the program’s slideshow feature to advance through the visuals while videotaping them. Because you’re recording directly from the Mac, you’ll get better quality than if you just aimed a video camera at the screen and podium. You can also record your speech by attaching a microphone or public address system to the video recorder. This technique can also help you fine-tune your presentation—and your presentation skills.

Record animation As we saw in last September’s “Getting Started with Animation,” products like Macromedia Director and Apple’s HyperCard allow artists to create impressive computer animations. If you’re one of these digital Disneys, you can videotape your efforts and not have to fire up a Mac to show them off. Other pluses: you can see your work on a larger screen and add a sound track. And you can create a longer animation than would otherwise fit in memory or on disk by creating it in several sections and then videotaping each section in turn, pausing the video recorder while loading each one.

Create a training video Perhaps your company uses custom-developed Macintosh software, or maybe you’d like to educate new employees on the fine points of your electronic-mail system or network file server. By videotaping your own software or system in action, you can create a custom training video that reflects exactly how your company or department uses the Macintosh.

Record Macintosh demonstrations A school in Los Angeles videotapes the HyperCard stacks that students create so they can show their efforts to parents. Indeed, videotaping (continues)
the Mac is an ideal way to show someone else what it can do. Just ask Apple, Microsoft, Adobe Systems, and Letraset. They're among the firms that have produced video demonstrations of their products in action.

Create a promotional video By mixing videotaped footage of live action with static or animated visuals created on the Mac, you can create a promotional video that can run in stores or be sent to prospective customers. Some advice: if you don't have any TV production experience, you might want to consult with someone who does. An amateurish promotional video may do more harm than good.

Create titles for home videos Let's be honest—this is really want we want to do with our Macs and video recorders, isn't it? And why not? Titles can lend a finishing touch to a home video, and they can be fun. Some video cameras have built-in titling features, but they're often hard to use and their typefaces aren't nearly as attractive as the Mac's. One catch: you can't superimpose a Mac-generated title over a videotaped image without specialized hardware, which I'll describe shortly.

Set up an emergency monitor If you attach a Mac to a video recorder that's attached to a TV set, you can use the TV as a Mac monitor. The results aren't great—you wouldn't want to use a TV as a monitor for very long—but they might be good enough to get you through an emergency if your main monitor breaks.

TV Technicalities

So there are several good reasons to put the Mac on TV. But why can't you just aim a video camera at the Mac's screen?

Actually, you can, but you may be disappointed by the results. For one thing, you're likely to pick up glare or reflections from the screen. For another, your videotape will have a fuzzy, out-of-focus appearance, even if you're extremely careful about positioning the camera. Worst of all, because of technical differences between Mac video and TV, your videotape will have a horizontal line running through it every few seconds. The bottom line: to get a clean recording of the Mac's screen, you need to attach the Mac directly to a video recorder.

To unite a Mac and video recorder, you need to attach the Mac video board's video-output connector to the video recorder's video-input connector. You also need to be sure that the Mac is sending a signal that the video recorder can receive. And that's when you encounter the differences between Mac video and TV.

The first of these differences concerns those horizontal scan lines that form video images. On all video tubes, these lines are formed by an electron gun (or, with most color monitors, three electron guns) within the video tube. The gun fires a stream of electrons at the tube's inner surface, causing its phosphor coating to glow briefly.

On a Mac II with Apple's standard Macintosh II Video Card, there are 480 horizontal scan lines, and they're painted one at a time, from left to right, from the top of the screen to the bottom. One complete set of scan (continues)
Four good reasons you should be using Scan Reader™ as your OCR program

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The Macintosh II Video Card repaints the entire frame 66.67 times per second (which translates into a frame rate of 66.67Hz).

By contrast, American television uses 512 horizontal scan lines, painted in a very different manner. Instead of painting one frame’s worth of scan lines from top to bottom, a TV set paints them in two separate passes, or fields. First, all the odd-numbered lines are scanned, and then all the even-numbered lines are scanned. Each field is painted 30 times per second, giving broadcast video a frame rate of 30Hz. Thanks to persistence of vision—the same phenomenon that makes movies appear to move—we see the two fields as one image. This two-fields-per-frame approach is called interlaced video. The Mac’s approach of painting all the scan lines in one pass is called noninterlaced video.

Mac video and TV also handle color differently. In the Mac, the signals for red, green, and blue—the primary additive colors from which all colors are created—each travel on a separate wire. Other wires carry synchronization, or sync, signals. This approach is called RGB video.

In the TV world, the red, green, and blue signals are merged with the sync signals into a composite signal that’s technically simpler but lacks the sharpness and clarity of RGB video. The rules that describe the format of a composite broadcast video signal were developed about 30 years ago by the National Television System Committee, or NTSC. Broadcast video is often referred to as NTSC video, or by the name of the standard itself, RS170.

Lowering Your Standards

So in many ways, an NTSC signal is technically inferior to a color Mac’s video signal. That’s to be expected, given the less-demanding nature of television—a TV image doesn’t have to be sharp enough to display small text that’s legible at arm’s length. To record a video signal directly from the Mac, we need, in essence, to tell the Mac to lower its standards.

Hardware add-ons such as Mass Microsystems’ ColorSpace III (for the Mac II family) and ColorSpace Plus/SE (for the Plus and SE) do this by outputting a true NTSC video signal. Often such products also include a genlocking feature that lets you superimpose a Mac video image over an existing video image. When you see an announcer’s name appear at the bottom of the screen as he or she speaks, you’re seeing genlocking in action.

But specialized video hardware starts at about a thousand dollars and goes way up from there. It’s hard to justify such an expenditure if you do desktop video only occasionally.

That’s where the Macintosh II Video Card Utility comes in. If you have the original Macintosh II Video Card, you can get reasonably good results with no additional hardware, except the cable. Alas, the utility doesn’t work with the Iici’s built-in video circuitry or with the three new video boards Apple unveiled earlier this year. Those boards, however, can produce NTSC video directly using a special adapter (continues)
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The Apple video utility relies on the Macintosh II Video Card's ability to be reprogrammed to put out a different kind of video signal. The utility is a start-up document (an INIT) that reprograms the video board to output a signal that's very close to the NTSC standard. The signal isn't completely NTSC-compatible, says Jack Palevich, the utility's creator, because "the video card isn't infinitely programmable." Because he couldn't completely reprogram the board, Palevich was forced to "round off" certain aspects of the modified video signal and, as a result, some video equipment may not be able to receive the signal perfectly. I had no problems tuning in the Mac's signal on a Sony VCR. If you have problems, you may be able to resolve them by adjusting the video recorder's fine-tuning controls.

The utility supports each of the Mac II Video Card's modes (2, 4, 16, or 256 colors), but in black and white only. So, you can record grayscale images or use the fade-in and -out effects of programs like MicroMind Director, but you can't record in color.

Perhaps the most serious problem with recording Mac screens is that any horizontal lines that are 1 pixel wide—like the lines in the title bar of a Mac window—flicker like a 1930s cartoon. This distracting flicker occurs because of the NTSC standard's interlaced approach—a horizontal line that's one scan line wide will appear in only one of the two fields that make up each frame. Thus, the line flashes on and off 30 times per second.

The Apple video utility fixes this by providing a flicker filter, a software routine in which each scan line is evaluated and averaged with lines adjacent to it. If that sounds similar to the Apple Convolution feature built into Apple's latest video boards (and described in "Power at a Price," May 1990), it is. The Apple Convolution routine was based on the flicker filter in this free and humble utility.

But filtering flicker isn't free—it uses 48K of memory and slows the Mac by 20 to 40 percent. Pull-down menus become ooze-down menus. Animations run in slow motion, although you can often adjust for that by playing the animation back faster. (This performance penalty doesn't apply to Apple's new video boards.)

Using the Utility
The Apple video utility includes several pages of clearly written documentation, so I won't describe how to get it up and running here. I will, however, describe what you need to use it and provide some tips gleaned from my own experiments. The utility itself is available for downloading from CompuServe and America Online. It should also be available through user groups. Keep in mind that the utility is unsupported, though Apple, your local dealer, and MacWorld are not responsible for, or obligated to help you with, any problems you have.

Besides the Mac II Video Card, you (continues)

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cable (see "Power at a Price" and State of the Mac, Macworld, May 1990).

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need System 6.0.3 or a later version, along with the 32-Bit QuickDraw and Monitors files that accompany those versions. You’ll also need to make a simple cable (see “Making the Connection”).

You may need to flick a switch on your video recorder to tell it that video is coming from the video-input connector, not the recorder’s built-in TV tuner. On my Sony VCR, for example, I move a switch labeled Input Select from the Tuner to the Line position. Check your video recorder’s manual for details.

To record sound coming from the Mac, attach its audio-output jack to the video recorder’s audio-input jack. (For details on connecting the Mac’s sound jack to other audio devices, see “Getting Started with Digital Sound,” Macworld, November 1989.) You can also record sound from a different source—such as a public-address system or stereo—by connecting the sound source’s line-output jack to your video recorder’s line-input jack.

To create titles for a video, consider using a paint program (I used PixelPaint 2.0) that lets you hide the menu bar and its tool palettes. Create the title using the program’s text-editing tools, and then hide its menu bar and tool palettes before recording the title. Because of a television industry practice called overscan, in which the image projected onto a television’s video tube is larger than will fit, the outer edges of the Mac’s screen won’t appear on the television or videotape (see “Video Boundaries”). So it’s best to design the title to occupy the center of the Mac’s display—although you may still need to adjust the position of the text after you’ve connected the Mac to the VCR and TV.

Most commercial video products compensate for overscan. Also, when you activate the flicker filter in the free Apple video utility, the utility shrinks the Mac II’s screen so it has the same dimensions as a compact Mac’s—512 horizontal pixels by 342 vertical pixels. This allows you to videotape a full Mac screen, which is especially useful if you’re taping a training video or HyperCard stack.

Overscan was born in television’s early days, when the image on a picture tube would gradually shrink as the tube aged. Today’s picture tubes don’t suffer from this flaw, but overscan remains, partly to accommodate the elderly televisions still among us and partly because television manufacturers would rather fill an entire screen than have a black border around its image. On the other hand, computer monitors underscan—they project an image smaller than the tube’s surface in order to show every precious pixel.

And that brings up the issue of designing titles for television, whose technical limitations impose some restrictions on graphic designers. You’ll find some tips from a professional in “Designing for Television.”

Signing Off
If you try Apple’s utility, drop me a line and let me know how it worked for you. Write to me in care of Macworld, or send electronic mail to 76174,556 on CompuServe, or to JimHeid on America Online.

Thanks to specialized video hardware, the Mac is playing a role in professional video production. Thanks to Apple’s free utility, the Mac can play a role in the amateur video world, too. We video buffs owe thanks to Jack Palevich for developing the utility and to Apple for making it available.

Video Boundaries
Of the Mac’s standard 480 horizontal lines, only about 350 appear on a TV screen. To compensate for this, avoid using the outer 15 percent or so (about an inch and a half) of the screen.

See Where to Buy for contact information.

Jim Heid is a Macworld contributing editor who each month focuses on a different aspect of Mac fundamentals. His latest book, coauthored with Peter Norton, is Inside the Apple Macintosh (Brady Books, 1989).
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And do it before you start another headline.
Insights on Canvas 2.1
DRAWING TIPS FOR CANVAS DABLERS

BY ERFERT FENTON

Denba Software's Canvas, like fine wines, violins, and Sean Connery, just keeps getting better with age. Version 2.1 adds such niceties as a preview window for aligning objects, improved bezier curves, dashed lines, a color-separation utility, and—of all things—a spelling checker. The following tips should make you a more proficient illustrator the next time you face a blank Canvas screen. Thanks to Rebecca Huba, Brooks Bell, Carmine Delligatti, Fawad Khan, and David Runfeit for their help.

Selective Changes
Let's say you've just spent 40 hours drawing a detailed floor plan of the Palace of Versailles in Canvas 2.1. You print it out and discover, to your dismay, that the pen lines you used for the walls look amite thin; you wish that you'd used a 2-point pen line instead of a 1-point line. The fact that you waited 40 hours before printing a proof does not speak well of your IQ, but fortunately Canvas 2.1 provides the means to rectify just such a creticious oversight.

To change all the 1-point pen lines in your drawing to 2-point lines (or any other custom line width you specify), follow the steps below. This tip will allow you to change other drawing attributes as well, such as colors, fill patterns, or pen patterns.
1. Hold down the Option key while you choose Select All from the Edit menu. Release the Option key.
2. Go to the Tool Box and select the drawing attribute you want to change. In this example, you'd go to the Pen Manager and select the 1-point pen size. Canvas will select all objects that were drawn with the 1-point pen.
3. Next select the change you want to implement—in this case the 2-point pen size—in the Pen Manager dialog box. The program will change all 1-point pen lines to 2-point lines.

AutoTrace with Finesse
The AutoTrace To command converts a bitmapped image into a set of polygons, which can be edited like any other object-oriented graphic. But AutoTrace To may not capture enough detail for your liking. Not to worry. You can instruct it to trace with more precision by following these simple steps.
1. With the lasso, marquee, or arrow tool, select the bitmapped image (or portion thereof) you want to trace.
2. Choose Object (Object menu). In the dialog box that appears, change the resolution from 72 to 150 or 300 dots per inch and click OK.
3. Select AutoTrace To from the Effects menu.
4. Go into the living room, settle into your favorite chair, and read War and Peace. If you're tracing a detailed image, the AutoTrace procedure could take quite a while. But the improvement should be worth the wait; compare the traced images in "A Trace More Detail." (Note: You can cut the tracing time somewhat if you select the AutoTrace To command's Smooth Polygon option, rather than Polygon. The Smooth Polygon option captures fewer vertices when tracing an image.)

Editing Polygons
Let's say you've autotraced an image at 300 dpi, as suggested in the last tip.

(continues)
A polygon, as you can see from the figure entitled "A Thousand Points of Line" can be made up of a great many vertices. Grabbing a single point to edit the polygon can be tricky, even when the image is magnified.

Here's how to reduce the number of editing points in a polygon.

1. Select the polygon.
2. Choose Object from the Object menu. In the Object Manager dialog box, the icon indicating Object Type will be a polygon. Change it to the free-form shape and click OK. When you return to the shape, it will have half the number of editing points it had as a polygon.
3. With the shape selected, choose Edit Polygon from the Object menu or double-click on the selection to enter the editing mode.

(Note: Removing too many points in a polygon can distort its shape. If yours ends up drastically altered, immediately select Undo from the Edit menu to restore the original.

**Permanent Palettes**

If you have the screen space, you can tear off Canvas palettes and place them anywhere you like for easy access. To tear off a palette, select the Hand tool, hold down the spacebar, grab the palette, and place it where you want it. You can tear off Palettes for Magnification and Reduction, Fill Patterns, Pen Patterns, Colors, Line Widths, and Transfer Modes. (If palettes overlap, just click on the gray bar at the top of a palette to bring that palette to the front.)

**Curbing Curve Closure**

If you're drawing along with the bezel curve tool and place a point within a few pixels of the curve's starting point, Canvas assumes you want to make a closed shape. Before you can say "Gaaah! I didn't want to do that!" the program has neatly joined the errant point to the starting point, making your would-be curve into a closed shape. To curtail this potentially annoying feature, hold down the Tab key as you draw. Even if a point strays dangerously close to the starting point, the curve will remain a curve.

**Quicker on the Redraw**

If the drawing you're working on contains a lot of complex objects, you can waste a good deal of time waiting for the image to redraw after you make a change. Canvas offers several ways to cut down on redraw time.

One way to speed up redraw is to take advantage of Canvas's Layer Manager. Create parts of your drawing in different layers of Canvas. When you've finished a section, turn off that layer (uncheck the Layer Manager box labeled Visible). The graphics in that layer won't show up on screen and bog down the redraw rate. When you've finished all the drawing elements—or need to see how they interact—turn all the layers back on to see the entire drawing.

Another way to avoid unnecessary redraw time is to work in wire-frame mode, which eliminates colors, fills, patterns, and pen widths during redraw. To enter wire-frame mode, select Display from the Layout menu, choose Wire Frame from the Display submenu. To view shading, line widths, and so on, select QuickDraw from the Display submenu.

If you want to turn off redraw altogether, press %K (period). To resume redraw, press %K.

**Paste and Trace**

Here's how to trace a scanned image:

1. Open the scanned image in Canvas 2.1. It will automatically appear in Layer #1.
2. Open the Layer Manager and click the New Layer button. Canvas 2.1 will, predictably enough, name the new layer Layer #2.
3. In the Layer Manager's list of drawing layers, select Layer #1 and check the Grayed option.
4. Now, select Layer #2 and click (continues)
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INSIGHTS
HOW TO

5. Set the fill pattern to None.
6. Choose Preferences from the File menu and check Retain Selected Tool After Drawing.

You can now use the pen or the Freeform tool to trace the grayed image. Use the Layer Manager to delete Layer #1 before printing, or use the Print Layer command to specify that it shouldn’t be printed.

A Bit More Color
If you have a color monitor, you can place an 8-bit TIFF file into a Canvas document. With a 32-bit color board, you can also import 32-bit TIFF images. Hold down the $ key as you open a TIFF file; it will appear in 32-bit instead of 8-bit color.

Shortcuts
When you select the Text tool and hold down the mouse button, a pop-up menu lists styles and justification options. You can quickly access other text options as you perform the same operations while holding down the following keys:

$ key: a list of fonts appears
Shift key: a list of sizes appears
$ and Option keys together: a font list appears with each font name displayed in the font itself (for example Times is in the Times font)

When you select the Line Manager (the long box with a line in it) and hold down the mouse button, a selection of line styles appears. The following shortcuts allow you to select other line attributes:

Shift key: an array of line terminators appears
Option key: a choice of dashed lines is displayed

Share 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 2nd St., San Francisco, CA 94107.

See Where to Buy for contact information.

Erfert Fenton is a Macworld contributing editor who specializes in fonts and graphics. She’d rather be sailing.

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For power, consider the fact that Nisus allows you to create custom routines beyond what we have already done for you, with our built-in word processing language. You don’t have to use this feature, but it’s there if you need it. It is one of the many features that distinguishes Nisus 3.0 from Word 4.0. It will let you, for example, create routines to index every word in a document, while stripping out and, or, the, but, and other nonessential words. One user even built a routine to index all proper names. Another user developed a method to find and correct all double words, periods, and extra spaces. The opportunities are unlimited.

Find and Replace virtually anything

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Here's our list of the current shipping versions of Mac software at the time we went to press. We hope you'll find it useful—because these days, keeping track of the latest CPU is tough enough.

**DiskDoubler version 2.0** transparently integrates into the open-file dialog box in any application, automatically opens compressed files in the Finder with a double-click, does one-step expansion of Stuffit and Packit archives, joins segmented files, and does one-step file-splitting for large files that need to be made to fit on floppy disks. Salient, 415/852-9567. $79 new.

**Lightspeed Color Layout System version 2.0** includes typographic refinements such as track kerning, hyphenation, justification, automatic text wraparounds, hanging punctuation, stand-up and drop initials, fixed spaces, and superscripts and subscripts. Crossfield & Lightspeed, 617/338-2173. Contact vendor for update policy and list price.

**MacDraft version 2.0** has Macintosh II color support; custom fill patterns in black and white or color; enables the user to edit colors and patterns; and gives the user control over color, font, and size of individual characters in a text block. Can rotate text in increments of less than 1 degree. This version includes the ability to save and recall multiple views in a drawing. Innovative Data Design, 415/680-6818. Contact vendor for update policy; $299 new.

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* = minor update.
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Quit mousing around and get to the point with The UnMouse. It does everything a mouse can—only faster and in less space. To move the cursor, simply touch the glass. To make a selection, merely press.

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MicroTouch

55 Jonspin Road /Wilmington, MA 01887
508 694 9900 /FAX 508 694 9980
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### To have products listed in this section, send upgraded software, an outline of changes since the previous release (indicate 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, 501 Second St., San Francisco, CA 94107.
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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 be contacted by phone.

Reader Service

A

703 Adobe Type Manager Adobe Systems; 415/991-4400, 800/833-6687.
704 Adobe Type Reunion Adobe Corp.; 206/628-2320.
705 Aldus Page Maker Aldus Corp.; 206/628-2320.
706 Aldus FreeHand Aldus Corp.; 206/628-2320.
707 Aldus Persuasion Aldus Corp.; 206/628-2320.
708 America Online Quantum Computing Services; 703/448-8700, 800/227-2985.
709 Apple Color High-Resolution RGB Monitor Apple Computer; 408/996-1010.
710 Apple Hand Disk SC series Apple Computer; 408/996-1010.
711 Apple LaserWriter II Series Apple Computer; 408/996-1010.

ATA Centers

(by order by state)

Alaska Center for Adaptive Technology P.O. Box 6609, Sitka, AK 99835; 907/747-6900.
Technology Resource Center 2704 16th St., #23, Santa Monica, CA 90405; 213/450-8827.

Special Awareness Computer Center 2975 N. Sycamore Dr., Simi Valley, CA 93026; 805/583-1881.

Special Technology Center 100 View St., #108, Mountain View, CA 94041; 415/961-6789.

Disabled Children’s Computer Group 2905 Rose St., Berkeley, CA 94709; 415/991-3224.

AccessAbility Resource Center 1076 E. 19th Ave., Denver, CO 80218; 303/961-6250.


Aloha Special Technology Access Center 669 Ahau St., Honolulu, HI 96827; 808/834-4092.

R.E.A.D.I. P.O. Box 523, E. 135th Ave., Shoreline, WA 98133; 206/377-1771.

Technical Aids & Assistance for the Disabled Center 950 W. Roosevelt, Chicago, IL 60605; 312/213-3573.

Technology Resources for Special People 3025 Canterbury, Salina, KS 67401; 913/827-0301.

Disabled Citizens Computer Center Public Library Fourth St., Louisville, KY 40203; 502/561-8637.

Blue Grass Technology Center 898 Georgetown St., Lexington, KY 40505; 502/233-1483.

SpecialLink 36th W. Fifth St., Covington, Ky 41111; 800/911-2464.

Center for Adaptive Technology and Educational Resources (CATER) 3540 Severn Ave., #300, Metairie, LA 70002; 504/888-9464.

MA Special Technology Access Center 1-6 Mudge Way, Town Center, Bedford, MA 01730; 617/275-2446.

Living and Learning Resource Center 601 W. Maple St., Lansing, MI 48906; 517/487-0883.

Pacer Center, Inc. 3826 Chicago Ave. S, Minneapolis, MN 55417; 612/827-2966.

Computer Resource Center 5025 Northrup, St. Louis, MO 63110; 314/776-1996.

Parents, Let’s Unite for Kids 1500 N. 30th St., Billings, MT 59101; 406/657-2055.

Carolina Computer Access Center Metro School, 700 E. Second St., Charlotte, NC 28202; 704/342-3004.

Nevada Technology Center 819 Las Vegas Blvd. S, Las Vegas, NV 89101; 702/382-3358.

Techcpress, Center for Independent Living 401 Columbia St., Utica, NY 13502; 315/797-4612.


Computer and Technology Services (CATS) 3241 N.E. 21st Ave., Portland, OR 97212; 503/221-8551.

Oregon Databank Technology Access Center 10100 N. MacAlister Rd., Island City, OR 97750; 503/563-4100.

Technology Access Center 2214 Metro Center Blvd., #110, Nashville, TN 37228; 615/248-6733.

East Tennessee Special Technology Access Center University of Tennessee, Rm. 106-A, Knoxville, TN 37916; 865/584-1465.

West Tennessee Special Technology Resource Center

Reader Service

B

112 AccessAbility Resource Centre 10100 N. MacAlister Rd., Island City, OR 97750; 503/563-4100.

BUI Exchange; 800/227-2985.

113 BIX Byte Information Center 206/522-1200.

114 Canvas Dechra Software; 305/594-6955.

115 CD Technology/Porta-Drive CD Technology; 408/542-8098.

116 Claris CDI Claris Corp.; 408/587-7000.

117 Closeshot Apple Computer; 408/991-1010.

118 ColorBoard 250 RasterOps Corp.; 408/562-4200, 800/408-7600.

119 ColorBoard 264 RasterOps Corp.; 408/562-4200, 800/408-7600.

120 ColorBoard 364 RasterOps Corp.; 408/562-4200, 800/408-7600.

121 ColorCapture Data Translation; 508/811-3700.

122 ColorSnap 32 Computer Friends, 503/626-2291, 800/547-3303.

123 ColorSpace III Mass Microsystems; 408/522-1200.

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<td>Avaya Corp.</td>
<td>508/835-6872</td>
<td>800/182-3270</td>
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<td>Bay Micro Systems</td>
<td>415/363-8392</td>
<td>809/872-9905</td>
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<td>BCM Systems</td>
<td>714/491-3393</td>
<td>800/872-9905</td>
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<td>Blue Chip Networks</td>
<td>750 Apple Computer</td>
<td>415/748-1600</td>
<td>800/422-1602</td>
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<td>CMS</td>
<td>714/259-9555</td>
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<td>Data Pak Series</td>
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<td>408/522-1200</td>
<td>800/522-7979</td>
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<td>Delphi</td>
<td>617/491-3593</td>
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<td>Delphi Delphi</td>
<td>617/491-3593</td>
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<td>DeskWriter Hewlett-Packard</td>
<td>800/752-0900</td>
<td>800/522-7979</td>
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<td>Digital Video Aapps Corp.</td>
<td>408/756-3650</td>
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<td>Display Server SE TVGiplan</td>
<td>Lapis Technologies</td>
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<td>800/522-7979</td>
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<td>Dream Machine: The Visual Computer</td>
<td>The Voyager Company</td>
<td>213/451-1383</td>
<td>800/522-7979</td>
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<td>Apple Computer</td>
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<td>Creative Software</td>
<td>201/665-9361</td>
<td>800/366-6899</td>
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<td>EditWorx</td>
<td>Specialized Computer Systems</td>
<td>415/370-8200</td>
<td>800/522-7979</td>
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<td>Encore Passport Designs</td>
<td>415/5726-0260</td>
<td>800/544-3020</td>
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<td>EPS Teacher's Assistant Executive Productivity</td>
<td>800/522-7979</td>
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<td>FileMaker</td>
<td>Claris Corp.</td>
<td>408/987-7000</td>
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<td>FileForce Aenus</td>
<td>408/252-4444</td>
<td>800/534-8157</td>
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<td>Fontina Eastgate Systems</td>
<td>617/924-9041</td>
<td>800/562-1638</td>
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<td>FrameGrabber 324NC</td>
<td>RasterOps Corp.</td>
<td>408/562-4200</td>
<td>800/562-7979</td>
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<td>Gradecam Professional</td>
<td>Ashton-Tate</td>
<td>213/329-8000</td>
<td>800/227-4866</td>
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<td>Abbott Systems CanOpen R v1.1</td>
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<td>Affinity Microsystems Tempo II</td>
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<td>Aladdin Systems Shortcut</td>
<td>16</td>
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<td>Stuff It Deluxe</td>
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<td>Master Juggler</td>
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<td>PowerChute</td>
<td>49</td>
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<tr>
<td>Berkeley System Design</td>
<td>49</td>
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<tr>
<td>Shooting Out II</td>
<td>49</td>
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<tr>
<td>Corel</td>
<td>69</td>
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<tr>
<td>OmniGraf or OmniSpill</td>
<td>105</td>
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<tr>
<td>OmniProof or OmniTrace</td>
<td>539</td>
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<tr>
<td>OmniPage</td>
<td>539</td>
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<tr>
<td>CE Software</td>
<td>63</td>
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<tr>
<td>QuickDraw or DiskTop v4.0</td>
<td>63</td>
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<tr>
<td>MockPackage Plus Utilities</td>
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<td>Calendar</td>
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<td>Central Point Software</td>
<td>23</td>
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<td>Copy II Mac v7.2</td>
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<td>MacTools Deluxe</td>
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<td>Dantz Software Development</td>
<td>149</td>
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<td>Replicat v1.1</td>
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<td>Dayne Communications</td>
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<td>DeskMount 5.5</td>
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<td>Fifth Generation Systems</td>
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<td>SuiteCase II</td>
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<td>Icon Simulations On Mac</td>
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<td>Insight Development MacPoint v12.34</td>
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<td>Kent Marsh NightWatch v1.03</td>
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<td>Loop Software PictureBook</td>
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<td>Magic Software Backtrack</td>
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**Accounting**

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<td>Aetric Software</td>
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<td>Atrix Checkwriter II v2.8</td>
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<td>Intuit Quickbooks</td>
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<td>Insight QIV 6.6</td>
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<td>Insight GL, AR, AP</td>
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<td>MECA Managing Your Money v3.0</td>
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<td>MoneyManager</td>
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<tr>
<td>Nolo Press WillMaker v3.0</td>
<td>32</td>
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<td>Reality Software</td>
<td>165</td>
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<td>Survivor Software</td>
<td>40</td>
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<td>ProGraf</td>
<td>56</td>
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<td>Timeslips III v2.0</td>
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<td>Turn Time Into Money!</td>
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**Modems/FAX**

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<td>Acme Interatax 12/48</td>
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<td>InterFax 24/96</td>
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<td>Anchor Automation Mac Pac 2400E</td>
<td>169</td>
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<td>Mac Send Fax</td>
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<td>Mac 2400E v5/15</td>
<td>239</td>
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<td>Mac 95 E External</td>
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<td>Applied Engineering</td>
<td>159</td>
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<td>DL/Mac Send Fax Option</td>
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<td>AE 36 Ex. Disk Drive</td>
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<td>DataLink Express</td>
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<td>DataLink Mac Portable</td>
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<td>DataLink Mac</td>
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<td>DataVUE Fax Desktop</td>
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<td>Hayas Microcomputing</td>
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<td>Smartmodem 2400D</td>
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<td>Smartmodem II v3.1C</td>
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<td>V2400 Baud Modem</td>
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<td>V2400 Internal w/Software</td>
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<td>V9600 Baud Modem</td>
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<td>2400 EX w/ QuickLink II</td>
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<td>2400 EX MNP w/ QuickLink II</td>
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<td>Orchard Orchid Fax modem</td>
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<td>Practical Peripherals</td>
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<td>Practical Modem 2400OSA</td>
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<td>Mac Connecting</td>
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<td>Promodem 2400 External</td>
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<td>MacFax</td>
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<td>PcNet 8600 Plus External</td>
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<td>MacKnowledge</td>
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<td>Shive NetModem V2400</td>
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<td>NetModem v3.2 (6600 BPS)</td>
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<td>Supra Corporation</td>
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<td>Supra Modem 2400</td>
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<td>Supra Modem 2400 MacPac</td>
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<td>Quantum 170 15ms</td>
<td>$879</td>
<td>$949</td>
</tr>
<tr>
<td>Quantum 210 15ms</td>
<td>$999</td>
<td>$1,079</td>
</tr>
</tbody>
</table>

**Seagate**

<table>
<thead>
<tr>
<th>Model</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seagate 20 32ms</td>
<td>$279</td>
<td>$349</td>
</tr>
<tr>
<td>Seagate 31 32ms</td>
<td>$319</td>
<td>$389</td>
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<td>Seagate 46 32ms</td>
<td>$339</td>
<td>$419</td>
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<tr>
<td>Seagate 62 28ms</td>
<td>$399</td>
<td>$459</td>
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<tr>
<td>Seagate 81 28ms</td>
<td>$429</td>
<td>$509</td>
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</table>

**Imprimis**

<table>
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<tr>
<th>Model</th>
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<tr>
<td>Imprimis 170 16ms</td>
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<tr>
<td>Imprimis 300 16ms</td>
<td>$1,499</td>
<td>$1,589</td>
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<td>Imprimis Runner 330 10.7ms</td>
<td>$1,825</td>
<td>$1,899</td>
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<td>Imprimis 600 16ms</td>
<td>$1,999</td>
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<tr>
<td>Imprimis 1.2 Gigabyte 16ms</td>
<td>$3,999</td>
<td>$4,099</td>
</tr>
</tbody>
</table>

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$1,999
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$2,695
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4M 56
4M Plus 103
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Adobe Photoshop 502
Adobe TypeSet 1 or 2 58
After Dark 22
Canvas 185
DOS Mooter 54
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Grammar 39
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Inkrad DesignStudio 249
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MS Works 179
MS Word 4.0 249
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MiniMac+ 2.0 449
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Peter Norton Utilities 69
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Quark Express 3.0 496
QuickDraw 34
Retrospect 1.1 146
SAM Virus Protection 56
Statview II 269
Soft PC 223
SoftIsA II 44
SoftSource 99
Systim 8 200
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TOPS DDS 165
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White Knight 75
WordPerfect 226

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Sharp JX-300 $3099
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$15

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MicroTek 4000GS $2639
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Sharp JX-300 $3099
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<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
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</thead>
</table>
| MacTel hardware | $109
| MacTel Extended Keyboard ADB Eng./German | $119 |
| MacTel Extended Keyboard ADB Eng./German | $18 |
| Ex1ended Keyboard ADB Eng./German | $109
| Ex1ended Keyboard ADB Eng./German | $119 |
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| Microtek Scanners | $2195
| MSF 300 GS, including cables and software |
| MSF 300Z ColorScan, including cables and software | $2945 |
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| • Macintosh lICX, CI, & NEW Mac IIIFX • Mac II FX logicboard upgrades and more Always available. Call for the absolute lowest price anywhere! |
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| Senior | |
| Syquest Syquest Cartridges | $75 |
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| Macintosh FX & LaserWriter NTX SIMMS | $69 |
| 4 Mo Mac IIx Upgrade | $450 |
| INDEX Macintosh Portable RAM | $1295 |

## Printers

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
</tr>
</thead>
</table>
| TI microLaser Printers | $2995
| PS35 w/35 fonts | $2995 |
| PS17 w/17 fonts | $2495 |
| AppleTalk Connector included! |
| Microtek Scanners | $1745
| MSF 300 GS, including cables and software |
| MSF 300Z ColorScan, including cables and software | $2195 |
| MSF 400 GS | $2945 |

## Software

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
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<tbody>
<tr>
<td>Adobe Photoshop</td>
<td>$599</td>
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<td>Adobe</td>
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<td>Microsoft Office</td>
<td>$599</td>
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<td>Microsoft Excel</td>
<td>$279</td>
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<td>Microsoft Word 4.0</td>
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<td>Quark</td>
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<td>Quark Xpress</td>
<td>$795</td>
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<tr>
<td>Aldus</td>
<td></td>
</tr>
<tr>
<td>PageMaker 4.0</td>
<td>$569</td>
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</table>

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- No surcharge for Visa or MasterCard. Add 4% for American Express. Your credit card will not be charged until your order is ready to ship. International orders call for tax details. European banking service available. • Purchase orders accepted from university, government, military NET 30 and corporate (on approval), NET 30. • Please allow 10 days for personal and company checks to clear. • Returned merchandise must be authorized to expedite process. call 512/451-2600 for RMA number. • All defects will be replaced or repaired at MacTel's discretion. • Shipping and handling charges not refundable. • Product must be in original condition and original shipping container including all packing materials. • All products are subject to a 5% restocking fee. • Prices subject to change without notice and all products subject to availability.

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<table>
<thead>
<tr>
<th>Capacity</th>
<th>Access time in milliseconds</th>
<th>External price $</th>
<th>Internal price $</th>
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<tbody>
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<td>20</td>
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</tr>
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<td>Imprimis (FH)</td>
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<tr>
<td>Removable SyQuest</td>
<td>25</td>
<td>$599</td>
<td>NA</td>
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</tbody>
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Complete with one 45Mb removable cartridge. Extra Cartridge $79

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<tr>
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<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 mb</td>
<td>$339</td>
<td>$439</td>
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<td>80</td>
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<td>799</td>
</tr>
<tr>
<td>170</td>
<td>899</td>
<td>999</td>
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**Imprimus WREN Drives**

<table>
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<th>Capacity</th>
<th>Internal</th>
<th>External</th>
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<tbody>
<tr>
<td>173 mb</td>
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</tr>
<tr>
<td>630</td>
<td>2595</td>
<td>2749</td>
</tr>
<tr>
<td>1 Gig</td>
<td>4349</td>
<td>4595</td>
</tr>
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</table>

**Syquest**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 meg</td>
<td>$649</td>
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The Macworld Catalog

**Business Opportunities**

### LaserCharge & TRW

**Introduction**

LaserMaintenance

Two World Leaders Now Offer the Number One Service Training Opportunity.

The rapid market penetration of laser printers and copiers in the U.S. and around the world has created an increasing need for qualified service personnel in this dynamic industry. LaserCharge and TRW are meeting this need with the exclusive offering of the new LaserMaintenance Training Program.

Through LaserCharge's exclusive agreement with internationally recognized TRW, LaserMaintenance enrolls three days of expert service and maintenance training, complete tool kits, training manuals and video tape, access to printer and copier replacement parts, and all the technical backup required to create your own laser printer and copier service business. All travel and lodging expenses are covered in a special turn-key package.

The new LaserMaintenance program is being offered in combination with LaserCharge's highly successful toner cartridge recharge training program. Act now and save up to $2000 off the total combination price (limited time offer).

Call today for full details on this exciting new opportunity from LaserCharge. Because of their highly detailed curriculum, both LaserCharge and LaserMaintenance training classes are limited in size, so make your reservation soon. Now is the time to take advantage of this excellent income producing career program.

In Canada, call LaserNet, 416-847-7823.

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### Disk Drive / Tape Power Supplies

Low Cost / Affordable Power Supplies for Disk, Tape and Optical Drives. Compact, proven reliability with agency approval.

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**Circle 618 on Reader Service Card**

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In Canada, call LaserNet, 416-847-7823.
## BUSINESS SOFTWARE

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- **Microsoft Word** - Microsoft
- **Microsoft Works** - Microsoft
- **Microsoft Excel** - Microsoft
- **Aldus PageMaker** - Aldus
- **FileMaker II** - Claris
- **QuarkXPress** - Quark
- **MacWrite II** - Claris
- **MacDraw** - Claris
- **Wingz** - Informix
- **Aldus FreeHand** - Aldus

## EDUCATION SOFTWARE

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- **Where in the World Is Carmen Sandiego?** - Broderbund
- **Reader Rabbit** - The Learning Company
- **Where in the USA Is Carmen Sandiego?** - Broderbund
- **Math Rabbit** - The Learning Company
- **Math Blaster** - Davidson & Associates

## ENTERTAINMENT SOFTWARE

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- **Tetris** - Spectrum HoloByte
- **SimCity** - Maxis Software
- **MacGolf** - XOR/PCAI
- **Microsoft Flight Simulator** - Microsoft
- **Welltris** - Spectrum HoloByte

## NETWORK/DATA COMMUNICATIONS

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- **TOPS** - Sika Corporation
- **AppleShare** - Apple Computer
- **LocalTalk** - Apple Computer
- **Netware for the Macintosh** - Novell
- **MicroPhone II** - Software Ventures

## HARD DISKS*

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- **MacStack SD20** - CMS Enhancements
- **MacStack SD40** - CMS Enhancements
- **Platinum PI 40 External** - CMS Enhancements
- **Micro/Stack 20 External** - MicroNet Technology
- **Micro/Stack 40 External** - MicroNet Technology

## ADD-IN BOARDS/MEMORY

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- **Apple 8-bit Color Card** - Apple Computer
- **Spectrum/8 Series III** - SuperMac Technology
- **Radius Accelerator** - Radius
- **Apple 1MB Expansion Kit** - Apple Computer
- **Apple 2MB Expansion Kit** - Apple Computer

## UTILITY SOFTWARE

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- **SAM II** - Symantec
- **SUM II** - Symantec
- **Virex** - HGC Software
- **Adobe Type Manager** - Adobe
- **Pyro** - Fifth Generation Systems

## PRODUCT WATCH

Reprints or forthcoming products of particular interest...

- **Muse** - Occam Research
- **RadiantTV** - Radius
  - Full-motion video in real-time
  - Sky Shadow - Cassidy & Greene
    - Defender-like arcade game

Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order vendors. Covers sales ending May 1990.

*Does not include hard disks installed at the factory.*
Affordability Has Always Been The Best Reason For Buying Ehman Hard Drives.
Now.

A new improved manual reduces learning time.

24-hour burn-in testing and improved quality control.

50-pin connectors to link peripherals.

New formatting software for clarity, ease of installation and optimum performance.

An improved 111 m11wl reduces learning time.

24-hour burn-in testing and improved quality control.

Ehman New for ing software for clarity, ease of installation and optimum performance.

Fomatter Disk 50-pin connector to link peripherals.

New E-Series.

manual makes learning to use your drive a snap.

And all of the new E-Series drives will be tested twice, including a final 24-hour system burn-in check. And if something goes wrong, Ehman is still backing all of its products with a 30-day, no questions asked money-back guarantee.

Now, if you think all these new extras will cost you extra, think again. The price is the only feature we haven’t changed. Our external drives still start below $300 and our popular SyQuest removable is just $649 including a cartridge.

Whatever your reason for buying our hard drives, price or quality, call your Ehman sales representative and order yours today.

Ehman The Apple Alternative

<table>
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<th>Hard Drives (MB)</th>
<th>Internal</th>
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Call 1-800-257-1666 or 1-307-789-3830
Fax 1-307-789-4656
Tech Support 1-307-789-1901

Circle 154 on reader service card
Since 1985, several hundred thousand Macintosh users have been interested in Ehman drives because of their attractive pricing. "Good product, great price and 30 days to change my mind," pretty much summed it up. Until now.

Introducing the new Ehman E-Series of hard drives and removables. An enhanced line of products, loaded with features that bring you unsurpassed quality and reliability. The new enhancements include two power outlets that enable you to turn on your entire Mac system from your hard drive, and 50-pin cables that make daisy chaining a cinch. There's also a new, quieter fan that makes your Ehman drive invisible to the ear.

Introducing our new formatting software is simple, yet sophisticated. It's essentially the same software used by companies that charge twice as much for their hard drives. You'll notice this difference right away. But other extras may not be so obvious. Our dual-fuse circuitry, for instance, provides a second buffer in the event of an electrical surge, while our new smart voltage switch means Ehman drives automatically operate on both international and domestic currents.

The new E-Series also offers enhanced ease of use and reliability. A completely redesigned user...
EYESORE VS. EYE PROTECTION

As today's monitors get bigger and brighter, anti-glare filters become less of an option and more of a necessity.

The right filter can combat eye fatigue, help eliminate headaches, even reduce overall body stress.

Yet, the irony is that something so good for your eyes can be such an eyesore.

In fact, most filters look like they belong to someone else's system.

The fit is sloppy. The colors don't match. The materials are different.

Kensington has a different idea.

Instead of making a filter that will fit on any monitor, we make filters that will only fit a specific monitor.

An example is our Maccessories® SE Anti-Glare Filter. It looks so much a part of the SE, you would think it was designed by the same people who designed the SE.

The styling is complementary. The color identical. Even the same material is used.

And unlike generic filters, the fit is perfect. So light passes through the filter, never around it.

Kensington uses only optical quality glass with a ceramic anti-reflection and scratch-resistant coating.

The result is a 96% reduction in glare. And an improvement in contrast and clarity of up to 20 times.

In short, the most advanced eye-protection system you can find today—it even filters out VLF and ELF radiation and dissipates static.

Kensington has custom designed screens for the Mac, Mac Plus, Mac SE, Apple IIGS, as well as for the entire Mac II family of large screen monitors.


See us at Macworld Booth 5312

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