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A shortage of Quadra 950s has resulted from several halts in production due to manufacturing problems. Dealers reported at press time that they were unable to get any of the systems. However, Apple said it has resumed shipping the 950 from its manufacturing plants in Fremont, California, and Cork, Ireland, and that any backlog should be remedied soon.

Mac Software on HP: Xcelerated Systems (619/576-3080) is shipping Liken, a $695 emulator that runs standard Mac software on HP's Apollo 9000 Series 700 workstations. Xcelerated says Apple has ignored Liken, though Apple and another Mac-emulator developer, Quorum, nearly did legal battle over patent infringement.

Microsoft Windows for Mac: Insignia Solutions (415/694-7600) is upgrading SoftPC to support Windows. SoftPC Windows runs standard Windows software on a Mac and supports VGA and extended memory. Insignia recommends using a Quadra for the $649 package, which comes preconfigured with DOS 5.0 and Windows 3.1.

DocuComp Upgraded: Advanced Software (408/733-0745) is shipping DocuComp II for $179.95. The new version runs in the background; under MultiFinder; preserves formatting, tables, and embedded graphics in the comparison document; and reads Word 5.0 and WordPerfect 2.1 files.

Disk-Syncing Utility: Microseeds Publishing's InSync will compare the contents of two volumes and update each volume with the newest versions of files. A scripting language will provide users precise control. InSync should list for $129.

Microseeds' products are now distributed by Inline Design, 203/435-4995.

UpDiff takes a different approach to keeping disks in sync. It compares two files (it doesn't work on volumes) and creates an intermediate file containing just the data bits that need to be modified; UpDiff can then insert the changes into the older file. UpDiff lists for $169 from KyZen, 609/354-3863.

Amateur Geographers: For kids of all ages, MECC (612/569-1500) is shipping USA GeoGraph. GeoGraph users can perform simple statistical analyses on information (the $49.95 package includes a megabyte of U.S. demographic data) and then create many kinds of maps and graphs.

QMS unveils color printers with the company's emulations of PostScript Level 1 and Level 2. The ColorScript 210 and ColorScript 230 are thermal-transfer printers that use both QMS's Crown print architecture and a RISC processor for high speed. The $4995 ColorScript 210 prints on letter- or legal-size paper, and the $7995 model 230 prints on ledger- and Super B-size paper. Both were slated to ship in September. QMS, 205/633-4300.

Miami Hurricane: The August hurricane destroyed NuBase-publisher New Era Software's Miami offices. New Era's temporary address is 16910 Bay St. Anchorage East, #205, Jupiter, FL 33477; telephone 305/238-8408, 305/232-7467, or 305/232-7636. Miami-area Mac companies Deneba, Olduvai, and Softsync survived with minor damage and expected to reopen by the time you read this.
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\hline
\text{Effect} & \text{With ThunderStorm} & \text{Without ThunderStorm} \\
\hline
\text{Gaussian Blur} & 12 \text{ seconds} & \text{3.00 minutes} \\
\text{Unsharp Mask} & 15 \text{ seconds} & \text{6.00 minutes} \\
\text{Resize} & 21 \text{ seconds} & \text{2.15 minutes} \\
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\end{array} \]

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Circle 88 on reader service card
The Editor-in-Chief Looks Back—and Forward

BY JERRY BORRELL

FOR THE LAST SEVEN YEARS I have had the honor of sitting down once a month to reflect upon the Macintosh in this column, a significant amount of rumination for me. This, my 75th editorial, marks my departure from Macworld magazine to head up Sumeria, a new company where several former Macworld colleagues and I will publish Macworld Interactive, an interactive electronic version of Macworld magazine.

Which makes this an extraordinary column for me to write, one of reflection. The changes at Macworld since my first editorial meeting more than seven years ago have been startling. At that time, there were 6 of us laboring away in the shadows of our then-larger sibling publication, PC World, which covers the IBM side. Today there are about 50 employees in editorial and design at Macworld, and more than a dozen Macworld publications worldwide.

One of the things I am most proud of about my tenure is having one of those original staff members, Adrian Mello, succeed me as editor-in-chief at Macworld. Another of those original staff members, David Ushijima, is now editor-in-chief and publisher of Macworld Japan. Dan Farber, another founding editor, left us several years ago and is now editor-in-chief of the industry trade paper, MacWeek. Dennis McLeod, one of the original designers on Macworld, continues here today as design director of Macworld and as an artist of growing national repute. Lon Poole and Erfert Fenton, other founding editors at Macworld, continue to contribute to the magazine and act as collaborators on many of our projects. Charlie Barrett—the magazine's managing editor, one of the most experienced editors in the publishing industry, and my friend of almost 15 years—will continue to oversee the entire copy and production process of the 1200 editorial pages appearing in Macworld each year. If one can come to view work as one's life, these last seven years have been as rich and rewarding as one could ask, thanks to these people.

Back in 1985 when I joined Macworld, the Mac arena was not as sanguine as today. Long lines of about-to-be-laid-off employees stood outside Jean-Louis Gassé’s office at Apple Computer, wondering whether they would be able to find new jobs. Third-party Macintosh developers were dropping like flies. About 100,000 Macintosh owners read Macworld. The six of us at Macworld were shoehorned into a corridor without a network, a laser printer, a copy of PageMaker, or a testing laboratory.

Somehow we’re still shoehorned into our space, but now Macworld occupies an entire floor of an office building in the trendy South of Market area of San Francisco. There are now more than 500,000 readers of our magazine. I’m proud to say the editors and designers have avoided the rancorous battles that mar so many major publishing houses. Looking at the Macworld staff, you’ll see the most experienced group of Macintosh writers in the world, and one of the most talented groups of designers and art directors in the nation.

Expertise and Integrity
AS A RESULT OF THE WORK OF NEARLY a decade, Macworld has built a staff of unrivaled experience and integrity. Working for Adrian are senior editors Deborah Branscum, Cheryl England, and Carol Person, all of whom worked for at least two computer magazines before joining Macworld. Tom Moran, our hardware news editor, has experience at four other computer magazines, and his colleague Dan Littman, software news editor, was the managing editor and primary force behind Macazine during that publication’s life. Assistant managing editor Ruth Henrich came to Macworld four years ago with over a decade’s experience at Mother Jones. Her colleague Luis Camus, assistant managing editor for editorial production, came to us from Macintosh Today.

After four years Luis and his staff, senior production editor JoAnn Villalobos and assistant production editor Lisa Braziele, are still working monthly production miracles. Joanne Hoffman, Arne Hurry, and Leslie Barton head up, respectively, art direction, informational graphics, and design at Macworld and are responsible for keeping the magazine’s appearance on track through the three major redesigns since its inception. I could continue to recite a list of credits and contributions for every person making up our remaining staff, but will instead point to the over 45 editorial and design awards we have received during my tenure, making Macworld one of this country’s most award-winning publications. Again, thanks to the magazine’s editors and designers for their hard work and often-unrecognized efforts.

A New Beginning
NOW EIGHT OF US ARE STARTING over. We have the chance to develop a new Macworld in an interactive format.

Chairman Pat McGovern, who heads our parent company, International Data Group (IDG), offered me the opportunity to form a company to explore electronic publishing based on the work we did two years ago to produce the first electronic version of a Macintosh-based magazine. As a result, Sumeria has been incorporated. With a name that I hope reflects the era of change and creativity represented in the culture of Sumer, which arguably gave Western civilization its first written language. Sumeria will publish five CD ROM-based issues of Macworld Interactive this year based upon articles in Macworld. The company will also explore means of distributing the magazine other than on CD ROM.

Looking Back
IT IS GOING TO BE HARD FOR Sumeria to live up to the expectations created by Macworld over the last seven years, a period...
The tradition continues: Clockwise from left—Adrian Mello (editor-in-chief), Dennis McLeod (design director), and Charlie Barrett (managing editor).
No One Has A More Complete Family Of Ethernet Products Than Asante.

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COMMENTARY
face: copyright, trademark, libel, and others. My fondest memory in this regard is of going to court to defend the magazine on a First Amendment issue as a result of a column written by contributing editor Steven Levy. Our president and publisher, Jim Martin, stood solidly behind me as I marched into court to cite Times v. Sullivan to protect the freedom of the press. We won.

There were other threats—more bellicose, less realistic—by other advertisers and vendors. There was the last-minute threat of a temporary restraining order in federal district court by one advertiser determined to manipulate our publication. And numerous threats of litigation. All faced down, with no retractions or apologies issued, because we had done our work well and were prepared to stand our ground. I owe thanks to our legal representative, Bernard Burke, of the law firm Howard Rice Nemerovski Canady Robertson & Falk, for dozens of phone calls at odd hours in the heat of battle. Thanks, Bernie, for helping defend the Constitution, and for your patience; you make me want to stop taking potshots at lawyers.

Almost four years ago I nearly left Macworld to join Apple in order to publish a CD ROM-based magazine. I was inspired to that vision by Larry Tesler, then the VP of Apple's Advanced Technology Group and now vice president of the Newton Group. Instead I stayed at Macworld and am finally able to realize that vision with Macworld Interactive. Larry was the person who demonstrated the Xerox Star to Steve Jobs during Jobs's tour of Xerox PARC, giving him inspiration for the Macintosh. Larry is now guiding Apple's entry into the consumer market with personal digital assistants. And he's inspiring others with visions for the future.

Two other Macintosh industry figures have been a source of inspiration to me over the years. Reese Jones, founder of Farallon, and Jean-Louis Gassée, now of Be Labs. It was at Reese’s insistence that I moved toward establishing what are now workaday ISDN connections with our foreign publications. Jean-Louis, well, he was just an inspiration.

Looking Forward
I AM CURRENTLY WORKING ON MY next editorial, for Macworld Interactive. I recently found myself interviewing John Warnock, founder of Adobe Systems, talking about the future of electronic publications. But in contrast to earlier interviews, this time I carried a video camera. And in my next column (Macworld Interactive Fall, Issue 1, Volume I) you'll actually hear John describe what he believes will happen.
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MacWeek, February 1991

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(under 80MB)

Best Hard Drive!
(80-200MB)

Best Hard Drive!
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Best Color Scanner!
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<thead>
<tr>
<th>Drive Size</th>
<th>Internal</th>
<th>External</th>
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<tbody>
<tr>
<td>42MB Quantum ELS NEW!</td>
<td>$199</td>
<td>$269</td>
</tr>
<tr>
<td>80MB Qntm 2½&quot; for Powerbook</td>
<td>$449</td>
<td>PocketDrive</td>
</tr>
<tr>
<td>85MB Quantum ELS NEW!</td>
<td>$299</td>
<td>$399</td>
</tr>
<tr>
<td>120MB Quantum</td>
<td>$399</td>
<td>$499</td>
</tr>
<tr>
<td>120MB Qntm 2½&quot; for Powerbook</td>
<td>$599</td>
<td>PocketDrive</td>
</tr>
<tr>
<td>170MB Quantum ELS NEW!</td>
<td>$479</td>
<td>$579</td>
</tr>
<tr>
<td>240MB Quantum LPS</td>
<td>$679</td>
<td>$779</td>
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<tr>
<td>425MB Quantum Maui</td>
<td>$1019</td>
<td>$1119</td>
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<tr>
<td>650MB Seagate</td>
<td>$1599</td>
<td>$1699</td>
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<tr>
<td>1.2GB Seagate</td>
<td>$1749</td>
<td>$1849</td>
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<tr>
<td>1.6GB Seagate</td>
<td>$2549</td>
<td>$2649</td>
</tr>
<tr>
<td>750MB-2GB HP 3½&quot; / 5¼&quot;</td>
<td>Call</td>
<td>Call</td>
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- FREE switchable termination ($50 value)
- Universal power supply
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The 1992 Macworld World Class Awards
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Best Hard Drive! (80-200MB)
Best Hard Drive! (over 200MB)
Best Color Scanner!
La Cie Silverscanner
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### La Cie PocketDrives

Quantum power “to go.”

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>40MB PocketDrive incl. T-connector</td>
<td>$299</td>
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<tr>
<td>80MB PocketDrive incl. T-connector</td>
<td>$549</td>
</tr>
<tr>
<td>120MB PocketDrive incl. T-connector</td>
<td>$699</td>
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<tr>
<td>Optional PocketDock Cable</td>
<td>$99</td>
</tr>
<tr>
<td>Extra T-Connector</td>
<td>$59</td>
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</tbody>
</table>

### La Cie Optical Drives

Reliable, fast, economical and conforms to both ANSI and ISO standards.

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Internal†</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>128MB 3½&quot; Optical NEW!</td>
<td>$1499</td>
<td>$1599</td>
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</table>

### La Cie Tape Drives

Drive Type

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Internal†</th>
<th>External</th>
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<tbody>
<tr>
<td>155MB Tape Drive</td>
<td>n/a</td>
<td>$649</td>
</tr>
<tr>
<td>600MB Tape Drive NEW!</td>
<td>$799</td>
<td>$899</td>
</tr>
<tr>
<td>1.3-2.0GB DAT</td>
<td>$1299</td>
<td>$1399</td>
</tr>
<tr>
<td>2-8GB Compression DAT</td>
<td>$1599</td>
<td>$1699</td>
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### La Cie ExpressDrive

The ultimate in data security. Drives are both upward and downward compatible.

<table>
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<tr>
<th>Drive Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>ExpressDrive Chassis</td>
<td>$399</td>
</tr>
<tr>
<td>50-240MB Quantum LPS</td>
<td>from $399</td>
</tr>
</tbody>
</table>

*for Quadra 900 or 950

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The 1992 Macworld World Class Awards

Best Hard Drive! (under 80MB)

Best Hard Drive! (80-200MB)

Best Hard Drive! (over 200MB)

Best Color Scanner!

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• Lightning fast scanning
• Color dynamic previews
• FREE Silverscan™ software plug-ins

La Cie Silverscanner

with Color It! and Read-It O.C.R. Pro!

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The 1992 Macworld World Class Awards

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Best Hard Drive! (80-200MB)

Best Color Scanner!

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"The choice is clear . . . buy the La Cie Silverscanner."

Macworld, June 1991

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4B754
Angry at Ehman

I believe you were entirely too kind to Michael Ehman and his operations at Ehman, Inc. and now at Bridgette (Conspicuous Consumer, August 1992).

Michael Ehman is quoted as saying that "probably less than a couple of dozen" people were burned in his slick deal to close Ehman, Inc. That, of course, does not include the people of Wyoming, stuck with a state-guaranteed loan. Or his loyal employees who were dumped after they were used by him, as reported in your article. My guess is that you will hear from more than a couple of dozen who were unhappy with Ehman and his operation.

I regret that Macworld would even suggest Ehman deserves a fresh, new start, especially in a project he says he is not even involved in, so he can continue his practices at the expense of consumers who expect honorable treatment.

Kennett Allard
Fair Oaks, California

Thank you for your in-depth article about the disgusting situation at Ehman, Inc. I think you have done your readers a great service. Keep up the good work.

L. D. Hunt
Seabrook, Texas

World-Class Woes

The World-Class Awards (August 1992) purport to reflect the relative quality of different products in each category on the basis of reader votes. I wonder how many voters actually compared two products in each category in which they voted. For example, in word processing software, Microsoft Word received 65 percent of the votes. No one who has actually compared the four heavy-duty word processors on the list can reasonably claim that Word is so grossly superior to FullWrite, Nisus, or WordPerfect. Rather, the results closely reflect the relative market shares of the various products. Those shares are influenced at least as much by advertising budgets and general conformity, masquerading under the banner of compatibility requirements, as by true indicators of quality. In fact, the software market is governed by a law that states that once a product receives a certain share of the market, it doesn’t have to be good at all. It will succeed anyway, because

U.S. businesses and the National Security Agency will be losers.

Eric Samstad
Huntington Oaks, California

I found Mr. Levy's article on electronic privacy interesting and alarming. It seems Big Brother is on his way ... fast! I am interested to know of any groups that keep abreast of the situation, so I can keep up with the laws our government is trying to legislate regarding electronic privacy.

Timothy Parker
Sherman Oaks, California

I enjoyed Steven Levy's article on the battle between software vendors and the U.S. government over computer data encryption (The Iconoclast, August 1992). Privacy for everyone is an important ideal to strive for. One point Levy did not mention is that the current exportation restrictions may rob U.S. businesses of the chance to exploit our competitive lead in the potentially lucrative global encryption market. If we don't market encryption technology overseas, the Japanese and Europeans soon will, and both

Two groups concerned about matters of electronic privacy are Computer Professionals for Social Responsibility, 415/322-3778 or via internet (cpsr@csill.stanford.edu), and the Electronic Frontier Foundation, 617/864-0665. —Ed.

Cryptically Protected

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OVERPROTECTED TYPING TEACHER

THANK YOU FOR DAVID POGUE’S ARTICLE ON THE BANE OF TYPING (THE DESKTOP CRITIC, AUGUST 1992). I HAD STARTED LEARNING THE DVORAK KEY MAP ONE WEEK BEFORE READING THIS, AND LIKES RECOMMEND IT. TWO CAVEATS, THOUGH: THE AUTHOR SAYS HE LEARNED DVORAK IN TWO DAYS. SO DID I, BUT I HARDLY ACHIEVED MY QWERTY WORDS PER MINUTE IN THAT TIME. I TYPE AROUND 75 WORDS PER MINUTE ON THE DVORAK KEY MAP AND—SO FAR—20 ON DVORAK. IT’S AGONY TO BE SO SLOW, BUT THERE’S A LOT OF SUNLIGHT AT THE END OF THE (CARPAL) TUNNEL.

ALSO, I AGREE THAT MAVIS BEACON TEACHES TYPING IS A FINE PROGRAM, BUT WHY IN THE WORLD DID THEY HAVE TO KEY-DISK COPY-PROTECT IT, AND MORE TO THE POINT HERE—WHY DID YOUR ARTICLE GIVE NO WARNING ABOUT THIS? THE KEY-DISK SCHEME IS DANGEROUS, INTRUSIVE, AND ODDIOUS.

JOHN RETHORST
ROCHESTER, NEW YORK

SOFTWARE TOOLWORKS REPORTS THAT VERSION 2.0 OF MAVIS BEACON TEACHES TYPING, DUE THIS FALL, WILL WORK WITH ADOBE TYPE MANAGER AND WON’T BE COPY-PROTECTED.

DAVID POGUE ADDS THAT AFTER ONLY TWO DAYS TYPING ON A DVORAK LAYOUT, HE HADN’T MATCHED HIS QWERTY TYPING SPEED EITHER.—ED.

COMPARATIVE REVIEW FEATURES ARE OVERLY ELABORATE FOR MOST FOLKS—THEY AREN’T HOT TO SWITCH, THEY AREN’T HOT TO UPGRADE. THEY JUST WANT TO KNOW WHAT’S NEW AND WHETHER IT WORKS.

NO ONE WANTS TO WAIT A YEAR TO SEE IF A DRIVE’S GOOD. FACE THE SITUATION, YOUR READERS FACED AND TEST THE NEW STUFF AS WELL AS YOU INTELLIGENTLY CAN. FORGET ABOUT A YEAR FROM NOW.

TRY TO BRING UP MORE WARTS IN REVIEWS OF NEW PRODUCTS. TOO OFTEN, I READ A YEAR LATER THAT “OF COURSE THIS PROGRAM NEVER DID THAT WELL.” THIS COMES UP AFTER I’VE BOUGHT THE PRODUCT AND DISCOVERED THIS ON MY OWN.

JOHN SWEENEY
SEATTLE, WASHINGTON

THERE IS A FOOLISH CONSISTENCY IN THE MAGAZINE’S REVIEWS. MOST SPEAK POSITIVELY ABOUT THE PRODUCT AND SAY LITTLE ABOUT THE SHORTCOMINGS THE REVIEWS MAY HAVE NOTED. IF YOU TOOK A POLL OF YOUR LONGTIME SUBSCRIBERS, MY GUESS IS THAT YOU WOULD FIND THAT WHAT THEY CONSIDER MOST IMPORTANT ARE THE NEWS AND NEW PRODUCTS LISTINGS, FOLLOWED BY COMPARATIVE REVIEWS OF HARDWARE.

I WOULD BE SURPRISED IF ANY OF THEM FOUND MUCH USE FOR YOUR SUPERFICIAL SOFTWARE REVIEWS.

STEVEN BAIRD
BATON ROUGE, LOUISIANA

I HAVE BEEN A READER OF MACWORLD FOR ONLY SIX MONTHS AS I ONLY RECENTLY PURCHASED A MACINTOSH LC, YET I FIND THE PRODUCT-TESTING ARTICLES IN EACH ISSUE THE MOST INTERESTING AND INFORMATIVE. HOWEVER, THESE ARTICLES WOULD BE MORE USEFUL TO ME IF AT LEAST SOME OF THEM DEALT WITH AN EXPLANATION OF THE MYRIAD SPECIFICATIONS, FORMATS, AND SO ON, OF THE EQUIPMENT REPORTED ON. IN MANY CASES, THE AUTHORS USE TERMS THAT ONLY A COMPUTER EXPERT WOULD UNDERSTAND. IN OTHER WORDS, I WOULD LIKE TO SEE ARTICLES THAT WOULD ASSIST THE NEW OWNER OR COMPUTER HARDWARE NOVICE RAISE HIS LEVEL OF UNDERSTANDING AND COMPREHENSION SO THAT NEW TECHNOLOGIES AND APPROACHES COULD BE BETTER UNDERSTOOD.

LEON P. KING, JR.
SUMMERTON, SOUTH CAROLINA

I WAS TAKEN ABACK WHEN YOU WROTE THAT YOU ARE “ATTEMPTING TO REPLACE THE VAST FEATURE CHARTS WITH NARRATIVE SUMMARIES OF PRODUCTS’ STRENGTHS.” THE WORST DIRECTION YOU COULD TAKE WOULD BE TO RETURN TO YOUR REVIEW FORMAT OF SEVERAL YEARS PAST, WHICH OFTEN CONSISTED OF A DISORGANIZED, STREAM-OF-CONSCIOUSNESS PROSE STYLE THAT WAS NOT ONLY IMPENNETRABLE BUT LACKING IN “HARD” INFORMATION.

ONE PRIME EXAMPLE TO WHICH I MAKE A VALID COMPARISON-CHART ROW IS THE NUMBER OF FOOTNOTES IT TAKES TO EXPLAIN IT. IF THE ROW HAS MORE THAN ONE FOOTNOTE IN IT, IT OBVIOUSLY NEEDS A PARAGRAPH OF MEANINGFUL EXPLANATION OUTSIDE THE CHART FORMAT. YOU MAY NOT NEED TO REFER TO THE MATTER IN THE CHART AT ALL. IF YOU CLEARLY STATE YOUR CRITERIA FOR INCLUSION, THERE IS NO REASON WHY THE CHART MUST COVER EVERY SINGLE ASPECT OF AL the COMBINED PRODUCTS.

JEFF FRKANJA
SEATTLE, WASHINGTON

YOUR PRODUCT-TESTING REPORTS, AS FINE AS THEY ARE, STILL DO NOT ADDRESS OR SOLVE A VEXING PROBLEM: THE INDEPENDENCE OF THE SOURCE OF INFORMATION. WHAT CRITICAL INFORMATION MAY BE WITHHELD OR DISTORTED, UNCONSCIOUSLY OR OTHERWISE, IF AN ADVERTISER’S OX IS ABOUT TO BE GORED? HAVE YOU BEEN ABLE TO BUILD A CHINESE WALL BETWEEN YOUR ADVERTISERS AND THE READER?—ED.

PRODUC'T TESTING AND LATE NIGHTS AT THE LAB: PART THREE

WHAT DO I LOOK FOR IN THE PRODUCT REVIEWS? PERHAPS SURPRISINGLY, I DO NOT LOOK FOR A DEFINITIVE ANSWER. I CANNOT REALISTICALLY EXPECT ANY MAGAZINE TO EVALUATE AND SELECT A PRODUCT FIT FOR MY PARTICULAR NEEDS OR PERCEIVED VALUES.

I DO WANT MACWORLD TO IDENTIFY MY ALTERNATIVES; PROVIDE QUANTITATIVE PERFORMANCE COMPARISONS; OBJECTIVELY EVALUATE PRODUCT QUALITY; LIST THE MANUFACTURERS’ PRICE FOR THE PRODUCTS; AND IDENTIFY, FOR COMPARISON PURPOSES, VENDOR SUPPORT LEVELS, UPGRADE POLICY, AND WARRANTY.

LARRY JACOBS
PLANO, TEXAS

COMPARATIVE REVIEW FEATURES ARE OFTEN ELABORATE FOR MOST FOLKS—THEY AREN’T HOT TO SWITCH, THEY AREN’T HOT TO UPGRADE. THEY JUST WANT TO KNOW WHAT’S NEW AND WHETHER IT WORKS.

NO ONE WANTS TO WAIT A YEAR TO SEE IF A DRIVE’S GOOD. FACE THE SITUATION your readers face and test the new stuff as well as you intelligently can. Forget about a year from now.

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**Product Testing (Continued)**

vertically test samples of its products for extended life? What is the company's policy toward purchased components? Does the company have an approved list of suppliers?

Last but not least, Macworld could survey its readers, along the lines of Consumer Reports, to find out what their experience with individual products has been. Publishing the results of reader-satisfaction surveys would not only prompt manufacturers to clean up their act, but would also go a long way toward alerting readers as to what products are liable to cause problems.

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**Letters**

I HAVE ALWAYS FOUND YOUR REVIEWS USEFUL, HOWEVER, THEY SHARE A SIGNIFICANT WEAKNESS WITH EVERY OTHER COMPUTER MAGAZINE'S REVIEWS: THEY SAY LITTLE ABOUT THE PERFORMANCE RELATIONSHIPS BETWEEN HARDWARE AND SOFTWARE.

IT IS NOT ENOUGH TO KNOW WHETHER A NEW MACINTOSH CAN RUN SOFTWARE THAT YOU OWN WITHOUT CRASHING. IT IS NOT ENOUGH TO KNOW THAT PROGRAM A RUNS ON MAC MODEL B WITH FOUR MEGS AND A HARD DISK. FOR MANY OF US PERFORMANCE IS AN IMPORTANT ISSUE. SOFTWARE THAT MERELY CRAWLS ALONG AT CERTAIN RAM LEVELS IS NOT WORTH THE PURCHASE.

ON MATTERS OF PERFORMANCE, WHO ARE WE TO BELIEVE? THE SALESMAN? THE MANUFACTURER? YOUR COMMENTARY EXPLAINS WHY COMPUTER MAGAZINE REVIEWS ARE NOT LIKE AUTOMOTIVE MAGAZINE REVIEWS, BUT YOU SIDESTEP THE FUNDAMENTAL QUESTION OF THEIR REASON FOR BEING.

WITHOUT MAGAZINE REVIEWS WE LOSE AN IMPARTIAL PLAYER.

AS YOUR ARTICLE EXPLAINED, TESTING IS EXPENSIVE, EVEN FOR SMALL MACHINES.

BUT IF PUBLISHING BUDGETS ARE TIGHT, BELIEVE ME, THESE DAYS, INTERNAL SYSTEMS TESTING BUDGETS ARE TIGHTER STILL.

CLEARLY, THE COST OF LARGE-SCALE PERSONAL TESTING IS VERY NEARLY IMPOSSIBLE. WE NEED YOU.

STEVEN EDELSTEIN

NEW YORK, NEW YORK

I, FOR ONE, AM MORE INTERESTED IN knowing whether a new monitor or hard disk will last for some time than in knowing whether its maximum brightness is a bit better than that of its competitors. One can start by realizing that reliability in a product does not appear by chance, but comes only as a result of painstaking care and discipline in design and in manufacturing. Thus, a company's track record is not liable to change overnight. It would be appropriate for Macworld to include in its reviews of hardware what a manufacturer does to ensure reliability. Some examples: Is there a quality-control department? Does the company rou-

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I MAKE EXTENSIVE USE OF PRODUCT TESTING INFO BEFORE MAKING ANY SOFTWARE OR HARDWARE PURCHASE BECAUSE I WANT THE BEST PRODUCT FOR MY NEEDS, I WANT THE BEST VALUE FOR MY MONEY, AND I WANT TO AVOID BEING BURNED BY A POOR PRODUCT. I DON'T NEED LONG-TERM DATA, SO ITS ABSENCE WILL NOT AFFECT ME.

I WANT THE TESTER'S RECOMMENDATIONS, BUT I STILL WANT THE MEASUREMENTS!

WITH DISK DRIVES OR CPUS, THE CURRENT METHOD OF TESTING AND THE PRESENTATION OF RESULTS ARE GENERALLY SUFFICIENTLY INFORMATIVE TO Allow A GOOD PURCHASING CHOICE, BUT WHEN DEALING WITH MONITORS AND PRINTERS, TRANSLATING THE SUBJECTIVE OBSERVATIONS OR THE TEST DATA INTO A SHORT LIST WITHOUT ACTUALLY SHOWING HOW WELL THESE VISUAL DEVICES PERFORM IS PROBLEMATIC. I URGE YOU TO USE PhotographS OF THE SCREENS THEMSELVES AND EXAMPLES OF THE PRINTED OUTPUT IN YOUR REVIEWS SO THAT WE CAN OBSERVE DIRECTLY THE CHARACTERISTICS OF EACH DEVICE.

FOR ALL REVIEWS, I WOULD BIAS THE ANALYSIS TOWARD ISSUES OF DIRECT CONSEQUENCE TO THE USER. I CONCUR THAT LONG-TERM TESTING IS UNREALISTIC FOR MACWORLD TO PURSUE AND THAT THE MARKET WILL IN ANY CASE SORT THE GOOD FROM THE BAD VERY QUICKLY.

IN CONCLUSION, I FIND MACWORLD'S TESTS AMONG THE MOST BALANCED AND INFORMATIVE AVAILABLE. I WOULD HATE TO BE WITHOUT THEM.

JOEL M. SCIAMMA

SURRY, ENGLAND
The More Tracks, the Better

I don't understand, Jim Heid writes "PageMaker sports the best tracking features of any publishing program, offering five tracking commands ranging from Very Loose to Very Tight," and "QuarkXPress offers just one track—though it is customizable" (Getting Started, August 1992).

Because QuarkXPress's tracking features are customizable, you can make as many as you want with the Edit H&Js command. Furthermore, if you make them when no document is open, you only have to make them once—they'll be there until you change them.

Jim Alley
Savannah, Georgia

DataClub Doesn't Deliver

You did a great disservice to your readers with your cursory review of DataClub Classic and DataClub Elite (Reviews, August 1992). It is true that DataClub makes file sharing transparent to the user, but its implementation and support leave much to be desired.

We have used DataClub Classic on a small network for almost two years and have found two very serious bugs in the program. It loses the graphic links in QuarkXPress documents when they are shared across the network. The bug was vehemently denied by DataClub technical support until a number of users showed them how to duplicate it for themselves.

Second, and even more serious, DataClub has a nasty habit of randomly creating an unnamed folder on the network. When a user attempts to delete this folder, it trashes the entire network. This bug has also been reported by a number of users to DataClub, to no avail.

We can only hope that with the backing of Novell, the new owner, DataClub will clean up the program and improve the support.

Greg Madsen
Appleton, Wisconsin

Chill Out on System 7

Maybe you should start a special section in your magazine entitled "Whining about System 7" for all the people who write you letters every month complaining about System 7 (Letters, August 1992). I am so tired of hearing "System 7 is not good because it's not compatible with my four-year-old copy of Word.

"I had to buy more memory," or "System 7 made my Mac Plus slow down and there isn't enough memory anymore." So go back to System 6, or 4.2, and stop whining.

John Mankisch
San Anselmo, California

Companies Respond

Charles Seiter remarks that 1-2-3 for Macintosh uses the same "cryptic" macro language as the DOS versions of 1-2-3 ("Spreadsheets That Count," July 1992). The native macro language is based on an English-like command set, such as (Edit-Paste) or (Insert-Rows). The set of commands to which Mr. Seiter refers is a subset of the whole, and is there primarily for users who need to maintain macro compatibility with 1-2-3 on DOS or other platforms.

Second, he erroneously states that 1-2-3 for Macintosh has no worksheet macro buttons. They are indeed in the product, activated by clicking on a button on the draw tools palette.

Yuko Takagi
Product Manager, Lotus 1-2-3 for Macintosh, Lotus Development Corporation Cambridge, Massachusetts

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T
HE REVIEWER TRIED TO FIT
LinksWare, a totally new concept,
into the old mold of HyperCard (Reviews,
August 1992). For example, in LinksWare
retrieving a link is not done through a list,
although that is an option, but is done
simply by clicking on the linked word in
the body of the text. The user is not re-
quired to look through “all linked words
in all documents” as the review states.
Additionally, to return to a linked word,
simply click on the window, as in all Mac
applications. LinksWare has no need of
go-back buttons or paths to return to the
source of a link, as does HyperCard, since
LinksWare uses multiple windows on a
standard desktop.

LinksWare can link many words in
many different documents to the same
file. If you remember that you linked a
word, but cannot remember where, you
select the word list. Clicking on the word
produces a second list containing all the
files in which that word was linked. You
may then click on one of those files to
open it.

Tracy Valleau
President, LinksWare Corporation
Pacific Grove, California

MACWORLD’S REVIEWER MADE A
series of technical mistakes while
reviewing the Notebook Display Adapter
030 (Reviews, September 1992)

The review stated that our software
“isn’t smart enough” to detect whether or
not a display is connected. This is wrong;
not only does the software recognize that
a display is attached, it also powers down
the adapter if no display is connected. It
was also stated that our board had trouble
with the monitors that were tested. This
is because the reviewer did not use the
Control Panel to select the monitors. The
reviewer also mounted the connector as-
sembly upside down (he did not go to a
dealer as we require).

The article stated, “Because the board
uses the PowerBook’s memory-expansion
slot, you can’t upgrade your PowerBook’s
memory.” Again, this is wrong. Our 0, 2,
and 4MB adapters have a pass-through
memory port which accepts Apple’s 2MB
memory upgrade. If users want even more
memory, they can send us their adapter
and we’ll install additional RAM chips.

The reviewer also noted that our
adapter for the PowerBook 100 does not
support color. That’s because the Power-
Book 100 is a monochrome machine.

I’d also like to point out that the
“smoking PowerBook” was in fact a com-
ponent on our board (not the PowerBook)
which came into contact with the metal
backing on the keyboard. We encoun-
tered this problem in a small number of
initial production units and have since
fixed the problem.

Envisio has shipped over 6000 Note-
b ook Display Adapter 030s to users who
are happy with our solution of providing
video-out capabilities for the Power-
Books. I’m sorry we can’t include Mac-
world among them.

Thomas Burke
President/CEO, Envisio
Minneapolis, Minnesota

The adapters we tested didn’t detect whether or
not the display was connected. The board was
installed by an Apple-authorized dealer. The article
did state that the only way you can add memory (if
you have more than 2MB already in the PowerBook)
is to purchase it from Envisio.—Ed.

Letters should be sent to Letters, Macworld, 501
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cally to CompuServe (70370,702), MCI Mail (294-
8078), America Online (Macworld), or AppleLink
(Macworld1). Include return address and daytime
phone number. We regret that due to the high vol-
ume of mail received, we are unable to respond per-
sonally to each letter. We reserve the right to edit
all letters. All published letters become the property
of Macworld.
What a miracle it is to have color scans on the desktop. What a pain it is to deal with them (up to 50MB of disk space gobbled up with a single scan). • That's why Apple put JPEG compression in QuickTime. JPEG, the world standard in graphic compression, crunches files at a ratio of 20:1. Unfortunately, Apple's JPEG solution is software-based and is as slow as cold tar. • Mirror to the rescue; for just $599 the new Mirror Quick! accelerator card will speed up JPEG compression over ten times. Yes. Ten times. • Just plug it into a NuBus slot and its second generation C-Cube 550B processor gets compression moving at record speeds. Faster than anything in the market (See chart). • Any application that supports QuickTime JPEG can take advantage of the Mirror Quick! board. The performance enhancements are not limited to still images. For the first time you can use JPEG compression on your QuickTime movies (instead of the much lower quality Video compression), and achieve dramatically improved image quality and higher frame rates. Don't waste another minute, start saving time, disk space and money with the Mirror Quick! JPEG accelerator. Call us Quick!

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A Suit in Time

BY STEVEN LEVY

In 1989, SHELDON BREINER HAD a good idea. He knew that the computer workstation market was growing steadily. It was clear that the users of those machines, which run on powerful RISC (reduced instruction set computing) microprocessors, would appreciate a wider range of software applications than the meager selection available for the Unix operating systems employed on workstations.

Breiner also knew that the best ensemble of software applications going were those written for the Macintosh. Why not, he figured, create software that would allow Macintosh programs to run on the RISC workstations of Sun, Apollo, Silicon Graphics, and IBM?

When a good idea arrives in the head of most people, they have a tendency to congratulate themselves, vow to implement it, and soon forget about it. But Sheldon Breiner, as Apple Computer was destined to find out, is not your average person. He has conscientiously packed a lot of experience into his 55 years. After earning a doctorate in geophysics at Stanford, he supplemented his efforts on understanding such mysteries as knowledge concerning upcoming earthquakes, sunk nuclear submarines, human beings buried in avalanches, and an imposing sculpture of the Rain God worshiped by the lost civilization of the ancient Olmec people.

Not long after finding the Rain God, Breiner applied his skills to the world of business, founding a company called Geometrics; its specialty was locating oil and minerals. When Breiner sold the company, he became a rich man. Later he founded other companies, including a software company dedicated to moving Macintosh applications to other computers—whether Apple Computer wanted them there or not.

Breiner likes risks—he is a seismologist who built a home only yards from the San Andreas Fault. But he also is a person who knows how to minimize those risks—the foundation of that same house is fortified by massive reinforced concrete piers.

In starting his new company he knew he was taking another risk: Apple Computer might try to stop his venture, even though he believed that he was doing Apple, and particularly its developers, a favor by expanding the domain of the Macintosh.

So even before Quorum began its design work, Breiner retained not one but two law firms specializing in intellectual property. Then, when it came to choosing the designated genius who would turn Breiner’s idea into the peculiar reality that is software, he had to find someone who was a certified computer wizard yet had never as much as crossed the Cupertino city limits—a total blank slate concerning Apple’s proprietary codes and techniques.

He found his man in Martin Chavez, 26, a Harvard B.A. and Stanford Ph.D. who had already founded a high-tech firm and in his spare time had completed four years of medical school.

In 1990, Chavez had a crucial breakthrough. When applications running on the Macintosh go about their business, they send out digital requests from the Macintosh Operating System to make certain things happen—dialog boxes appear, files are saved, and so on. Chavez figured out how to interpret those commands to make the same things happen in the Unix operating system of RISC workstations. This scheme, dubbed the Quorum Compatibility Engine, required no use of Apple’s much-protected proprietary technology. For instance, when a Mac application asks for something to be drawn on the screen, it requests the Mac Operating System to use Apple’s patented QuickDraw algorithms to produce the images. The Compatibility Engine plugs that request into the PostScript-based display system already implemented in workstations—and the screen shows the intended image, without raiding Apple’s Toolbox. The Quorum lawyers saw the Compatibility Engine, and said it was good.

Plans were made to use the Engine in two products. The first was Latitude, which would enable Macintosh developers to easily adapt their applications to run on workstations. The second was Equal, which would allow Mac applications to be run on Unix workstations without the box. Breiner envisioned implementing the same principles used in Latitude and Equal in a series of other products that would allow any software to run on any computer. For Breiner, this situation would be nirvana, a multisped wheel of compatibility in which all spokes are connected to Quorum.

Letters, They Get Letters

ASSURED BY HIS ATTORNEYS THAT HE was violating no copyright, Breiner initiated discussions with Apple executives in October 1990. He even hoped that Apple would itself license his company’s technology. Eventually, over 50 executives at Apple, including John Sculley, viewed early versions of Quorum products. In January 1992, when Quorum publicly announced its products, scheduled to ship later in the year, Breiner felt good about his relationship with Apple. When Apple requested an alpha release of the software so Apple’s engineers could examine it, Breiner felt it might be a prelude to a deal.

Then came an odd letter from Apple VP Roger Heinen. Dated February 6, 1992, the letter requested that Quorum send the complete code of Latitude to Apple’s lawyers. On Valentine’s Day, Breiner responded with a 24-page white paper detailing how Latitude was developed, emphasizing that Quorum’s engineers had no access to Apple’s proprietary code. And he agreed to allow Apple to examine some of Latitude’s code.

On March 17, Heinen sent another letter, this one to a Quorum attorney, charging that “Latitude appears to specifically infringe Apple’s patents and copyrights. This is evident from a cursory review.” The letter continued to say that although the other Quorum product, Equal, was in too nascent a form to evaluate, Apple was convinced that if the product worked, it would do so only by violating Apple’s intellectual-property rights.
Heinen's letter concluded with a dark suggestion that Apple and Quorum meet to see "how Quorum proposed to remedy the various legal issues raised by these products."

Quorum's lawyers were glum—"Apple's going to sue you," they told Breiner. Even if Apple did not sue, the letter was a potential death warrant for Quorum. The young company, already in the hole to venture capitalists for over a million dollars, was about to seek new funding. It would be illegal to contact investors or potential customers without notifying them of this letter. What sort of idiot would invest in a company seemingly about to be stomped by a giant?

Breiner, ever the optimist, wondered if there was still room for negotiation. But no one at Apple would return his calls. Everyone referred him to "legal." Then on May 1, Quorum received a letter from Apple's Developer Program. Although Quorum had been a certified Apple Developer for over a year, the letter cited that "your application this year was approved in error." It explained that "the program is designed to facilitate the development of products which run on the Macintosh. Neither Equal nor Latitude fit this description." Therefore, the letter said, Apple was revoking Quorum's status as a developer. Breiner had already paid to attend the Apple Developers Conference later that month. But when he showed up at the conference, the folks at Apple barred his entry.

So Sue ALL IN ALL, THIS SEEMED TO FIT THE pattern of Apple's behavior when the slightest hint of an intellectual-property-rights issue arises: a knee-jerk tendency to threaten and to litigate. It seemed that as far as Apple was concerned, the proper response would be for Quorum to roll over and die.

But Quorum did not die. You will recall that Breiner's business, like his earthquake-resistant house, had been bolstered by prophylactic measures. He knew that Latitude did not infringe on Apple's QuickDraw, because it did not use QuickDraw—it used the Display PostScript already on the workstations. The code was totally clean. Apparently the engineering talent at Apple had not been able either to discern this or to convey this to the executives in charge of writing threatening letters. So Breiner and Quorum decided to speak to Apple in the one language in which the company seemed conversant. They sued.

The litigation, filed on May 11, was officially a request for a declaratory judgment that Quorum's products did not violate Apple's intellectual-property rights. But longtime watchers of Apple's liberal use of litigation to achieve its ends saw it for what it was: a rock in David's slingshot. And just as a single rock felled Goliath, this single piece of paper not only changed Apple's attitude, but also ensured there would be no changes in Latitude.

Apple's attorneys began negotiations for a settlement of the suit within hours of the filing. Within two months an agreement was indeed signed. Its contents, alas, are confidential. (Quorum is permitted to show the agreement to potential business partners.) But Quorum's understated press release speaks volumes: "Quorum will continue to develop and market its cross-platform compatibility products without threat of legal action from Apple. Additionally, Quorum will be reinstated in the Apple Certified Developer program with full privileges." In other words—David 1, Goliath 0.
Now There Is A Way To Detect A Network Problem While It's Still Just A Funny Noise In The Engine.

If you're running an AppleTalk network, you know how life feels in the fast lane. As technology grows more complex, networks start having problems. Routers and file servers go down. Printers stop printing. Network modems hang up. Traffic levels surge out of control and everybody and everything grinds to a halt.

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A Moment in Time

THERE ARE CERTAIN MOMENTS IN HISTORY THAT INDICATE A SIGNIFICANT ABOUT-FACE IN THE POLICY OF A NATION OR INSTITUTION. THOSE OF US WHO WATCH APPLE HOPE THAT THE QUORUM SETTLEMENT MARKS SUCH A SEA CHANGE. FOR YEARS WE HAVE BEEN WATCHING APPLE HARASS BOTH COMPETITOR AND ALLY. THE TECHNOLOGY-DRIVEN COMPANY WHOSE PRODUCTS WE ADORE SEEMED OBSESSED WITH LITIGATION. NO LONGER AN UNDERDOG, APPLE HAD BECOME THE BULLY OF THE VALLEY.

Needless to say, this attitude did nothing to enhance Apple’s popularity. But ironically, the biggest victim of this aggressive legal strategy was Apple itself. As explained by G. Gervaise Davis III, a Silicon Valley lawyer, “People may say a suit is well and good, but how much time does it take from executives? They might be tied up for three weeks of testimony.” Apple has just undergone a tediously long and drawn-out battle with Microsoft over whether or not Gates and company violated Apple’s rights, a fight that at press time looks to be a total loss. Who knows how many days of decision-making time has been lost in stuffy deposition rooms? Who knows how many hours of pricey legal talent has been billed to Apple and its shareholders?

Ultimately, the price of blind litigation is credibility. In this case, Apple revoked Quorum’s developer status, claiming that the reason was that Quorum doesn’t make applications that run on the Mac. But as explained to me by Kirk Loevner, vice president of Apple’s developer group, this is not at all a criterion for exclusion from Apple’s fold. “Apple is very supportive of companies that create opportunities for developers,” he says. “Lots of companies whose products aren’t specifically Macintosh-based are welcome.” Loevner says that Apple’s objection to Quorum was “not their business, but the way they went about it.” Loevner told me that unlike during the dark days at Apple, when the company discouraged any Mac developer who considered porting an application to Windows, Apple now welcomed the kinds of cross-platform schemes that Quorum promoted. (He noted that, in conjunction with Symantec, Apple was even involved in such a scheme, code-named Bedrock.)

Was Apple’s reaction to Quorum a blunder then? The company will not answer the question, but its behavior certainly begs for explanation. If Apple did not believe that Quorum really infringed on its rights, why did an official write a letter charging just that? A letter that, if unchallenged, would have become a death warrant for Quorum? And if Apple did in fact believe Quorum’s products truly infringed upon Apple’s intellectual-property rights, why did the company instantly settle the case?

Here’s a rosy scenario: Apple is finally willing to draw its age of litigation to a close. “The settlement is a constructive sign,” says Gervaise Davis. “I think [Apple] management is getting tired of paying legal fees.” Let us hope that this is so. And let us also honor Sheldon Breiner. Though his company’s actions were purely in the interests of its own survival, the impact of its suit is reminiscent of that of the man who looked Senator Joseph McCarthy in the eye and said, “Sir, have you no shame?”

History records that the vile McCarthy looked away. And let it be noted that when Quorum sued, Apple blinked. In both cases, it was time for new thinking to carry the day.

STEVEN LEVY’S MOST RECENT BOOK IS ARTIFICIAL LIFE (Pantheon, 1992).
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### POWERBOOK MEMORY, DRIVES, CASES

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**LEARN & PLAY FOREIGN LANGUAGES, TRAINING, GAMES**

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Our techies can talk

### CD-ROM

**Broderbund**
- Just Grandma and Me (CD-ROM)...
- CD Technology
  - CD-ROM Caddy...
  - 2533 (6 Pack)...
- Portfe Drive CD-ROM...
- Creative Multimedia Corp.
- Mammals of North America...
- Beyond the Wall of Stars...
- Total Baseball 40...
- Family Doctor...
- Cosmos 1...

**Ergonomic Software**... 30 day MBG
- Panoramat Vol. 1 (CD-ROM)...
- Highlighted Data...
- Webster's Dictionary (CD-ROM)...
- Footage '91 (CD-ROM)...
- HyperGlot Software...
- Berlitz Think & Talk (CD-ROM)...
- ICOM Simulations

**Hayes**
- OPTIMA 96 Modem for Mac—Cost effective
- V.32/V.42bis modem, MNP 5, throughput to 38,400 bps. Incl. free Smartcom for Mac software & Mac-to-modem cable. Macworld World Class Winner!...
- OPTIMA 96 Modem for Mac...

**rasterOps**
- RasterOps 24SX...
- RasterOps 24STV...
- Spectrum 8LC or 206S...
- Spectrum 8/24 PDQ or 2231 PDQ...

**VIDEO AND SOUND**

**Articulate Systems**
- Voice Navigator SW w/Headset Mike...
- Coda Music Systems
  - MusicPro...
  - MultiMac Direct 3...
  - MultiMac Three-D...
- NEC
  - MultiSync SX...
  - Passport Designs
  - Encore...
  - PCTV
  - System 7 Video...
- Color Pivot LE...

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**Berkeley Systems**... 30 day MBG
- After Dark 2.0...
- Macworld World Class Award for Utility-System Enhancement. Stops screen burn-in...
- More After Dark (M.A.D.)...

**COMMUNICATIONS**

**Apple Computer**
- Microscreen PC Exchange...
- AppleTalk Remote Access...
- AppleShare...
- QuickMail...
- QuickMail (5 users)...

**METATEC/DiscoverySys.**... 60 day MBG
- Best of MIDI Connection...
- Music Library...
- Image Series Vol. 1...
- Sound Series V.1...

**Pluma, Inc.**
- Mavis Beacon Typing...
- Illustrator, FreeHand, Word, HyperCard
- Word, HyperCard, Articulate Systems
- Articulate Systems
- Full line available.

**CONSUMER ELECTRONICS**

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- Articulate Systems
- Full line available.
Dear MacConnection,

Recently I purchased four 1 MB SIMMs to upgrade my SE/30 from 5 to 8 MB of RAM. You are to be commended on your clear and concise instructions. The booklet SIMM Installation for the Macintosh is very good, but the instructional video SIMM Installation: The Inside Story is excellent. It provided crucial tips not found in the written literature (e.g., techniques for the removal of the power cord, things to do to avoid bumping the video card, etc.). Thank you for taking the time to prepare instructions for a simple process that could become a nightmare without the proper guidance.

Sincerely,

Marvyn E. Steele, Ph.D.
Richmond, VA

“This could become a nightmare.”
you all through it.

**TechWorks ... 30 day MBG**

7690 ONet Utilities 75. 1763 OHubworks B. 249. 1582 OGraceLAN 275. 1584 OCorporate 669. 4894 OLightwave 3D 999. 3208 O3D Live 359. 2208 O3D Live Plus 199. 8958 OKeyLever 299. 2340 OUltraDo 179.

**Rich Text Software ... 30 day MBG**

3576 OFax9524V Send/receive Fax/Modem 99. 2310 OFax9524V (Fax only) 299. 3576 OFax9524V Send/receive Fax/Modem 99. 2310 OFax9524V (Fax only) 299. 2311 OFax9532B Modem 199. 4698 OFax 32Bis 229. 3553 OFax/Modem FXV 32Bis 269.

**INPUT/OUTPUT KEYBOARDS, MICE, TRACKBALLS, PRINTER & SCANNERS**

**Input/Output**

**Basic Picture**

**CompuServe ... 60 day MBG**

1674 OMacintosh Membership Kit 1.0 ..... $25.
1675 OCompuServe Navigator 3.1 ..... $49.
1676 OMembership Kit/Navigator Bundle ... $72.

**Database ... 60 day MBG**

4842 OMacLink Plus/Translator 6.0 ... $109.
1823 OMacLink Plus/PC 6.02 ..... $129.

**DataVis ... 60 day MBG**

7720 OPowerPort/Silver 439. 7710 OPowerPort/Gold 589.

**Dayna ... 60 day MBG**

7459 ODartaPort TRX (BNC or 10 BASE-T) ea. 97. 7459 ODartaPort Ethernet (BNC or 10 BASE-T) ea. 149. 8719 EtherPrint 339. 5888 O10BASE-T-Ea. 339.

**DavnetPort EUI/3-Adapter**

7089 ODavnetPort EUI/3-Adapter 199.

**Dvre COR S/LINK (BNC or 10 BASE-T) 259.**

**Dove Computer**

6758 ODoveFax 2.0. 199. 3352 ONullBus 229.
9345 ODoveFax Plus 2.6. 4111 ONullBus 299.
9332 ODoveFax News Retrieval 249.

**Paragon Computing ... 30 day MBG**

5295 ODow Jones News Retrieval Membership 24.

**Software**

**Computer Technology**

6115 OWhite Knight 11 ..... $85.
3441 OMicroPhone Pro ..... $239.
6905 OTelcom 5.0.2 or OPhone 3.0. 6927 ODoveNET StarConnector 10-Pack 129.
4866 ODoveNET StarConnector 10-PK (DINB) 195.
3961 ODoveNET Card PC 209.
2208 ODoveNET StarConnector 307. 4862 OStar 3257. 1025. 3841 OStar 377. 1299.

**Freesoft ... 30 day MBG**

1160 OEntry Level Soft PC 2.5 125.
3455 OFax/Modem VFX V.32bis ......... 269.
3553 OFax/Modem VFX V.32bis 269.

**Hayes**

3553 OFax/Modem VFX V.32bis ..... 269.

**Macintosh Membership kit 30 day MBG**

9442 ONext Utilities 75. 1763 OHubworks B. 249. 1582 OGraceLAN 275. 1584 OCorporate 669. 4894 OLightwave 3D 999. 3208 O3D Live 359. 2208 O3D Live Plus 179.

**Microsoft**

8046 OMP Mouse (MPV-1) 89.
9830 OCompuServe ONE2. 299. OQuickKeys 143.
6901 OSwitchboard (dual keyboard) 155.

**Everex ... 30 day MBG**

1144 OSilhouette Trackball 1.0 (ADB Macs). 78.

**GDTSoft Works**

3429 OSmartPack. 39. 8297 ONetwork. 89.
2499 OPowerPaint 1.2. 94. 8290 ONetwork 169.

**Hewlett-Packard**

1599 OHP B&W DeskWriter with cartridge 479.
2964 OHP Color DeskWriter C (w/color cart.) 793.
2993 OHP LaserJet IIIF (requires kit) 1099.
6754 OHP LaserJet III (requires kit) 1599.

**Kensington**

3547 OPort Mouse 4.0 ADB 107.

**Keytronics**

6974 OIsolator Plus Keyboard 139.

**Kraft Systems**

7519 OMAC MacTrackball 42.

**Logicteh ... 30 day MBG**

1671 OMouseMan 77, 1672 OTrackMan 89.
5062 OScanMan Model 32 O-Scale Scanner 299.
7117 OFOTOMAN w/Digital Darkroom 639.

**MicroTech**

7967 OMicroTech ADB 2.0 (SE & II family) 57.
6621 OMicroTech ADB 2.0 (SE & II family) 75.

**Microtek ... 30 day MBG**

1978 OmicroModem 9053SS 849. 1895 6002S 1399.

**Monitor Design Group**

1486 OIsolator Monitor (two, stereo) 169.

**Mouse Systems (System 30 MBG)**

7520 OLittle Mouse or KB01 Plus ea. 68.
9471 O3D Mouse 74.

**NEC**

5377 SilentWriter Model 85 1439.

**Orange Micro ... 30 day MBG**

8431 OGrappler II-9 Pin 102. 3662 O3lisp. 115.

**Sophisticated Circuits ... 30 day MBG**

8009 OPowerKey 2.01. 75. 8009 ORemote 32.

**Thunderware**

4994 OLightningScan 400 359. 3107 Pro 256 489.

**UPGRADES & DRIVES**

**Memory, Accelerators**

**SIMMs ... with free video and manual**

8316 O1 MB SIMMs (20ns, set of 2) 67.
9437 O2 MB SIMM for IIi or IIc ea. 63.
7437 O4 MB SIMMs (20ns) 119. 7600 (set of 4) 469.

**Applied Engineering ... 30 day MBG**

8361 O1.44 MB High Density Drive 229.
Effective Relief For Macintosh TRAINING Headaches!

Speed Learning
Most people are amazed. They need training. They hate reading manuals and they don't want to pay huge sums for local Macintosh training. At first they feel like giving up in frustration. Then someone tells them about MacAcademy's unique and valuable Video Training Library.

The Price
The first benefit of the training library is the price. Each video is only $49. While other training companies have raised their prices out of sight, MacAcademy videos cost the same as five years ago.

Selection
The next bit of good news is the huge selection of training videos available from MacAcademy. Below you will find a sampling of the videos currently available.

Quality
No blurry screens. No paid actors reading scripts. No frills. Each MacAcademy video features one of our top trainers recreating the classroom atmosphere and teaching you each program from start to finish.

Effectiveness
Many of our customers say our videos cut their learning curve by up to 70%! Videos give you the ability to actually see each technique on the Macintosh screen. The video allows you to replay, fast-forward, or to find any particular technique immediately by using our unique counter system.

Flexibility
MacAcademy videos make excellent learning libraries for companies, schools, individuals, and clubs. They can be watched over and over and can even be projected to large groups. New employees can take them home and learn on their own.

Reputation
MacAcademy is the winner of the 1992 MACWORLD World Class Award. Readers chose MacAcademy as the top trainer in the nation. No other organization even came close! When it comes to training, MacAcademy has the best reputation in the business. You deserve World Class training at an extremely low price. In addition, all videos carry a complete 30 day guarantee.

Lotus 1-2-3 Video #1
Lotus 1-2-3 Video #2
Lotus 1-2-3 Video #3
Macintosh (6.0 or 7.0) Video #1
Macintosh (6.0 or 7.0) Video #2
Macintosh (6.0 or 7.0) Video #3
Microsoft Excel Video #1
Microsoft Excel Video #2
Microsoft Excel Video #3
Microsoft Excel Video #4
Microsoft Excel Video #5
Microsoft Word Video #1
Microsoft Word Video #2
Microsoft Word Video #3
Microsoft Word Video #4
Microsoft Works Video #1
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QuarkXPress Video #3
WordPerfect Video #1
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$49 ea.
Some folks buy heaps of high-end software and the latest Macintosh model as soon as it comes on the market. That's reasonable if they need serious, professional tools (or if they have buckets of money). But high-priced products can be overkill for those of us with simple needs. Color graphics don't necessarily demand Adobe Photoshop, for example, at a street price of $550. And a used SE is far more affordable than a Quadra, and adequate for a small business. Below are five strategies to combat the high cost of computing.

Shareware
Shareware is not free, but it is inexpensive, accessible, and often surprisingly good. Mac owners with modems can download shareware (and freeware) from online services, while others can find it through Macintosh user-group libraries and from commercial companies that distribute it for a fee. Finding shareware isn't really the hard part—the hard part is sorting through thousands of programs to find the shareware that meets your needs.

Two user groups and a new book aim to make that task easier. BCS Mac (617/864-1700), the Macintosh special-interest group of the Boston Computer Society, maintains a terrific shareware catalog that rates some 1800 programs on ease of use and overall quality. All the programs listed are part of the BCS Mac Software Exchange Library. Nonmembers of the group can purchase the catalog for $17.95, and software for $10 per disk.

Many user groups offer members a shareware disk-of-the-month for a nominal fee. The Los Angeles Macintosh Group (310/278-5264) has expanded on the concept with a two-disk set of 15 programs and utilities the group calls the best shareware around. The disks include ZTerm (described later), Disinfectant (the legendary, free-virus-detection application), and 13 other crowd pleasers, according to executive director Suzy Prieto. There is a hitch, though—you have to become a member to get the software disk set, which costs $5. So sign up.

Another way to track down shareware is through The Mac Shareware 500, a new book from Ventura Press (919/942-0220). Authors Ruffin Prevost and Rob Terrell evaluated some 15,000 shareware and freeware programs and rated the ones they found most useful and fun. The $39.95 volume includes three disks containing 17 shareware programs and fonts. The book purchase also includes five hours of free connect time on America Online, where all 500 programs listed can be found in the Macintosh Shareware 500 Library. (CompuServe and other services are likely to have many of the programs as well.)

You might not associate shareware with business, but Prevost and Terrell found a gem in Mariner, a spreadsheet by William Paar. Mariner isn't flawless—it supports only text and Mariner file formats, for example, and Prevost and Terrell found some bugs—but it has several powerful features. The program lets users change the width and height of cells and change text fonts and sizes. It supports multiple levels of undo, background calculation, and more than 60 built-in functions. The version on America Online is 1.1c; the most recent version is on CompuServe. Paar tells me that version 2.0, which supports three-dimensional layers, file linking, and named ranges, among other improvements, should be out by October. The programmer said he wrote Mariner in part because he couldn't afford Microsoft Excel. At $40, which includes a 50-page manual, this spreadsheet is quite a bargain. (Paar can be reached at 1903 Fox Trail Dr., La Grange, KY 40031.)

A less dazzling, but still useful, business program is BiPlane 2.0, a $59 spreadsheet that was awarded four stars in The Mac Shareware 500. Other highly rated programs include Image and ZTerm. Image is a freeware processing and analysis program by Wayne Rasmund that rivals some commercial programs, according to Prevost and Terrell, while ZTerm, $30 software from David Alverson, is "the best shareware terminal-emulation program you can get."

Several popular commercial programs started out as shareware, including StuffIt and Kid Pix. More shareware authors may be forced to go commercial if users ignore the fees. Please remember to mail in payment for the shareware programs you use—paying for the disks is not enough.

Low-Cost Commercial Software

WriteNow 3.0 from T/Maker and MacWrite II from Claris are two found yet fairly inexpensive word processors at mail-order prices of approximately $150 and $90, respectively. The new version of WriteNow is especially sleek and inviting and was awarded four stars in a September Macworld review. Both programs have long, respected histories on the Mac and offer many useful features. (Look for Claris to launch a low-end line of software—with retail prices of $50 to $200—in the near future.)

Less expensive and, in turn, less flexible programs include ExpertWriter from Expert Systems (305/444-0080) and QuickLetter from Working Software (408/423-5696), which both sell at a suggested retail price of $49.95; street prices should be lower. The two programs are identical except for packaging and templates. Both are intended for short letters and memos and include spelling checkers, address books, and envelope printing capabilities. ExpertWriter offers more letter templates than its rival.

Several 32-bit color graphics programs are available at reasonable (and approximate) mail-order prices, including Color It ($169) from MicroFrontier (515/270-8109, 800/388-8109); Color MacCheese ($56) from Delta Tao (408/730-9336, 800/827-9316); and Expert Color Paint ($29) from Expert Systems. The first two programs got good press in "Paint Imitates Life," Macworld's paint-program overview in the March 1992 issue. Expert Color Paint won a four-star review in our June 1992 issue, and is a good, affordable bet for novices.

MySoftware Company (415/325-9375) publishes several low-cost packages, including MyAdvancedDatabase and MyAdvancedMailList. Those products sell for less than $50.
CONSPICUOUS CONSUMER

Service Hero

Nick Ailamakis of Greece writes to thank Symantec for superior technical support. "I had a serious problem with a crashed SUM partition, but Steve [Wolf] stood by my side with overseas telephone support and a four-page fax transmission." Ailamakis recovered the partition with Symantec's help.

via mail order. Scaled-down versions of the programs, called MyDatabase and MyMailList, will be out soon and should sell for less than $25. The only program I've seen in the series is MyAdvanced-Database, which is friendly, functional, and easy to use. It's a good beginner's flat-file database.

Integrated Software

INTEGRATED PACKAGES ARE MORE EXPENSIVE than the programs discussed so far but still offer a good value for the money. Best-seller ClarisWorks, for example, combines word processing, page layout, graphics, spreadsheet, charting, telecommunications, and database features in a single package that sells for about $199 via mail order. Similar packages are available from Symantec (GreatWorks for $139), Beagle Bros (BeagleWorks for $185), and others. "All-in-One Programs," Macworld, June 1992, covers the strengths of six integrated packages. Seriously tardy Microsoft Works 3.0 should be shipping by the time you read this and selling via mail order at about $159. The program's improvements include a stand-alone draw module, page-layout features, and the ability to include graphics in database files. Will Microsoft beat Claris in the integrated-software department? That remains to be seen. But whatever integrated package you choose should be a bargain compared with buying five or six individual applications.

Used Hardware

THERE ARE MANY WAYS TO SCORE A used Mac and peripheral equipment, including computer brokers, local classified ads, and direct-mail companies. There are at least three national used-computer brokerages. The oldest is the Boston Computer Exchange (617/542-4414), which pioneered the concept in the United States. The American Computer Exchange (404/1250-0054, 800/786-0717) in Atlanta and the National Computer Exchange (212/614-0700, 800/659-2468) in New York were founded using the principles established in Boston.

The Boston Computer Exchange has changed from its early days when it was solely a liaison between computer sellers and buyers. These days it also buys equipment directly from sellers and maintains an inventory of used equipment as well as contacts with potential sellers. "It's transparent to the user whether it was in stock or whether we got it from a listing," says Alex Randall, who founded the BCE. "A lot more gear comes to us now than it did in the past. Buyers get a seven-day warranty from BCE, which sells one-year service contracts for $99. Call 617/542-2345 ext. 300 to receive a fax listing BCE's used-computer price index and inventory.

The American Computer Exchange (AmCoEx) and National Computer Exchange (NaComEx) are more-traditional brokerages, making money from sales commissions by linking sellers and buyers. AmCoEx (which provides the index of used-Mac prices on the Best-Sellers page of Macworld) charges a $25 listing fee to sellers, then runs diagnostic tests on equipment.

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To make the right choice in selecting an interactive service, pick the one that will always help you get the most out of your computer. For more information or to order CompuServe, see your computer dealer or call 1 800 848-8199. Outside the United States, call 614 457-0802.

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When a buyer calls, we go through our database and try to find something that meets their needs," says AmCoEx president John Hastings. A buyer then sends a check for the price to AmCoEx, and if the seller’s equipment works, AmCoEx ships the equipment, in turn, to the buyer. The seller receives payment minus a 10 percent sales commission. AmCoEx holds the money for 48 hours and charges a $25 escrow fee to buyers who want an additional 48 hours to personally check out their purchases before sellers receive payment.

The National Computer Exchange works a little differently, according to founder Robert Zises. There is no charge to buyers using the service; sellers pay a 15 percent sales commission. Sellers listed with NaComEx insure their equipment and then ship it directly to buyers. Payment is kept in an escrow account for 48 hours before being released to sellers; buyers must check the equipment themselves. The company also offers one-year service contracts that generally cost about 15 percent of the value of the computer or peripherals.

Many companies sell used Macs. To find them, check the back pages of Macworld and other industry publications such as Computer Shopper, which should be available on newstands. And to best protect yourself, use a credit card when making a direct-mail purchase.

The value of used computers and equipment varies by region and is affected, usually dramatically, by Apple product announcements and price cuts. That hurts users selling their machines, but buyers generally benefit. According to Alex Randall, the most popular used Mac sold by the BCE is the Mac SE/30. "It’s the best computer Apple ever made," says Randall, "the sweetest machine in the set. That doesn’t mean the price is set artificially high. Just because people want the SE/30 doesn’t mean the price goes up, because the ceiling is set by dealers selling new machines."

If you want to buy a used Mac (or any Mac, for that matter) and don’t know which one to choose, check out BMUG’s guide, Which Macintosh Should I Buy? This useful booklet is available free by requesting it in writing from BMUG at 1441A Walnut St., #62, Berkeley, CA 94709.

Penny-Pinchers, Unite!

Many software companies offer competitive upgrades (for example, to buy Lotus 1-2-3 for $89 requires a photocopy of a manual page or disk of Microsoft Excel), bundles, or special deals to lure buyers. Mail-order prices on a particular product can vary widely, and several companies sell their programs direct, which gives them flexibility in pricing. Working Software, for example, is selling its Findwell search utility for $9.95 until the end of the year. Another example is Microsoft, which has created Club Works for Microsoft Works buyers. Membership, which is automatic, lets registered Works owners buy other Microsoft products at the upgrade price, among other benefits.

And if you are a smart shopper, send me your money-saving tips so I can share them in a future issue. In the meantime, happy bargain hunting.

Research assistance by CAROLYN BICKFORD.

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

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V. = version #. Req. = min. RAM and system software required. * = last time (in the past year) this or an earlier version was reviewed. $ = cost of update to registered owners. NA = first version, not applicable. *= contact your dealer for update policy. Blue = new version. Yellow = reviewed product.

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Circle 19 on reader service card
Lab Notes

When Format Becomes Fiasco

By Tim Warner

When optical technology was in its infancy, developers of rewritable optical drives recognized the need for cross-compatibility standards, which would allow any optical drive of a particular size to read from and write to any cartridge of like size. But bowing to consumers' demands for higher-capacity disks, vendors brought optical drives to market before a 650MB 5¼-inch rewritable optical standard could be finalized—and before the Macintosh was capable of managing removable-media device drivers as dynamically as it should.

The result—as we discovered during our testing of 43 rewritable optical drives for this month's comparative review “Optical Update”—was the incompatibility of optical formats.

Our troubles began with a quick test for interchangeability. After inserting 5¼-inch cartridges formatted in one optical drive into a drive from a different vendor, we encountered error messages like “Disk unreadable... initialize or eject?” or worse; a few times, cartridges simply ejected with no explanation.

Discussions with vendors quickly made it clear that the errors were related to formatting differences. But the conflicting information we got from vendors about whether hardware or software incompatibilities were the source of our problems led us on several wild goose chases—until we eventually discovered that incompatible device drivers were the cause of most of our problems.

Seizing a Standard

Several problems can crop up when you try to exchange cartridges between optical drives from different companies. Incompatibilities can occur with low-level formatting, which defines physical space on the disk, and with high-level formatting, which determines where data blocks will be placed within that space. The optical drive must understand the low-level format, while the Macintosh and the device driver must understand the high-level format.

Several vendors cited low-level incompatibilities with the ISO specification (the standard that establishes the parameters within which an optical drive should operate). Because the standard was not complete until two years ago, older optical drives only partially implement the ISO standard. Today, however, these problems are rare.

When they do occur, the problems usually involve the handling of spare blocks—extra data blocks used when the physical space on the cartridge that corresponds to an existing data block goes bad. If the spare blocks are laid out on the cartridge in a way that does not conform to the 325MB specification affectionately called ISO 10089, the drive does not accept the media (the 325MB designation corresponds to only one side of a 650MB cartridge). ISO 10089 lets vendors choose from two formats, A and B, but for our purposes only A is important. Format A lets the user specify the number of bands—logical areas on the cartridge that improve data access—and the number of spare blocks in each band.

Sony included two variations of Format A in its CS01 drives. Sony provides one ISO-compatible format, mode 3, and one proprietary format, mode 2. The difference between the two modes is small but crucial.

Sony's proprietary mode saves time by placing half the spare data blocks at the

continues
beginning and half at the end of each band so that the read-write head needs to travel no more than half the width of a band to replace a block. However, ISO mandates that spare data blocks be placed only at the end of each band. Cartridges formatted with Sony's proprietary mode can be read only by Sony drives, and the time savings are so minimal that, according to Sony, its future drives will support only ISO formats. Outside of Sony, we couldn't find a mechanism in production today for the Mac that is not ISO compatible.

Dastardly Drivers

Once we realized that differences in ISO implementation at the drive level were not the major cause of conflicts, we turned to the formatting software. In the course of our testing, we found that high-level formatting problems, particularly driver conflicts, are the more common cause of interchange problems.

Typically, the process of high-level formatting includes writing a driver to the cartridge, and then writing a file directory immediately after the driver. Drivers contain information about the drive and the format of the disk, and because they vary in length from vendor to vendor, depending on how many features (such as passwords and partitions) they support, they occupy different amounts of space on the disk.

When you start the Macintosh, it looks for SCSI devices and asks each one for a driver, then loads each driver into RAM for system software use. With an optical drive, the Mac loads the driver from the inserted cartridge. Once drivers are loaded, system software assumes that they will not change. And when a cartridge or another volume is dismounted, its driver stays in memory, even though that drive is not available for use.

If another, differently formatted cartridge is inserted, the Mac uses the driver that's already loaded into memory. Because driver sizes vary, the starting point of the Mac's directory files varies. But since the old driver doesn't know anything about the new cartridge, it uses its old information about the layout of the disk, and tries to read the directory files from the wrong starting point. It's like using a ten-year-old phone book to find a lost-old friend without knowing that the phone book is out of date.

There are two ways to get around this problem. You can use a utility, such as QuikMount from MicroNet or SCSI Probe 3.4 from SyQuest, that attempts to remove the existing driver from memory and load a new one from the inserted cartridge. Or you can restart your computer. As a holdover from the days when drivers fought for the same space in memory, today's drivers are often locked against change or termination. But when you restart, everything is erased from RAM, including the driver that caused the problems, and the Mac loads the new driver into memory from the inserted cartridge. Restarting can be a pain, but it guarantees success.

Avoiding Incompatibility

Another way to avoid problems is to use optical drives and software from a single vendor. If all your drives come from the same company, interchangeability won't be a problem. If you use multiple mechanisms and drivers, you can standardize on a single software formatter. Generic formatting programs (such as FWB's HDT Primer 1.1) provide formatting options that meet the ISO standard. However, while generic software has certain advantages over vendor-specific formatters—such as a consistent interface and more features—there's a price to pay.

Using third-party software means that you forfeit much of the technical support available from the company that sold you the drive. Also, the read and write speeds may be affected, depending on what options you select in the software package you use. And because generic drivers are not optimized for all mechanisms, you may get poor or only fair drive performance, even if you don't try to use advanced software features not supported by the drive.

No End in Sight

The easiest way to avoid format incompatibilities, without spending a lot of time reloading drivers and restarting, is to standardize on one mechanism and one formatting application among workgroups that often swap data.

Part of the confusion about optical drives among vendors and consumers stems from early incompatibilities in low-level formats. Though the trouble has thus far been confined to 650MB 5½-inch drives, it's only a matter of time before the relentless push for higher cartridge capacities begins to cause similar formatting troubles for 3½-inch drives. But there are several other data capacities being developed (and sold) right now in the 5½-inch size. The MaxOptix Tahiti drive is currently the only mechanism in the Mac market that reads and writes 1-gigabyte cartridges. While standards have been proposed for several capacities and formats greater than 650MB, none has been adopted yet. In the worst case, the process could begin all over again. Fortunately, only time can tell which standard will ultimately be adopted.
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- Horizontal and vertical mounting
- Dust-resistant design
- Plug-and-play ready for MAC, IBM AT/XT, PS/2 and Compatables, SUN, HP, Silicon Graphics and others

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**XXBENCH TEST**

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### Networking

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$86

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$198

External Full-Cycle Battery Charger
for PowerBooks 140/170
"Memory effect" is the loss of battery capacity due to using a battery over only a portion of its storage range. Since the PowerBook automatically shuts down on low battery, the battery is never used over its whole range, so it won't develop a memory effect. The Lind External Full-Cycle Charger not only charges the PowerBook 140/170 ni-cad battery but optimizes full performance and long life by giving you the option to discharge the battery completely before the charging cycle begins. Lind Electronic Design #05354

$158

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UserLand Frontier is priced like a utility, but it’s actually a platform for utilities. You can write your own scripts, modify the sample scripts that ship with the product, or download scripts from electronic services like CompuServe and AppleLink. The FREE sample scripts alone are well worth the asking price! Userland #05323
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FolderBolt and NightWatch II
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DateBook and TouchBASE 2.0
TouchBASE is an indispensable database which keeps track of personal and business contacts. It remains handy all the time—no matter what application you’re using. DateBook is the Macintosh personal organizer that enables you to enter and keep track of appointments, schedules and things-to-do. DateBook prints monthly, weekly and daily schedules as well as FIOFAX and DayTimer imprints. After Hours Software

Payroll and MultiLedger
CheckMark’s accounting packages will drastically reduce the time you spend doing your books. Payroll offers a complete payroll system for Macintosh that is powerful, easy to use and easy to set up. MultiLedger is a complete yet straightforward accounting system for small-to-medium-sized businesses. It provides General Ledger, Accounts Receivable, Accounts Payable and Inventory.

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  4. Great Cities of the World Volume II
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Norton Utilities 2.0

The Norton Utilities Version 2.0 offers intuitive tools for protecting your data and enhancing your Mac's performance. With these tools installed, it's easy to keep your computer running at peak efficiency, and even the most difficult disk problems aren't a problem. Best of all, the Norton 40/88 Turbo removable hard drive gives you infinite storage potential. Relatively inexpensive 40/88MB removable cartridges are easy to switch and store. Includes Turbo Optimizer, Turbo Cache and disk accelerator software.

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In Retrospect,

In Retrospect is automatic, unattended backup for a single Macintosh or AppleTalk network. Dantz 02595

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Nok Nok and NetDistributor Pro

Trik makes network management easy with two must-have network solutions: Keep track of who is attempting to connect to your Mac via System 7 file sharing with Nok Nok. Nok Nok senses when someone is logging on, reads the user and machine identity and informs you with a 32-bit Numlock LED. NetDistributor Pro installs software updates, including applications, fonts and desk accessories, anywhere and anytime to networked Macintoshes across LocalTalk, EtherTalk, TokenTalk and WAN links.

Nok Nok 05042

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When you need reliable, flexible storage, you need the Infomax Turbo 40/88 from PLL. The Infomax is a true workhorse, tough enough to take the punishment of constant use. The electrical engineering is top-notch, as are the internal components. Each PLI drive is rigorously tested to meet standards which far exceed industry requirements. The mechanism carries an incredible 60,000-hour MTBF rating. It's virtually impossible to damage the unit by inserting the cartridge incorrectly. Best of all, the Infomax 40/88 Turbo removable hard drive gives you infinite storage potential. Relatively inexpensive 40/88MB removable cartridges are easy to switch and store. Includes Turbo Optimizer, Turbo Cache and disk accelerator software.

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Baker's Dozen

THE COMMON SAYING “six of one and half a dozen of the other” is about to take on new meaning thanks to Morph, a little program that can mix two images into one. You can open scanned photographs of people from inside Morph, define some common points in each image (for example, the tip of the nose, the center of the eyes, the earlobes), and let Morph output a QuickTime file of one face merging into another, or still images showing the faces at different stages of merging. Morph can also merge images of inanimate objects. Morph is $149 from Gryphon Software, 619/454-6836.—D.L.

for Macintosh, the printers produce 15 ppm and 20 ppm, respectively, have multiple interfaces simultaneously active, include PCL (for DOS machines) and PostScript Level 2, and can sense which of those two formats a file is in. The interfaces include a serial port, a parallel port, and an AppleTalk connector.

Both products can print at up to 800 dpi by 400 dpi, have high-speed RISC processors, and provide high paper capacities. Both come with 4MB of RAM, expandable to 18MB for the PageMarq 15 and to 20MB for the PageMarq 20. An optional multipurpose sheet feeder will also be available for both. Another option provides for an internal fax modem for either printer.

The PageMarq 15 will list for $4199 and was slated to ship in September. The PageMarq 20 will list for $5699 and was also expected to be available in September. Compaq, 713/370-0670.—T.M.

Compaq Printers for the Mac

COMPAQ CORPORATION, long the stronghold of IBM clones, has brought out its first printers—network devices that, somewhat surprisingly, come in versions for the Mac. Called the Compaq PageMarq 15 for Macintosh and PageMarq 20 for Macintosh, the printers produce 15 ppm and 20 ppm, respectively, have multiple interfaces simultaneously active, include PCL (for DOS machines) and PostScript Level 2, and can sense which of those two formats a file is in. The interfaces include a serial port, a parallel port, and an AppleTalk connector.

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New Tools for QuickTime

Adobe’s QuickTime movie editor Premiere is being upgraded to version 2.0, and startup VideoLake is developing VideoFusion, a QuickTime special-effects package.

Premiere 2.0 adds support for device control and SMPTE time code and can export edit decision lists. Premiere can create transition effects; save files in Filmstrip format for editing in Photoshop; and map channels to other movies. Premiere 2.0 lists for $695. Adobe, 415/961-4400.

VideoFusion provides a wide range of special effects including geometric distortion of images; panning, zooming, and rotating images in three dimensions; compositing movies using channels or moving mattes; and special color controls. A script view works with WordPerfect. VideoFusion lists for $795. VideoLake, 419/891-1090.—D.L.

ONE OF HUNDREDS OF USEFUL OR FUN SPECIAL EFFECTS THAT VIDEOFUSION CAN IMPOSE ON QUICKTIME MOVIES.

THE PAGEMARQ 20 (SHOWN) AND THE PAGEMARQ 15 ARE COMPAQ’S FIRST PRINTERS AND FIRST MAC PRODUCTS.

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Unfortunately, this ad isn’t a Bernoulli. We’re out of space. So call for a brochure. Because now unlimited storage is at an unbelievable price.
Fast Serve
If your AppleShare server feels a little poky on that new Ethernet network, take a look at ShirtPocket Software's two AppleShare-compatible EasyServers.

Both EasyServers use Intel processors. The $2600 Viper is based on a 40MHz 80386 with 4MB of RAM, of which 3MB are devoted to disk caching; and the $4800 Python is based on a 50MHz 80486 with 16MB of RAM, 15 used for disk caching. Both boxes include Ethernet and SCSI hookups, but the user must supply a fast Mac-compatible hard drive. ShirtPocket claims the Python can pump out about 8MB of data per second—enough to saturate an Ethernet network. The company also sells a kit for systems integrators. ShirtPocket, 602/966-7667.—D.L.

Medical Odyssey
RESEARCH BY internists at the University of Utah Medical School has led to the development of Iliad, a system that is intended to take the guesswork out of diagnosing illness.

Using Iliad in Consultation

TREND
MacInStor Speed Array
The MacInStor Speed Array from Storage Dimensions is a RAID Level 0 disk array that's designed for very fast access to data and can support up to seven hard drives at once. The Speed Array is intended for publishing, multimedia, and other disk-intensive applications. It uses a Fast SCSI-2 controller and Storage Dimensions's disk-control software to achieve effective seek times of less than 2ms and sustained data-transfer rates up to 9MB per second, according to the company. The Speed Array systems range in capacity from 1GB to 8.12GB when using from two to four drives. The same systems range in list price from $7559 to $37,099. Speed Array will be available on September 15 in a Quadra-only version, with support for Macintosh II systems due in the fall. Storage Dimensions, 408/954-0710.—T.M.

Speeding Up the Quadra 950
DayStar Digital has announced a cache card for the Quadra 950 called the FastCache Quadra. The card can increase the performance of the 950 by up to 40 percent, depending on the application, according to DayStar. The FastCache Quadra also works with the Quadra 700 and 900. The card has a list price of $449. It is currently shipping. A previous version that works with the Quadra 700 and 900 is available for $299.

DayStar also announced new adapters that let its Universal PowerCache CPU accelerator board work with the Mac Classic and SE. The Universal PowerCache can now work in ten different Macintosh models, usually with an adapter designed for the individual Mac model, which means that users can move the board to their new system if they decide to upgrade to a more powerful Mac. The new adapters have a list price of $49 and were expected to be available in October. The Universal PowerCache starts at $479 and goes up to $1559, depending on the clock speed of the 68030 processor and whether a math coprocessor chip is added. DayStar, 404/967-2077.—T.M.

Deneba's New Artworks
Perceiving an empty market slot for a low-price drawing package, Deneba is revamping UltraPaint and changing its name to Deneba ArtWorks. ArtWorks provides both draw and paint tools, and both can operate on the same layer. Files can have unlimited layers. ArtWorks provides Bézier curves; transparency controls for both paint and draw objects; a simplified way of creating masks; and blends and gradient fills. It has image-editing tools and allows nonprogrammers to experiment with creating new filters. It will list for $149.

Deneba is also developing add-on modules for its high-end drawing package Canvas, including one for pressure-sensitive tablets. Deneba, 305/596-3644.—D.L.
Small enough to fit in most briefcases, all models measure 8.5 x 11 x 2.1 inches, weigh only 6.25 pounds, and boast a Full-size, silent keyboard. In tight quarters, use the keyboard area than the Apple PowerBook screens.

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SnapBack Backup

GOLDEN TRIANGLE'S SnapBack is a hard drive backup utility that's highly customizable, works over an AppleTalk network, and provides individual UserSpace interfaces for each user. The user clicks on a button in the SnapBack window to access the UserSpace, a customized list of files and folders that have been (and should be) backed up. The UserSpace then mounts from a central server, where up to 100 UserSpaces are stored. Files or folders can be labeled with different colors, and backup procedures can be specified by color. Once the backup criteria are set, SnapBack performs the actual backups at the user-specified intervals.

SnapBack is available now and lists for $129 for the Starter-Pack, which supports the server and three users. Six or 12 users can be added for $229 and $329, respectively. Golden Triangle, 800/326-1858.—T.M.

VIRUS WATCH

CURRENT VIRUSES, TROJAN HORSES, AND WORMS

T4-A, T4-B

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 10/92
INFO: Initially discovered in a game called GoMoku
IMPACT: Both versions of T4 damage system files and applications

ChinaTalk

TYPE: Trojan Horse
FIRST LISTED IN VIRUS WATCH: 10/92
INFO: ChinaTalk is an INIT that comes with a Read Me file claiming it provides a female voice for MacinTalk
IMPACT: Deletes the contents of your disk drive upon restart

INIT 1984

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 8/92
INFO: Infects INITs; becomes active only on Friday the 13ths
IMPACT: Destroys files and changes file and folder names and attributes to random garbage

Code 252

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 8/92
INFO: Displays a message telling user it is destroying contents of hard drive
IMPACT: After displaying message, it deletes itself without causing damage. Infected Macs may behave erratically

Decision Maker's Companion

Demos is a simulation package that combines the system-modeling capabilities of Extend or think with the uncertainty analysis of @Risk or Crystal Ball. In Demos you draw a flow chart, or influence diagram, of factors affecting your system (diagrams can be embedded within diagrams). Each factor can be a function, a list, or a multidimensional array. Like @Risk and Crystal Ball, Demos provides Monte Carlo and Latin Hypercube support for working with uncertain factors and performs importance analysis to determine which uncertain factor contributes the most to the uncertainty of the result. Demos supports Apple events and has an internal programming language.

High-Quality Color LCD Projection

Proxima Corporation has brought out ColorWorks, a series of relatively inexpensive color LCD overhead projection panels that produce high-quality images. The ColorWorks A502C has a 9-inch LCD panel, while the ColorWorks A522C has an 11-inch panel for producing larger images. Both can produce 24,389 colors and have a contrast ratio of 20:1.

The A502C lists for $3995. The A522C lists for $4995 including presentation utility software. Both devices come with a wireless remote control and cables for Mac II's and DOS machines. The two panels are shipping now. Both are compatible with Proxima's Cyclops attachment, which allows the user to "click" on the displayed desktop or other image with an infrared pointer. Proxima, 619/457-5500.—T.M.

Music Bank

In the age of QuickTime, it's hard to know what sounds and moving images you can and cannot legally appropriate for that snazzy presentation or awesome E-mail. To address the sound part of the legal equation, The Music Bank has put together Stingers, a CD ROM that contains 98 professional-quality music clips that anyone can include in a presentation or a commercial product without having to worry about further licensing.

The CD ROM includes the music clips in several formats for different personal computers, including 22kHz AIFF/SND format for the Mac. Stingers runs the gamut from country-and-western to classical, with introductory themes, transitions, and sound effects as well. The company expects to release a series of other music CD ROMs, with each disc specializing in one kind of music. Stingers lists for $99 and is available now. The Music Bank, 408/867-4756.—T.M.

For PowerBook Owners

AFTER HOURS Software's GUM (Guy's Utilities for Macintosh) supplements Apple's PowerBook management features. GUM lets users set how long the drive waits to spin down for each application; checks for presence of a network, and turns AppleTalk on or off appropriately; can shut down in the middle of booting (for use after showing airport guards that your PowerBook isn't a bomb); and prevents users from accidentally setting caps lock on. GUM also has a utility for synchronizing the contents of the PowerBook's drive with a desktop Mac's drive. GUM lists for $99. After Hours Software, 818/780-2220.—D.L.

Lumina Decision Systems is marketing a $600 "early-adopter" version of Demos. Pricing for version 2.0, the first commercial release, is not set. Lumina, 415/327-4944.—D.L.

TREND

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Circle 275 on reader service card
**QMS Printer Adds OS**

QMS has beefed up its line of laser printers with the QMS 860 Print System, which has its own operating system and is the first to use the 600-dpi Canon LBP BX print engine. The QMS Crown multitasking operating system runs on a 25MHz i960 RISC processor resident on the printer’s system board, keeping track of whether files are PostScript Level 1 or Level 2, HPGL, or PCL (the latter two for the DOS side); controlling the spooling of files on the printer itself; and polling the different interfaces and accepting multiple incoming files simultaneously.

When alternating between PostScript and PCL files, the operating system also stores and switches between the appropriate downloaded font sets to avoid downloading the same font sets from the computer continually.

The printer’s simultaneously active interfaces include a serial port, a parallel port, and an AppleTalk connector and can also include one of several optional Ethernet connectors.

The QMS 860 Print System comes standard with 8MB of RAM and can hold up to 32MB.

**Microtek’s Color Scanners**

Microtek has brought out the ScanMaker II and ScanMaker IIXE, 24-bit color scanners with high performance and resolution of 600 by 300 pixels, or 600 by 600 pixels using software interpolation. The two ScanMakers can also scan line art, halftones, and 256 shades of gray.

The ScanMaker II comes with Adobe Photoshop LE (Limited Edition), which does not include color-separation capability, for a street price estimated at $899. The ScanMaker IIXE comes with the complete version of Adobe Photoshop and with Savitar’s ScanMatch color-calibration system. The ScanMaker IIXE lists for $1699. Both were expected to ship in September. Microtek, 213/321-2121.—T.M.

**High-End Monitor**

BARCO has introduced the Megagraphics, a high-resolution, 29-inch, color-calibrating monitor designed for high-end DTP and related applications. The monitor can support resolutions ranging up to 1600 by 1200 pixels, but requires a graphics adapter also capable of driving that resolution. Because it is more than big enough to show two full-size color pages next to each other, the Megagraphics monitor can increase the efficiency of a designer by up to 40 percent, according to Barco.

Special features include dynamic astigmatism focus, which reduces dot distortion in the corners of the screen. The Megagraphics comes in a desktop version and a chassis version, which is intended to resist harsh conditions. The monitor is shipping now at a list price of $19,995. Barco, 404/590-7900.—T.M.

**Mass Micro’s MO Drive**

The DataPak MO/650 from Mass Microsystems is a magneto-optical erasable drive that stores up to 650MB of data. The external drive uses a Sony mechanism and has an average access time of 70ms and a sustained data-transfer rate of up to 680KB per second, according to the company.

The DataPak MO/650 is currently shipping at a suggested retail price of $4299. Cartridges for the drive carry a suggested retail price of $199. Mass Microsystems, 408/522-1200.—T.M.

**Design Flaws Noted**

*Color separators beware:* Does your service bureau throw fits when trying to separate files that contain Photoshop duotones? Don’t blame it on Adobe. Photoshop uses Pantone’s new and improved color-numbering scheme, which adds an extra letter to the end of color numbers, but most other programs (including PageMaker and even Adobe’s own Illustrator) still use Pantone’s old-fashioned method. To separate files with mixed numbering schemes, you have to delete the final C, U, or P from color numbers.

Logitech MouseMan disables the Restart keyboard command on the Classic, LC, and IIci. Logitech blames the problem on how Apple assigns ID numbers to ADB devices, but the restart sequence (control-b-e-power-on button) works fine with some other third-party mice and trackballs attached to the keyboard.

**Turkey Shoot**

MACWORLD November 1992 91
Macintosh Gives You The Power To Be Your Best.

Just As Soon As You Dig Through 300 Folders, Restart Ten Times, And Figure Out What Palatino Looks Like.

You know all those things you wish your Mac did? Like let you get at files and applications immediately instead of digging through umpteen different folders, or load new extensions without making your entire system blow up. Well, contrary to popular belief, it can. With Now Utilities 4.0, an updated version of the software collection awarded best utility last year by the editors of both Macweek and MacUser, its seven components are designed, tested and guaranteed to work together. And it simplifies using your Mac in so many ways, it'd be downright impossible to mention them all in one ad. So here's the Reader's Digest Condensed Version.

NowMenus is the ultimate file and application launching tool. It creates sub-menus up to five levels deep for anything in your Apple Menu. It lets you launch files
AND APPLICATIONS INSTANTLY. IT LETS YOU ASSIGN HOT KEYS TO MENU ITEMS ON THE FLY. IT LETS YOU GROUP APPLICATIONS, FILES AND FOLDERS INTO WORKSETS. IT EVEN LETS YOU CHANGE THE FONT AND ORDER OF ITS MENU ITEMS. IS THERE ANYTHING IT DOESN'T LET YOU DO? YES, BUT GIVE US A BREAK. THE AD JUST STARTED.

| Super Boomerang | saves you time and hassles by keeping track of your most frequently used files and folders. Then it presents them to you in the 'open' and 'save' dialogs of every application. And it finds your lost files with just a partial name or a shred of content to go on - even if they've been compressed.

| Now Save | automatically saves your work after a specified number of minutes, keystrokes or mouse clicks. And if you want, it will record every keystroke in a special back-up file, just as you typed it. So even if your system crashes, your work is saved. As is the hair you would have torn out.

| WYSIWYG Menus | means what you see is what you get. Will it let you see font names in their actual typefaces? Yes. Will it let you change the order, size and color of fonts in their menus? Of course. Will it let you group certain fonts with certain applications and assign them hot keys? Absolutely. Will it group font families together so you don't have to scroll all over kingdom come to find them? You betcha.

| Startup Manager | controls the loading of extensions and control panels. It helps prevent crashes. It disables extensions that do crash. It even links together extensions that require each other and keeps disagreeable extensions apart so they won't bloody each other's proverbial noses.

| Now Scrapbook | grew out of the 5-mouse-rated Picturebook++. It helps you organize graphics, text, sounds and Quicktime movies and stores them in multiple catalogs that can all be open simultaneously. It also shows you 'thumbnail' views and lets you sort, zoom, scale, resize and crop images just like a real, live art director. Even if you don't have a ponytail.

| Now Profile | is not glamorous. It's not exciting. But it does provide a detailed analysis of your system, its configuration, the whole ball of wax. That way, if you ever run into trouble, all the info is right there.

| W O S \ P M O D E R A T E D P I C T U R E B O O K + | HOT KEYS TO MENU ITEMS ON THE FLY. IT LETS YOU GROUP APPLICATIONS, FILES AND FOLDERS INTO WORKSETS. IT EVEN LETS YOU CHANGE THE FONT AND ORDER OF ITS MENU ITEMS. IS THERE ANYTHING IT DOESN'T LET YOU DO? YES, BUT GIVE US A BREAK. THE AD JUST STARTED.

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Project Scheduler 5
Award-winning Project Scheduler 4 just got better.

Introducing the next generation in the award-winning Project Scheduler series—Project Scheduler 5 for the Macintosh.

Awarded "Editor's Choice" by MACWORLD in April 1992, Project Scheduler 4 has gained greater functionality and enhanced performance in Project Scheduler 5. With Project Scheduler 5, you can meet the challenges of coordinating multiple projects. Now, managing tight schedules, limited resources, and different computing platforms is easier than you ever thought possible.

Effective communication. As a project manager, you know that communication is your most important—and most difficult—task. With Project Scheduler 5, you can convey your scheduling information effectively through customized reports and schedules. And, since Project Scheduler 5 is available in Macintosh, DOS, and OS/2 versions, you can track projects and update schedules easily, even in a multi-platform environment.

Multi-project management with ease. With Project Scheduler 5 you can track resources and status across multiple projects. Integrate multiple projects into groups and establish dependencies that cross project boundaries. Automatically calculate validated group schedules using error-free, cross-project critical path analysis. And automatically update individual projects to accommodate schedule commitments and changes made at the group level.

A professional product. Backed by professional support. When you have a question, we'll get you the answer fast—without making you waste your time waiting in an electronic queue. Our support program even provides direct access to Project Scheduler 5's designers. And we offer the most comprehensive training and consulting program in the industry.

The ideal corporate solution. Whether you're managing multiple projects in a Fortune 500 corporation, or a single project in a small business, Project Scheduler 5 is the fast, easy, and elegant way to make everything come together—on time, every time.

For more information, call or write:
415/570-7700
393 Vintage Park Drive Suite 140
Foster City, CA 94404
Cayman's AppleTalk Remote Server

Cayman Systems' GatorLink is a communications server for Apple's AppleTalk Remote Access that supports up to three users simultaneously over dial-up phone lines. The GatorLink device can hook into an AppleTalk or Ethernet network. It provides lists of network zones that the remote users can access over the phone lines.

The GatorLink also offers passwords and other security features. It was expected to begin shipping in October at a list price of $1895. Cayman Systems, 617/494-1999.—T.M.

Focus's Line of Ethernet Boards

Focus has brought out a family of Ethernet products that work with every currently shipping model of the Mac. Most of the products are boards designed for the various models with NuBus or PDS slots, but Focus is also offering external Ethernet boxes that connect to other Macs via the SCSI port. The company is offering a range of choices: thick, thin, and 10BaseT Ethernet connections for most Macs; FPUs for some models; and a $249.99 hub with eight 10BaseT connectors and one thin-net connector.

The Ethernet boards range in price from $139.99 to $229.99, and the external SCSI boxes are priced at $249.99 and $259.99, depending on the type of Ethernet adapter chosen. All the products are currently shipping, according to Focus. Focus, 617/938-8088.—T.M.

Coffee-Table CD

A new first in the world of electronic publishing hits the stands in November: a photobook bundled with its own interactive CDs. From Alice to Ocean is the story of Robyn Davidson's 1700-mile trek across the Australian outback with four camels and a dog, narrated by Davidson and illustrated with 142 color photographs by Rick Smolan. Smolan produced the CD with Kodak's new Photo CD technology, which makes it possible to drop off film at Kodak shops and get back a CD loaded with photos in digital format. You'll be able to play From Alice to Ocean on a TV (with a new Photo CD-compatible CD player) or on a Mac (with a Mac-compatible CD ROM player). The book will include a Mac-format CD and a Photo CD-format CD for $49.95.—ANN GARRISON

Simulating Life

SAVING THE PLANET is serious stuff, but Maxis thinks we might as well have fun learning how. In its new game SimLife, the Genetic Playground, players create plants and animals and turn them loose in an environment where only the best-adapted species survive. Players introduce mutagens, change the genetics of a single creature and see how its offspring affect the survival of the species, or alter the ecosystem more generally; and players can assume the role of a planetary game warden, a behavioral ecologist, an evolutionary biologist, Charles Darwin, an artificial-life experimenter, or a supreme creator of worlds. SimLife is $69.95 from Maxis, 510/254-9700.

ANN GARRISON

Macworld Offers Bug Report T-shirt

Now Menus and Retrospect A backup machine running Retrospect with Now Menus 3.02 installed crashes when attempting to back up a Mac that is turned off. Now Software and Retrospect publisher Danz both claim the other company's software causes the problem.

DocuComp II 1.0 Using the Save As command causes a crash. Bug is fixed in currently shipping 1.03, which is available at no charge to registered users upon request.

Texas Instruments Printers Some models of TI's microLaser printers have a paper-feed problem that can produce a line running all the way across the page at about 1.5 inches from the bottom. For owners of the defective printers, Texas Instruments will "do everything we can to make the customer happy."

MACWORLD WILL SEND YOU A BUG REPORT T-SHIRT IF YOU ARE THE FIRST PERSON TO INFORM US OF A SERIOUS, REPRODUCIBLE BUG THAT WE REPORT IN THIS COLUMN. SEE HOW TO CONTACT MACWORLD.

HP Unveils 600-dpi Plotter

The DesignJet 600 from Hewlett-Packard is a relatively inexpensive ink-jet plotter that produces output at up to 600 by 600 dpi. The plotter comes in two models; one can handle paper up to 36 inches wide, and another handles paper up to 24 inches wide. Both include 4MB of RAM and an Intel 80960 RISC processor for higher performance. With an optional HP JetDirect interface board the plotters can work with a variety of networks (one at a time), including Ethernet and tokenring. The DesignJet 600 plotters come with Macintosh drivers for AutoCAD, VersaCAD, ClarisCAD, and Architron. They are also compatible with Microspot's MacPlot, Engineeried Software's MacPlots II, and Palomar Software's Plottergeist.

The DesignJet 600 has a suggested list price of $9995 for the model that produces 36-inch-wide output, and a suggested list price of $8495 for the model that produces 24-inch-wide output. Both models of the DesignJet 600 began shipping in August. Hewlett-Packard, 800/752-0900.—T.M.
The new PSI PowerModem™ III is the fastest fax and the only 14,400 bps fax and data modem you can buy for your Macintosh® PowerBook™. For more information, call us at 800.622.1722 or 408.559.8544. PSI POWERMODEMS. WE GIVE YOU THE WORLD™.

Circle 61 on reader service card
Trend

On the Waterfront

A new category of artists' software is emerging that tries to combine the strengths of digital art with those of natural media. Fractal Design Painter was the first such program on the Mac, providing tools that simulate canvas, papers, chalk, and other art supplies.

Now AXA is developing WaterColor, a natural-media paint program like Painter but focused on simulating watercolor tools. WaterColor lets you set the shape, size, and texture of the brush; how wet the brush is and how quickly it dries out; and so on. All color mixing is based on real-world red, yellow, and blue instead of the computer's red, green, and blue. WaterColor does not support pressure-sensitivity in tablets, and the first release has only one paper type. WaterColor is $79. AXA, 714/757-1500.—D.L.

Multiple Resolutions in Color

E-Machines has introduced the T19 II, a 19-inch color monitor that supports two different resolutions. One resolution, 1024 by 768 pixels at 72 pixels per inch, is intended for WYSIWYG desktop publishing. The other resolution, 1152 by 870 pixels at 82 pixels per inch, can show two full pages side by side without horizontal scrolling, or it can display a single large image.

The T19 II lists for $2999 and is currently shipping. When used with the company's 8-bit DoubleColor LX or 24-bit Futura LX display adapters, the E-Machines monitor can switch between the two resolutions without the need to reboot the Macintosh. E-Machines recently introduced the Futura LX at a list price of $1299. It was slated to begin shipping on August 30. E-Machines, 303/646-6099.—T.M.

Global Warming

New York's American Museum of Natural History has mounted what may be the most complex interactive science exhibition to date—Global Warming: Under- standing the Forecast. At one of the Mac-based exhibits, visitors direct a global environmental task force and get feedback on the results of their decisions. At another, they learn the basic concepts and mathematics of climate models through a display projected on a 3-by-4-foot monitor. The exhibition was designed at the museum, which now has a department devoted to interactive productions. After January, the show will travel for four years, visiting Los Angeles, Pittsburgh, Denver, Saint Louis, and Washington, D.C. The American Museum of Natural History, 212/769-5100.—Ann Garrison

The Life of the Mind

The Brainstorming Tool MindLink is marketed largely by the management-consulting firm Synectics, but not all MindLink users are corporate executives. For example, Tom Duke is a Burlington, Iowa, farmer with 300 acres of corn, 135 acres of soybeans, and some sheep. Duke spends his spare time hacking makeshift neural nets out of Excel and modifying Apple keyboards. When he's working on his farm, he faces tasks like spraying down the inside of grain storage bins with malathion. Using MindLink, Duke imagined spraying malathion while flying around at the top of the tanks, and from that idea devised a way to reduce his exposure to the poisonous chemical.

MindLink's current version, 2.2, lists for $259. MindLink, 802/457-2025.—D.L.

In Search of Meaning

Have you ever needed to search old files for something but couldn't remember a precise search term? Blueridge Technologies, which makes Optix systems for scanning, archiving, and retrieving documents, has a new technology for just such situations.

Optix NLS, which stands for natural language search, analyzes the syntax and semantic context of documents, using a dictionary of word relationships and meaning relationships (the NLS dictionary can be modified by nonprogrammers). So, for example, if you search for West, it might find documents containing arubay or wyoming even if they don't mention West.

Optix systems are available as single-user or AppleShare (Macintosh-only) systems, and as Unix-based client-server systems. The Mac NLS module is $1995. Blueridge Technologies, 703/675-3015.—D.L.
Introducing the ScanMaker II. Microtek's next generation color scanner that's priced like a grayscale scanner. For about the same price as the Hewlett-Packard ScanJet IIp, one of today's most popular grayscale models, the ScanMaker II brings a new level of affordability to color scanning. Thanks to an all new electronic design, the ScanMaker II offers greatly enhanced features, higher reliability, and unbelievable ease of use. And it's faster than any scanner we've ever built.

For more information or the name of your nearest authorized Microtek dealer, call 1-800-654-4160. After all, just because you're paying grayscale prices doesn't mean you have to settle for grayscale limitations.

*Well, more or less.

Circle 146 on reader service card
At Last, The PowerBook Shows Its True Colors.

With Envisio's new ColorBook 16, your PowerBook can display photographic quality images in brilliant 16-bit color! ColorBook 16 is the first internal display interface to deliver 52,000 colors on VGA or Apple compatible 12", 15", 15" or 16" monitors, or overhead projection devices. Your PowerBook can even display 256 colors on larger 19" or 21" monitors.

ColorBook 16 is extremely fast, making it the perfect solution for portable multimedia presentations. And since ColorBook 16 shares the same native bit depth as QuickTime, QuickTime's performance is significantly enhanced.

And ColorBook 16's internal design keeps your PowerBook truly portable. Visit an authorized Envisio dealer today, to see how you can bring out the true colors in your PowerBook.
"The only way I'd file my own return is if I knew it'd be easier and faster than taking the stuff to someone else.

Of course, I'd have to know I was paying the least tax and it'd be perfectly accurate."

With TaxCut® Software, filing your own tax return is a simple two-step process:
1. Key in answers to the questions your computer asks.
2. Print and file!
It's guaranteed accurate, and you'll pay as little tax as the law allows. Plus you'll get two Free Gifts.

This year, team up with Andrew Tobias' TaxCut to complete your tax return. You'll have the skill of America's best tax professionals, plus computer power to save you time and money. Better yet, you'll fully understand your taxes as you never have before.

How It Works
You start by selecting the Interview, Shoebox, or the Direct-to-Forms method.

The Interview. TaxCut asks you simple Yes-or-No questions right on your computer screen. Based on your answers, TaxCut selects just those questions you must answer to correctly fill out your return, from the 3,000 questions in its bank.

As TaxCut learns more about you, it decides which forms you need and fills them out for you. The Interview asks you to key in the relevant numbers from your receipts, forms, etc.

After you've answered the questions, TaxCut shows you your completed return on the screen, and prints IRS-approved forms, on plain paper, ready to file.

The Shoebox. Pick up any receipt from your pile of records. Use the scroll-down list TaxCut shows you to identify the type of record. Then key in the number. TaxCut decides where it should go on your return...then does all the math.

Be Your Own Tax Expert Instantly
TaxCut knows the entire Tax Code, so you don't have to. You access what you need to understand through the on-line Help with just a keystroke.

Or, go straight to IRS instructions for what you're trying to do, if you prefer.

TaxCut Audits Your Return Before You File
TaxCut checks every figure as you complete your return. Then it compares all your deductions with national averages.

The program alerts you to anything that looks out of line, to reduce the risk of an IRS audit.

Guaranteed Accurate
TaxCut is the only software to guarantee the accuracy of its calculations. If the IRS makes you pay a penalty because of a miscalculation in TaxCut, we'll pay that penalty for you.

Your Complete Tax Tool
TaxCut provides over 85 different IRS forms and worksheets, from the most common to the obscure. They're all IRS-approved, and print on plain paper on any printer.

You can also file the new IRS-preferred 1040PC form (uses less paper). Or file electronically for a faster refund.

CA & NY State Editions Available This Year, Too
Data from your Federal return automatically transfers to the State Edition to save you time and ensure accuracy.

TaxCut Audits Your Return Before You File
TaxCut checks every figure as you complete your return. Then it compares all your deductions with national averages.

The program alerts you to anything that looks out of line, to reduce the risk of an IRS audit.

Guaranteed Accurate
TaxCut is the only software to guarantee the accuracy of its calculations. If the IRS makes you pay a penalty because of a miscalculation in TaxCut, we'll pay that penalty for you.

Your Complete Tax Tool
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CA & NY State Editions Available This Year, Too
Data from your Federal return automatically transfers to the State Edition to save you time and ensure accuracy.

Method of Payment:
- Check or Money Order Enclosed Payable to Meca
- Visa 0 MasterCard 0 AMEX

Canadian residents are responsible for all duties and taxes upon delivery. We can only ship and fulfill to U.S. street addresses, no P.O. Boxes (including PR, U.S. Territories, FPOs, APOs, and Canada.)

Mail To:
Meca Software, Inc.
P.O. Box 912
Fairfield, CT, 06430-0912.
Source Code: A92074
Also available at your favorite retailer.
Farallon's Minihub

Farallon recently introduced the Ether10-T Starlet, an inexpensive twisted-pair Ethernet hub with nine ports. One of the ports is for a thin Ethernet connector for connecting to an Ethernet backbone, while the other eight are for twisted-pair (10BaseT) connectors for attaching to Macs and peripherals.

The Ether10-T Starlet can be used either to create small networks or to expand the port capacity of larger networks. It began shipping in August, at a suggested retail price of $399. Farallon, 510/596-9100.—T.M.

Sony's Fast CD ROM Drive

Sony Corporation of America, the leading maker of CD ROM mechanisms for resale by third-party vendors, has introduced a high-speed CD ROM drive mechanism that has an average access time under 300ms and can transfer data at a sustained rate of 300KB per second. Called the CDU-56/1, the mechanism will appear in third-party products, probably in late November. Significantly faster than most existing CD ROM drives, the CDU-561 achieves its speed by spinning the disc at twice the speed of previous Sony CD ROM drives.

Suggested list prices for drives built around the new mechanism will be set by individual third-party resellers.—T.M.

Talking Networks

Ungermann-Bass, supplier of networking hardware for computers large and small, has been adding to its line of products for organization-wide networks with products for workgroup-scale networks. One of its new products is the Access/1Hub, a 10BaseT Ethernet hub with 12 ports that Mac, DOS, and Unix machines can share.

The Access/1Hub comes in two configurations, one for $1995 with Simple Network Management Protocol capability (the company's NetDirector SXNP-management software does not run on the Mac) and a $1395 unmanaged version. Access/1Hubs can be daisy-chained to create bigger networks or can feed into an Access/One, Ungermann-Bass' central switching station, which can connect Ethernets with token ring, FDDI, TCP/IP, and other network types. Access/One's price depends on configuration. Ungermann-Bass, 408/496-0111.—D.L.

C. Itoh Printer for the Mac

THE CI-8 LASER PRINTER FROM C. ITOH NOW WORKS WITH THE MAC USING AN UPGRADE FROM C-TECH.

The CI-8 Laser Printer from C. Itoh now works with the Mac using an $850 upgrade from C-Tech Electronics. The upgrade, called the Mac-PAT kit, includes PostScript, an AppleTalk interface, and 1MB of RAM.

The C. Itoh printer produces 8 ppm at 300 dpi with edge-enhancement technology to reduce jaggies. The printer contains a RISC processor for faster page preparation. It has a straight paper path for envelopes and labels. The list price of the printer alone is $2395, including 14 bitmap fonts and 8 scalable fonts. It works with DOS machines and comes with a standard parallel interface and two serial ports. Both the printer and the upgrade kit are available now. C-Tech, 714/833-1165.—T.M.

COPYRIGHT IN THE PROCESS OF COPYING THREE FILES TO THREE DIFFERENT PLACES—ALL AT THE SAME TIME.

Copy-Hopping

The Mac's Finder copies one thing at a time, but a new utility called Copyright can perform several copying operations at once. For example, you can start copying files from an AppleShare volume to your local hard drive and, while that is taking place, begin copying other files from your drive to a floppy disk. Copying can continue in the background, giving you access to the Finder.

Copyright also has a scheduling feature; lets you define criteria such as modification date for files to be copied; and logs every copy made to or from your Mac. Copyright is $49 from CSG Technologies, 412/471-7170.—D.L.

Just for Fun

Auto Mouse

Ever dream of taking a hot Corvette around tight corners at high speeds? Well, with Auto Mouse from Sun Time, you can negotiate some of those turns while tooling around your mouse pad. Auto Mouse is a show-quality model of a red Corvette that fits over a mouse. The hood of the car becomes the mouse button, and users can adjust the amount of pressure required to click. The model is hand-painted, and other colors are available. Available now, Auto Mouse lists for $19.95. Happy dragging! Sun Time, 813/886-1145.—T.M.

Survey: Desktop Publishing

Do you use Macintosh desktop publishing software?

Yes

No

No answer

Based on 579 respondents to a 1992 Macworld mail-in subscriber survey. Answers do not add up to 100% due to rounding.

If so, what types of documents do you create?

Reports

Newsletters

Brochures

Catalogs

Books

Magazines

Other

Based on 381 respondents who use DTP software. Multiple responses were allowed.
Snooper Kit

- Snooper provides truly comprehensive system diagnostic capabilities—everything from power supply and system clock, to the serial, modem and ADB ports are covered. Snooper detects hardware problems and sources of intermittent failures. It performs over 60 major component tests, prints the results, and logs errors. It also does benchmark testing and reports on system configurations to allow technicians to find and fix problems quickly. Includes a NuBus card to check errors even when the screen displays a "Sad Mac.

Publisher: Maxx UT#027

$159

VocabuLearnce or PICTURE IT!*


- PICTURE IT!™ a highly interactive "bilingual" approach to a foreign language dictionary... Designed for beginning students, yet a perfect learning tool for everyone. Offers a simplified user interface, 8 mgs of native pronunciation, over 1000 entries depicted with high resolution graphics. Expandable resource file for customizing word lists.

Publisher: Perigee Overseas Full line available.

$42 ea.

Universal SoftPC 2.5 or SoftAT 2.5*

- Universal SoftPC is the best selling PC emulation software for the Macintosh for those performing word-processing and based functions and light number crunching calculations. Runs on all Macintoshes and emulates a basic Macintosh including all the standard PC features. Universal SoftPC is a software solution designed for running off-the-shelf and customized MS-DOS programs on the Macintosh. $199.

- SoftAT has all the features of the Universal SoftPC, and adds EGA graphics, a math coprocessor and expanded memory emulation. SoftAT is ideal for more demanding PC applications including graphics and number crunching. With SoftAT or Universal PC your company's investment in MS-DOS software and training is totally protected.

Publisher: Insignia Solutions COM0108

$299*

WristSaver Mini-MousePad

The WristSaver Mousepad's success prompted the WristSaver Mini-Mousepad. At only 5" wide x 8.5" long it is 5" smaller than the original. This is ideal for people who don't have room for a standard size pad. It works well because of the bulk-and wrist support that raises your wrist about 1" off the desk surface. Your precious desk space is saved and your wrists will thank you! Manufacturer: LB Innovators

ACC0757: Navy
ACC0756: Gray
ACC0759: Black
ACC0758: Red

$12 ea.

Capitalist Pig

- New! Animated business simulation game challenges you to build and run your own business under fake economic conditions. Experience the challenge of business, scandals, fires, terrorism, and more, as you battle for billions—or bankruptcy. Make crucial business decisions every minute and enjoy the results—or suffer the consequences. Packed with sound, animation, and fun, it draws rave reviews from would-be entrepreneurs of all ages. Capitalist Pig is the must-have "Game of the Year." You never knew business could be so

Publisher: Plum Software EN70417

$35

Stickybear's Reading Room

- Stickybear's Reading Room makes reading fun for kids from four to eight. This bilingual learning application lets kids switch between English and Spanish at any time. Reading Room uses word sound effects, stimulating graphics, and verbal reinforcement to entertain and stimulate children as they learn. For example, in the Word Bop game, a special toy cannot "bop" pictures into words, then back into pictures. In the Sentence Builder game, Reading Room reinforces and builds reading ability by animating the sentences kids create. The Word Match game lets kids match pictures with words, and rewards them with sound effects, graphics, and clearly spoken reinforcement. The Word Find game features hundreds of engaging animations.

Publisher: Optimum Resource EI-Y10555

$35

Optima 96 or Optima 24 *

- Optima 96 or Optima 24 for the Macintosh - Low-cost, high-performance 9600 and 2400 bps modems. Optima 96 provides the latest error-control and data compression technology for maximum data throughput. In addition to X 32400 bps communications, Optima 96 provides 56,000 bps throughput and Optima 24 provides 9600 bps throughput. Optima's modem practically operates without audio! Automatic Tone Generation creates the most efficient combination of speed, error-control, and compression every time. Optima 96 and Optima 24 - More modem for your money. Manufacturer: Hayes OPTIMA 96 MOD#077 $390

OPTIMA 24 MOD#0906 $149*

Universal Macintosh Software

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ACC0759: Black
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OPTIMA 24 MOD#0906 $149*
Power User's Tool Kit 10.0

Version 10.0 of Steven Dobker's Power User's Tool Kit is stuffed with useful productivity enhancers and software to make your Mac more fun. A valuable collection of twelve programs, The Power User's Tool Kit 10.0 includes three programs especially designed to take advantage of System 7.

Here's what awaits you: Auto Menus II makes your Mac's menus drop down automatically whenever you drag the cursor over them. Azax is a challenging game with elements of Reversi. Simsonite creates empty suitcases for storing and consolidating fonts and desk accessories. Power Alias consolidates as many as five aliases into one icon -- great for project management. WindowWizard provides a pop-up menu for System 7 users to switch from window to window and application to application. Klondike is an enticing version of the solitaire favorite, with an arcade game variation that will knock your socks off.

* All software works with System 7, three programs are designed to take advantage of its new features.

AutoDoubler

AutoDoubler is the easiest way to increase your hard disk capacity. It works in the background to automatically keep your hard disk compressed. It's lightning quick and completely transparent, so it won't interrupt your work. In fact, AutoDoubler's new patent pending technique lets you access Macintosh files and applications while they are still compressed! It's fully compatible with all applications, disk accessories, and system extensions. UT052/4 $49.

DiskDoubler 3.7

DiskDoubler gives you total control of file compression-archiving for modern transfer, compressed backups, self-expanding files, and fast copying of files. AutoDoubler and DiskDoubler combined give you the ultimate in speed, convenience, and control. System 7.5 Savvy! Publisher: Salient UT0179 $49.

Encore 2.5 or MusicTime*

Special Offer, FREE True with purchase of either Encore or MusicTime. Encore lets you play, compose, edit, and print publisher-quality sheet music. Transcribe MIDI files or play music in your MIDI keyboard. Includes Passport's "True" music font. MSU0289 $39.95. MusicTime allows you to play, compose, record, and print out music with your Mac. Records music as you play it on a MIDI instrument and displays it in standard musical notation. Publisher: Passport Designs MSU0105 $169*.

Aldus SuperPaint or Aldus Gallery Effects*

Aldus SuperPaint 3.0


Publisher: Aldus GRO0279 $129*.

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Alarming Events

Make your Mac your beeper! Alarming Events™ is the personal appointments and schedule manager that not only keeps your schedule, but also alerts you to the future. Specify the advance warning you need, and your Mac will beep, whistle, flash, or bark as you prefer. View a day, week, or months at a time-just select! Print your schedule, or just parts of it, when you're on the move. Keep as many appointment books as you need, and store them on your desktop for convenient group access. You can even create a "to do" list that can follow you from day to day. It's true time management with all the bells and whistles!

From QuickKeys™ and DiskTop™ adding power to your desktop, to QuickMail™, helping you to communicate regardless of platform. We can help you do whatever you do, better.

How do we know this? Simple.

Imposing your environment is our business™.

Publisher: CE SOFTWARE

InTouch 2.0

InTouch 1.1 was named "the best name-and-address DA for the Mac." MacUser Magazine, 4/91 (4.5 Mice rating). New InTouch 2.0 is even better! Version 2.0 adds an integrated reminder program, sorting, fax new phone books, fax cover sheets and much more. InTouch stores unlimited names, addresses, phone numbers, and more. The reminder program will notify you about that important meeting or phone call. InTouch is the lightning fast InTouch network! Publisher: Advanced Software Also available: DTP Compel DTP008 $99, and InTouch 2.0 Network Pack UT0210 $109.

InTouch 2.0 UT0291

FileGuard

9. "It's about as much software-based security as you can get in one package." MacUser, March '92. Protect your hard drive from unauthorized access including security breaches with a system discrete, copying and erasure, and applications and file/folders. (Including System folder) from unauthorized access, deletion, and/or illegal copying. Block your desktop from unauthorized access by using FileGuard's User Log which continuously tracks user/group activity. System 7.0 Compatible Publisher: ASD Software

FileGuard Single UT0135

Bridge 6.0 or Grail Quest*

Bridge 6.0

Now you can play a ribbon of Bridge on your Mac. Bridge 6.0 supplies three players and uses standard rules for Bridge. Major bidding with Spades and Blackwood conventions. The program keeps score deals opening hands at your request. 1-99$.

Grail Quest

Ties the Mac's sounds and graphics to put you inside the world of King Arthur's England. Best of all, its well-crafted plot and authentic settings are based on authentic tales of time by Geoffrey of Monmouth and Sir Thomas Malory. Publisher: Arrow Ent Ent0802 $19.
MacEKG 2.0

- MacEKG can warn you of computer failure BEFORE it happens. LED monitors over 250 aspects of your system and generates results each time you reboot. LED features advanced computer-level tests that were only available to authorized Apple Technicians until now. Using EKG's Reactor to continuously reboot simulates several days of heavy use to quickly diagnose intermittent failures. EKG can automatically run at startup or shutdown, making sure you are the first to know if your computer has failed a test or slowed down.

Publisher: MicroMat UT0285

$99

MacPrint 1.3

- Use a Macintosh with any Apple printers, Print Mac applications on IBM Laserjet, Deskjet or compatible printers including all Series B, IIcs, and the Deskjet 500. Print test and graphics at the printer's maximum resolution. Does not require PostScript. Cable is included. Publisher: Insight Development UT0098

$95

Virtus WalkThrough 1.11

- The latest version of this award winning 3-D drawing program includes everything you need to quickly capture and explore your ideas in 3-D. Multiple windows and extensive drawing aids provide an interactive environment for editing and reviewing your ideas. Interactive 3-D presentations, QuickTime® and PICS animated movies and perspective pictures dazzle your audience. Enhanced controls of 3-D view, PICT, QuickTime, and EPS; and control of 3-D view, PICT, QuickTime, and EPS with Virtus Masterclass. Winner of Macworld Software of the Year Award 1990.

Publisher: Virtus Corporation GM027/8

$309

MacGolf Classic 1.1

- MacGolf Classic v1.1 challenges you to match your skills against sand and water traps, roughs, winds, and undulating greens. Six tough courses are brought to life with full color screen graphics, five entertainment options, and digitized sound effects. Control your shots, ball position, shot direction, swing power, and club choice. Supports courses between holes and allows hard disk installation. Includes 7 game types (tournaments, Powerbook and Quad). Publisher: XOR Corporation EN027+ $52

Design Your Own Home:

- Design Your Own Home: Architecture, Interiors, or Landscape. Create floor plans, elevations and building plans with a touch of humor, and your own personal touch. Publisher: Abrams

$59 ea.

Font Fun House

- Font Fun House is a fully usable CD-ROM with hundreds of fonts for your Macintosh and IBM compatible computer. The disc contains shareware and freeware fonts in TrueType or Type One Postscript (ADAM) formats. Also includes the Macintosh screen fonts libraries of both Adobe and AGA. They can be used to see the fonts available and get a feel for how the fonts look. Over 1/3 of the fonts on the disc are FREEWARE!

Publisher: Wayzata Technology FSN018+$ $35

ClickArt Bitmapped Portfolios

- The ClickArt 3 series is a collection of high-quality computer art for use with all types of Desktplished books and documents. The bitmap graphic collection includes graphics and ready-to-use portfolios, each containing hundreds of images. With so many images to choose from, you'll always be able to find the right image to add excitement and style to your book's covers, newsletters, menus, and other publications. And if you want to add a touch of humor, look through the ClickArt-1 bitmapped collection that includes: Business Cartoons, Cartoon Images, Events & Holiday Cartoons, Personal Graphics, Business Graphics, Buildings, Newsletter Cartoons and Publications.

Publisher: T/Maker

$39 ea.
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SPEED

Do you need 60, 100 or 120 Nanosecond (ns) chips? Nanoseconds are billions of a second, so an 80 ns chip responds faster than a 1000ns chip. The original Mac used relatively slow 150ns memory chips. The 68020 processor needs 120ns (or faster) chip, and the 68030 Mac like the speeclerd model.

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What do I need?

Our helpful sales and technical staff is standing by to answer any questions and take the mystery out of memory upgrades. Memory cards come with one megabyte on each card and are usually sold in pairs — (2 @ $39 ea.)

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

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

WHAT YOU NEED TO KNOW

Memory chips come factory-installed on plug-in cards, called SIMMs (Single Inline Memory Modules). Each one megabyte SIMMs card holds eight top quality, memory chips. We carry chips by all the major manufacturers like Texas Instruments, Intel and Samsung.

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Aldus IntelliDraw

GRA 0354 FaxFACTS 3827
Publisher: Aldus
Suggested Retail: $999

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APPLE'S NEW PERFORMA

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Mouse Basics

110 November 1992 MACWORLD
In a bid for the first-time computer buyer, Apple will sell Macintoshes and printers in retail outlets such as Sears and Office Depot. The line of products that Apple will sell is called the Macintosh Performa series, and it consists mainly of proven products—the LC II, Classic II, StyleWriter, and Personal LaserWriter LS. Apple has renamed the LC II the Performa 400 and the Classic II, the Performa 200. The StyleWriter and Personal LaserWriter LS retain their original names. Apple will also continue to sell these products under their original names through the traditional dealer channel. For the consumer market, Apple has made a few minor software changes, added support options, and created lower prices for the Performa series. Most of the changes consist of marketing attempts to bring in the first-time user. The big news, however, is the introduction of a brand-new midrange machine, the Performa 600 (which will be available in October), and two new 14-inch color displays, the Performa Display and the Performa Display Plus (see “The Rest of the Family”).

Introducing the Performa 600

ANYONE WHO IS CONSIDERING THE PURCHASE of a Macintosh IIfi would do well to look at the Performa 600. Like the Macintosh IIfi, the Performa 600 has a 68030 processor, three NuBus slots for adding expansion boards, enough video memory to support 256 colors on a 13-inch monitor, an internal hard drive, a SuperDrive that supports high-density floppy disks, and the standard Macintosh ports for connecting peripherals. One of the big differences between the two machines, however, is that the Performa 600
can be purchased with a speedy internal CD ROM drive, the AppleCD 300i.

Since there's a socket on the Performa logic board for a 68882 math coprocessor but Apple won’t be installing one for the home market, you would expect the Performa 600 to be slower at math and math-dependent operations than a Macintosh Ileci is. Worse, the lack of an internal cache imposes an additional performance penalty. On the day-to-day operations that matter most—text scrolling, find-and-replace, and plain arithmetic with dollars—the 600 works at 50 to 80 percent of a Ileci's speed. Since the Ileci costs $3999 for a standard 5/80 configuration, and the 600 is expected to cost about $2500 in a 5/160 configuration with Apple’s new CD 300i (about $2000 without the CD and 1MB less of RAM), the 600 is a hardware bargain but not, at these prices, a performance champ.

What you notice first about the Performa 600 is the futuristic case design. The Performa 600 is about the size of the Quadra, but the front panel curves outward, and the Performa 600 is designed for standard horizontal use with a monitor on top. Tap the side of the case with your finger and you’ll realize that the monitor will be well supported—the case work is metal. In fact, the Performa 600 can support the weight of a 16-inch monitor—up to 60 pounds.

Metal-forming tooling lasts longer than injection molds for plastic, so the metal box suggests that Apple plans a very long production run for the Performa 600. There’s another cost savings in metal as well; Apple no longer has to resort to sprayed-on metallic compounds or separate internal metal screens to battle radio-frequency emissions.

**An Internal CD ROM Drive**

In its basic configuration, a Performa 600 has 4MB of RAM, a 160MB internal hard drive, and 512K of video RAM (VRAM). The hard drive fits into a 3½-inch bay in the case. A removable bezel covers the lower-right corner of the Performa 600’s front panel, just below the floppy drive. This space accommodates any 5 ¼ inch drive or other mass storage. Apple is working with vendors who sell storage products to create custom installation rails so that Apple dealers can plug in storage units. But Apple really hopes you’ll use the space for the AppleCD 300i CD ROM drive.

The 300i provides a serious price and performance improvement over Apple’s external CD ROM drive, the AppleCD 150. The 300i uses a Sony mechanism that is completely enclosed to protect it from dust particles. The 300i transfers data at 300K, twice the speed at which sound is transferred (150K). Apple has rewritten the CD drive—it’s now version 4.0—to support both the 300i’s higher speed and Kodak’s Photo CD system.

If you buy a system that includes the 300i, Apple will upgrade the RAM on the Performa 600 to a total of 5MB and will upgrade the VRAM to a total of 1MB. The extra main memory is needed to give System 7 enough room when it is working with the large files stored on CD ROMs, and the additional video RAM allows you to display CD ROM images in photo-realistic, 16-bit color (Apple’s recommended color depth for playing QuickTime video). The RAM/VRAM upgrade and 300i together add about $500 to the price of a basic Performa 600. Apple also plans to provide several CD ROM titles with the 300i, although at press time, these titles were not finalized.

**Photo CD Support**

The best feature of the AppleCD 300i is its full-blown support for Eastman Kodak’s Photo CD system. With Photo CD, you take photos with your camera as you always have, but when you take the rolls of film to a photography lab, the lab adds them to a CD ROM. Apple’s CD ROM drive will support multiple-session capability—a key feature of Photo CD—which lets you add different sets of photos to a CD ROM at different times. In addition, a special application provided with the CD ROM driver software converts photos on the disc to PICT files, compresses them into thumbnail images, and then lets you play a slide show of the photos, controlling the presentation with the standard QuickTime slider at the bottom of the viewing window.

**Expansion Options**

Apple has done an excellent job of planning for expansion in the Performa 600. Besides the 5¼-inch drive bay, there are several sets of slots for adding upgrade options. And the interior design of the Performa 600 makes it easy for the user to access all the slots as well as other key components. The expansion options include:

- **Video RAM** The standard Performa 600 has 512K of VRAM sorted to the logic board. This allows the Performa 600 to support 256 colors on 13-inch Apple monitors and also on a fairly large assortment of low-cost VGA monitors and some SVGA monitors. But the Performa 600 also includes two slots for adding 256K VRAM SIMMs. With a total of 1MB of...
VRAM, the Performa 600 supports 32,000 colors on 13-inch Apple monitors. No matter how much VRAM the Performa 600 has, however, it cannot drive any monitors larger than 14 inches.

- **System memory** The basic Performa 600 has 4MB of RAM soldered to the logic board, and there are slots for four SIMMs. Since the slots can take 1MB, 2MB, 4MB, 8MB, or 16MB SIMMs, you can create memory configurations for the Performa 600 that range from the stock 4MB up to 68MB (the stock 4MB plus four 16MB SIMMs), which should even be enough to run Microsoft Word 8.0 under System 9.0.1 in 1998.

- **Acceleration** The logic board of the Performa 600 features a slot designed specifically for accelerators, meaning 68040-based accelerators, since the system already has a fast 68030. We weren’t given the exact pin assignments, but Apple says that this slot most nearly resembles the Macintosh IICi cache slot. But because the Performa does not support cache-enable and -disable functions, the slot must contain a CPU accelerator, not a cache card. Apple has tested some accelerators already; the PowerCache 40, a IICi accelerator from DayStar, has been qualified as compatible, and Apple expects that most accelerators for the IICi will work as well.

- **Floating-point unit** The Performa 600 does not include an FPU for speeding mathematical calculations, but the logic board does include a socket for adding a third-party FPU chip. Many accelerator boards also include an FPU option.

- **NuBus slots** The Performa 600 includes three NuBus slots. Since virtually every performance feature imaginable is either on the logic board or available through the accelerator slot, the most popular use of NuBus slots will be for graphics boards for large monitors, 24-bit color graphics boards, graphics accelerators, or Ethernet boards (the Performa 600 does not include built-in Ethernet). In fact, a little planning is appropriate for high-end color users—if you know you will need a full 24-bit system, there’s no point in populating the rest of the VRAM on the logic board, since you’ll need a NuBus board anyway. Other uses are likely to include data acquisition, video editing, or other vertical-market functions.

**The Logic Board**

THE LEVEL OF INTEGRATION IN THE PERFORMA 600 is high. Looking down on the newly designed logic board, the highlights are the 68030 processor, a socket for a 68882 math chip, the 4MB RAM bank, and a handful (five, actually) of custom chips—including the VASP chip, which takes care of memory management, clocking functions, and color control. The power supply to run this chip set has been beefed up to 112 watts from the Macintosh IICi’s 90w. Apple has built lots of power margin into this system; running the CD ROM, an accelerator, 68MB of RAM, Inside the Performa 600 The Performa 600 includes room for a 51/2-inch drive device, filled here by an internal CD ROM drive, as well as a 31/2-inch drive bay, filled here by a 160MB internal hard drive.

**How Fast Is a Performa 600?**

<table>
<thead>
<tr>
<th>Screen Redraw</th>
<th>FPU Math</th>
<th>Non-FPU Math</th>
<th>Processor</th>
<th>Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two scroll tests—in Microsoft Excel and Word 5.0—represent overall graphics-handling performance, since scrolling is one of the Mac’s most common graphical tasks.</td>
<td>A scientific recalculation in Excel 4.0 shows the floating-point-unit math co-processor’s performance—or its lack of performance.</td>
<td>A business recalculation in Excel 4.0 shows the performance of math functions by the processor and Standard Apple Numerics Environment (SANE).</td>
<td>Four Tests—a sort in FileMaker Pro, a preview and magnification in Aldus FreeHand, and searching-and-replace in Microsoft Word 5.0—measure the speed of the processor by itself.</td>
<td>Four drive-intensive tests—sorting in 4D, opening a file in Photoshop, compiling in Think C, and duplicating a 3.9MB file—measure the CPU’s processing speed as well as its ability to transfer data to and from an external Storage Dimensions 800MB drive.</td>
</tr>
<tr>
<td>Quadra 950</td>
<td>44</td>
<td>20</td>
<td>2.7</td>
<td>18</td>
</tr>
<tr>
<td>Macintosh IICi</td>
<td>113</td>
<td>44</td>
<td>9.1</td>
<td>53</td>
</tr>
<tr>
<td>Performa 600</td>
<td>140</td>
<td>398</td>
<td>22.0</td>
<td>84</td>
</tr>
<tr>
<td>Classic/SE</td>
<td>265</td>
<td>1484</td>
<td>77.8</td>
<td>240</td>
</tr>
<tr>
<td>Times are in seconds. Shorter bars are better.</td>
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The Quadra 950, Macintosh IICi, and Classic SE were tested with 8MB of RAM, internal video, and System 7.0.1 with TuneUp. The Macintosh IICi also had a Macintosh IICi Cache Card. The Performa 600 was tested with 8MB of RAM, internal video, and System 7.1b10, a beta version of the new system shipping with the Performa series.
The Rest of the Family

Apple had to admit it. Gone are the days of high profit margins and an ever-expanding Macintosh base. Though there are millions of Macs out there, there are still millions of American households without one. What's a computer company to do?

Think toasters. Think television. Think about all those appliance-acquiring families who have never crossed the doorsill of a computer emporium. Apple has a plan.

ATTENTION SHOPPERS
Recognizing that many potential owners of Apple products are intimidated by the technospeak and vast array of hardware configurations and software options available in computer stores and mail-order catalogs, Apple is launching a new product line, the Performa series, aimed precisely at this market. In the initial launch, the one new and two not-so-new machines, and their peripherals, are being offered in more than 1600 consumer retail outlets nationwide. Shoppers at places like Sears, Silo, and Office Depot are already beginning to find Apple products next to the fax machines and audio CD players.

The Performa packages are clearly aimed at individuals who want a simple plug-and-play solution—integrated hardware, a palette of useful software, and dependable vendor support, all at a decent price. But inside the package, the Performa 200 is a Classic II, the Performa 400 is an LC II, and the Performa 600 is based on the same 68030 processor as the Macintosh IIci. So why the new name?

While these machines look familiar, Apple claims that the new Performa owner is buying more than just the hardware. They're buying a modified version of System 7—some of its more advanced features have been cloaked to make the Finder more approachable and easier to learn, while others, like DAL, have been left out altogether.

For a start, the default desktop patterns appear in color on the 400 and 600 instead of a more staid gray folder, thereby avoiding the embarrassment we all feel when we can't find a file we've just closed. You can, of course, navigate to any other folder should you choose to save the document elsewhere.

To avoid the vertigo that some new users feel when they accidentally click outside a document window and find themselves back in the Finder, the Performa system software hides the Finder layer when applications are being used. Clicking outside a document window doesn't return you to the Finder, and volume icons and the Trash Can are hidden. You can return to the Finder by selecting it from the Application menu located in the upper-right corner of the screen.

In addition, the Performa series includes an Apple backup-and-restore utility that lets users copy the contents of their hard drive to a set of floppy disks.

AT EASE
The Performa units also ship with At Ease, a System 7 extension designed to simplify file management for those who share a Macintosh. (Other Mac owners can purchase At Ease separately for $59.)

With At Ease installed, the traditional Finder disappears, and two near screen-size folders, one labeled Applications and the other Documents, dominate the desktop. Applications and documents appear on these folders as large colored icons and, just as in the Launcher, a single click of the mouse opens them.

To control access to files, a designated system operator—mom or dad, for instance—easily determines who can open, edit, or rename files. Kids can't tinker with tax returns, coworkers can't add odd and embarrassing sounds to your System, and bosses can't read sensitive and confidential material, such as your résumé. There's no Trash Can, so files can't be inadvertently thrown away; and you can lock the hard drive, forcing other users to save to floppy disks. An optional password reopens the Finder.

GETTING THE WORKS
Filling out the Performa bill is a selection of one to three third-party application products such as word processors, spreadsheets, and databases in integrated packages; graphics programs; and communications packages. The applications come installed on the hard drive, and their oversize icons appear in the Launcher window. Accompanying manuals are included in the box with the hardware.

THE PERFORMA DISPLAY
The Performa 200's black-and-white 9-inch display is built in, but owners of the Performa 400 and 600 can choose between two new monitors, the Apple Performa Display and the Apple Performa Display Plus. These new monitors do not use the Sony Trinitron tube used in the Apple Color High-Resolution RG8 Monitor, instead, they use a tube (unidentified by Apple) that is made in Taiwan.

Both Performa displays measure 14 inches diagonally, and their screens are slightly more curved than the Trinitron-based Apple monitor's screen. The 512K of video RAM (VRAM) included on the Performa 400 and 600 machines limits those machines to displaying only 256 hues on the Performa displays; the
Performa 600 offers an option that brings the VRAM up to 1MB and the number of colors to 32,000. Both Performa displays have screens with 640-by-480-pixel resolution.

The Apple Perfora Display Plus is the more expensive of the two, retailing for $450, and complies with the Swedish government's extremely-low-frequency (ELF) emissions guidelines. The Perfora Display Plus has a dot pitch of 0.29 that makes it just slightly coarser than the more expensive AppleColor display ($999), which has a dot pitch of 0.28. The less expensive Performa Display retails for $350, does not conform to the Swedish guidelines, and has a dot pitch of 0.39, which results in the coarsest screen image of the three.

Macworld Lab testing showed that both Perfora displays had better brightness than the AppleColor display, but the AppleColor display had better contrast, especially at normal brightness levels, perhaps due to the extra glare picked up by the Perfora displays' curved screens. The AppleColor display also had slightly better convergence (how precisely the red, green, and blue electron guns hit their targets) than the Perfora displays, as well as better color purity (the ability of a monitor to display pure white and less distortion). Subjective testing by Macworld staff garnered underwhelming enthusiasm for the Perfora displays—they seemed muddy, washed-out, and slightly blurry. Those who spend all day at their screens seemed to feel the extra money for the AppleColor display was a worthwhile investment.

Perfora packing boxes list the products included in that package, and pictures of the contents appear on the outside. Even keyboards are included this time around. (Extended keyboards are standard with the 600, optional with the 400.) Every effort is clearly being made to make purchase as painless as possible.

**DEALER'S CHOICE**

So how much does all this entry-level technology cost? And which software packages and keyboards come with each setup? Even Apple wasn't sure at press time. Within some constraints imposed by Apple, each of the outlets included in the launch of the Perfora line are free to bundle and price as they see fit. Estimated prices are $1250 for the Perfora 200, $1450 for the 400, and $2500 for the Perfora 600 sans monitor but with the AppleCD 300i CD ROM player.

These are competitive prices, and the Perfora packages just might prove attractive to babied boomers hoping to mitigate the education crisis on the home front with a personal computer. If successful, this strategy will obviously bode well for Apple and the consumer outlets, but many questions arise.

By offering Macintoshes in retail outlets, Apple presents users with somewhat confusing choices. Since the prices for the Classic II and LC II look-alikes are below those of their Macintosh counterparts (at $1849 for each with 4MB of RAM and an 80MB hard drive), wouldn't someone buy a machine from a traditional Macintosh dealer, thereby passing up the installed software and enhanced service packages? Why would dealers bother trying to sell these machines?

There is always a fair share of grumbling within the third-party vendor community. Should the Apple-consumer push be as successful as some pundits predict, won't vendors feel even more subject to Apple's whims and manipulations? Will some be discouraged from continuing to develop for the Macintosh platform?

And what if Apple is wrong and the Performas are still too expensive and too difficult to master? A dwindling market share means even less money for research and development. Can Apple survive without constant upgrading and innovation?

Whether the Perfora series opens up the demand for home computers, or merely provides an easy way for the already converted to buy Macintoshes, one thing is certain. Apple marketing will never be the same again.

—SuZANNE STEFANAC

**Should You Buy the Perfora 600?**

APPLE'S MOST POPULAR PRODUCTS—THE CLASSIC II and the LC II—make up the low and midrange machines in the Perfora series. A competitor to the popular midrange Macintosh IIci (which will still be sold through traditional dealer channels), the Performa 600 makes up the high end of the new consumer lineup. Right now the most enticing configuration (5MB of RAM, a 160MB hard drive, and an internal CD) is expected to sell for about $2500, compared with $3999 for the 980 Macintosh IIci.

The basic Performa 600 offers a lot more for the money than a Macintosh IIci and provides a no-penalties upgrade path. Whether you use the drive bay to eliminate extra-drive clutter on your desk or to participate in Apple's vision for the future of CD ROM, the bay is a nice bit of industrial design. None of the new hardware is technically earth-shattering (the Photo CD system is dazzling, though), but the Performa 600 represents the sum of many good decisions implemented well. The Performa 600 is going to find many happy owners in the middle of the market through the middle of the 1990s.

Charles Seiter has, like most Macworld contributing editors, been long awaiting a low-cost Mac with a CD ROM drive. He designs analytical equipment for biotechnology firms in the San Francisco Bay Area.

Macworld Lab testing supervised by Mark Hurlow.
here's a wide range of potential customers for Macintosh accounting programs. Let's take a look at four different kinds of users who typify the broad range of accounting requirements. Peter Workhome wants to start a small business he can run from his home during the day so that he can spend more time with his children. Tom Smallbiz and his wife, Jan, run a small service business. They have four employees, and Jan spends most of the day outside the home, working with customers, while Tom handles the office operation.

Harry Bigbiz has been growing his business steadily for the past five years and now has a nearly $2 million cash flow per year. He automated his accounting procedure with a fairly simple accounting program a few years ago, but his office operation is now close to chaos because of confusion among all the extra people he hired to keep the paper moving. And there's Julie C. Corporate, who is trying to save her company money (and get herself a promotion as well) by moving the firm's finances from a mainframe to a Macintosh network.

Home Finance
PETER WORKHOME CAN BEGIN BY LOOKING AT personal-finance programs like Survivor Software's MacMoney, Aatrix Software's Checkwriter, Intuit's Quicken, or MECA Software's Managing Your Money.

These programs are aimed primarily at personal-finance users, but they fulfill small-business needs as well by offering business charts of accounts and explaining in their documentation how to perform common business functions. All four include check writing, transaction entries, budgeting, and other basic bookkeeping functions. They also produce all the basic reports needed for any small business, and each is available at a street price well under $100.

I think Peter Workhome should look at the MacMoney program first. Although its bookkeeping terminology is different from that in business packages—you don't have general ledgers or accounts receivable, for example—you still accomplish the same basic accounting tasks. Instead of entering a purchase as an accounts payable, for instance, you enter it as a credit card purchase. And Survivor Software's unlimited free support, plus the newsletter the company publishes periodically for registered users, makes getting up to speed relatively easy.

MacMoney also offers an add-on for accounts receivables, called InvoicIt, that allows you to pre-
Personal-finance programs can fulfill business needs as well by offering business charts of accounts and good documentation

All the personal-finance programs let you export data to MacHep at the end of the year, for calculating your taxes (or giving to your accountant to do your taxes).

Still, Peter doesn’t think he’ll be satisfied with adapting a personal-finance program to his business. He knows enough to feel comfortable with numbers and bookkeeping forms, and he has to manage a small inventory, which can get pretty confusing in a personal-finance program. He should consider an integrated program, which incorporates basic bookkeeping functions into one program. Such programs also organize financial information into traditional accounting categories like accounts receivable and payable, making it easier to turn the books over to an accountant during tax season.

I’d recommend Teleware’s M.Y.O.B. The program uses a file cabinet metaphor—you go to various file drawers to write checks, enter bills, add inventory, and produce reports. Work-flow diagrams guide you through all the necessary steps in common business tasks.

M.Y.O.B. offers general ledger, accounts payable and receivable, and inventory; it does not offer payroll. M.Y.O.B. also lets you schedule appointments and create a database of vendors and customers. These functions are a bonus feature for people like Peter, who want to keep name and address information together with financial records.

Although Peter doesn’t need a payroll program (he is the only employee), people like Tom and Jan Smallbiz could certainly make use of one. Tom could handle the checks, salaries, and deductions manually. But payroll can get fairly complicated and time-consuming when you’re preparing it for three or more employees, since you’re not only paying the employees their take-home pay, but also withholding and assuming obligations for federal, state, and local taxes; federal and state unemployment; and other deductions for insurance or medical benefits.

CheckMark Software’s Checkmark MultiLedger and its companion program, Payroll, are my recommendations to people who need to do payroll. The documentation is lean, but the programs are easy to navigate. People like Tom and Jan with only a few employees can probably process their payroll in about the same amount of time they’d spend preparing the data for a payroll service. CheckMark’s Payroll program is also flexible, allowing for easy entry of different hours for each period, with the option of saving the hours if they don’t change (or change little) from payroll to payroll. MultiLedger also offers calculation of sales commissions. As a bonus, Payroll lets users change their tax tables manually. (Most other programs require you to buy updates to keep tax tables current.)

Another excellent program for people like Tom and Jan is Accountant, Inc. from Softsync. The menus are longer than those in MultiLedger (although this is compensated for by Accountant’s comprehensive and clearly written documentation), but

I particularly liked being able to fill out a deposit form on screen, print it, and use it at the bank. Aatrix also offers unlimited free telephone support.

My next recommendation is Quicken. It tracks assets, liabilities, income, and expenses—the same basic elements you’ll find in most business accounting applications. The program has a good Mac interface and is easy to learn and use; Intuit provides unlimited free support. Quicken also connects to the Checkfree service (at additional cost), which enables you to transfer money via modem.

If Peter is already using MECA Software’s Managing Your Money (MYM) to track his personal assets (such as insurance policies, stocks and bonds, and retirement and tax-planning accounts), he could easily adapt it to also track his business expenditures and incomes, but I wouldn’t recommend it as a personal-finance package otherwise. MYM, like Checkwriter 4/0, Quicken, and MacMoney, covers how to use the program for business in its documentation. Like Quicken, MYM also offers the option of paying checks electronically through Checkfree. Peter might also consider using Signature Systems’ Simple Accounting Plus (once Plains and Simple Accounting from Great Plains Software). This package is designed to mimic a manual one-write system.

for larger payrolls. I particularly liked being able to fill out a deposit form on screen, print it, and use it at the bank. Aatrix also offers unlimited free telephone support.

At Joseph Schmidt Confections’ 25,000-square-foot chocolate factory in San Francisco, company controller Matt Ehlen (left, with coworker Leticia Santamaria) uses Great Plains Accounting to keep track of the business.
they are far from complex. Accountant includes general ledger, accounts receivable, accounts payable, inventory, and payroll. In September, Softsync plans to include Snow International’s Report Writer with Accountant, which will be a plus for users who regularly produce lots of reports. Both the CheckMark programs and Accountant come in multiuser versions, so they can handle expansion as your currently part-time bookkeeping responsibilities grow into a job for more than one person.

Computer Associates’ ACCPAC Simply Accounting could use some updating (it doesn’t offer on-screen checkbook reconciliation, which I think is a necessity for easy bookkeeping); but it is still a basic, simple program appropriate for many non-bookkeepers. The main screen consists of icons of the program’s ledgers and journals; you move around the books easily by working from and returning to the main screen, with a separate set of menus for each area of the program.

Users that need payroll but not inventory and would like an easy-to-use program should consider Peachtree Software’s Peachtree Accounting for Macintosh (formerly atOnce), which offers general ledger, accounts receivable, accounts payable, and payroll. The interface lets you move easily from the summary level to detailed data-entry screens with a few mouse-clicks. And at a $99 list price, it is the best value of all the accounting packages for the budget-conscious bookkeepers out there.

Business Sense Integrated Accounting Software, from Business Sense Inc. ($199), is an alternative to Peachtree Accounting for Macintosh and offers general ledger, accounts receivable, accounts payable, and payroll. The program is organized around a main screen in which icons represent functions and journals. To enter the payables journal, for example, you click on the purchases icon; the entry screens are electronic replicas of the standard double-entry ledger pages familiar to people used to doing accounting manually.

The payroll tax tables included with the program, however, require real effort to use. Instead of a single annualized table, there are separate entries for each of the different pay periods (either 12 or 13), each of the three categories (single, married, head of household), and each salary bracket. You can create and update these files yourself, or you can buy the federal tables from the program’s publisher. If the state tables, only California’s is available for purchase, so you can plan on several hours of entering and updating tax data for any other state.

HyperCard enthusiasts might consider Wetzel & Company’s Profitability Professional, which offers a good breadth of functions and is easy to modify if you’re familiar with HyperTalk. I hope, however, that the publishers rewrite the documentation, which is skimpy and less comprehensive than many of its competitors’.

For the Knowledgeable Bookkeeper

HARRY BIRGIZ IS ADDING AN ADMINISTRATION group to his company. When Harry started the company, he used an all-in-one accounting program that he maintained in his spare time. Then he hired a second and third person to do the books. Now he needs to better organize the work duties, so he’s bringing in his brother-in-law Charlie, who managed a financial department in a large corporation, to set up a dedicated administrative department.

Charlie evaluates the situation and decides that he will divide the work into several functional areas. He plans to have one person manage the payables and

Great Plains Accounting in Great Plains Accounting, you can post recurring batches of transactions, as shown here, and then post them monthly to avoid duplication of effort.

M.Y.O.B. Like Managing Your Money, M.Y.O.B displays a navigation map when you first start up the program. Similar graphic devices are used throughout the program, such as a card file metaphor for organizing the chart of accounts.

Accountant, Inc.

Accountant, Inc. uses a variety of lookup lists, such as customer and inventory lists, to simplify data entry. The program also calculates many values, such as sales tax and invoice totals, for you.
receivables, then to add another person later. Another person will handle payroll. Charlie will manage the general ledger himself, and he will have another person in the warehouse take care of sales processing and inventory.

At this point, Charlie does not want to get involved with a multiuser network because of the cost and the additional work involved in system support. After studying the multiuser versions of Softsync’s Accountant and CheckMark’s MultiLedger and Payroll programs, he determines they would be perfect for a one-, two-, or maybe three-person group, but they won’t be adequate, or provide growing room, for all the functions he plans to spread out over five or more people in different locations. He therefore decides to go with a separate-module bookkeeping sys-

---

### ACCOUNTING MATRIX

<table>
<thead>
<tr>
<th>Company</th>
<th>Softsync</th>
<th>ACCPAC Simply Accounting 1.38</th>
<th>Business Sense</th>
<th>CheckMark MultiLedger 2.0 and Payroll 4.6</th>
<th>In-House Accounting 1.2</th>
<th>M.Y.O.B. 3.0</th>
<th>Peachtree Accounting for Macintosh 1.30</th>
<th>Profitability Professional 1.7</th>
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<td>●</td>
<td>●</td>
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<td>Enter prior-period transactions</td>
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<td>Calculates finance charges</td>
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<td>Provides customer credit limits</td>
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<td>Tracks (by salesperson/ by commission)</td>
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<td>○/○</td>
<td>○/○</td>
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<td>Separate bill-to and ship-to addresses</td>
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<td>●</td>
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<td>Prints dunning messages</td>
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<td>Allows entry of prior-dated invoices</td>
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<td>Batches invoices for payment</td>
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<tr>
<td>Allows user-defined memos on checks</td>
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</tr>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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</tr>
<tr>
<td>Integrated job tracking</td>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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</tr>
<tr>
<td>Integrated export capability</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Integrated import capability</td>
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<td>●</td>
<td>●</td>
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<tr>
<td>Multiuser version available</td>
<td>$995 1</td>
<td>○</td>
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<td>●</td>
<td>●</td>
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<td>$199</td>
<td>$199</td>
<td>$695</td>
<td>$199</td>
<td>$249</td>
<td>$99</td>
<td>$249</td>
<td>$99.95</td>
</tr>
</tbody>
</table>

1 = yes; 0 = no. 1 Some modules cost more. 2 Price per module. 3 $50 per user. 4 $695 for enhanced version. 5 With source code $695.
tem where he collects the data files on disk at the end of each workday and posts them to the general ledger. He will create reports from this general ledger daily and distribute them to Harry Bigbiz and the other department heads.

If Charlie comes from a traditional accounting background, he will probably like Absolute Solutions' Computerized Classic Accounting, which replicates traditional accounting forms on screen. If Charlie is looking for a multimodule program that makes excellent use of the Macintosh interface, he will like Peachtree Insight Accounting for Macintosh. (If you are considering expanding to a network operation, however, the Insight series is not for you; it is limited to single users.)

Charlie should also check out Satori Software's...
Components, which offers clean menus and a great deal of flexibility in designing forms and reports. Satori, however, does not yet offer an integrated payroll module, and Components’ inventory segment is part of the accounts receivable module rather than being a dedicated module. In Charlie’s case, this means an awkward situation because he has two people handling sales processing and inventory and receivables, and it would be awkward for the two of them to share the same module at the same time. (Satori does, however, offer a dedicated job-cost and time-billing module.)

Accounting is one area where one size doesn’t fit all—the key to finding the right package is understanding your needs

If Charlie wants to concentrate on content rather than interface, I highly recommend the Great Plains Accounting series. The series has a first-rate lineup of dedicated modules whose various accounting functions can easily be used by different individuals or groups. Great Plains Software provides excellent training and support to users.

On the basis of content alone (ignoring the Mac interface), virtually all of the programs with separate modules are worth examining, by comparing the programs’ dedicated function modules to your specific needs. SBT Corporation’s SBT Mac Series Six Plus has excellent depth and breadth, and the programs, which run under FoxBase+/Mac, can be easily customized by dBase or FoxBase programmers. And Lake Avenue Software’s Avenue Accounting Collection, which looks like a mainframe program, has a solid content base.

The Manapro Accounting Software series is interesting because it runs in six languages (all included in the basic package), offers a money-back guarantee, and has an electronic manual on screen that explains how to use the program as well as some basic accounting terms and procedures. I also like the accounts receivable module, which makes it easy to write dunning letters. In actual overall use, however, Manapro is disappointing. The documentation is skimpy, covers only highlights, and doesn’t even have an index. The electronic manual is skimpy as well, and the little information provided is more elusive than illuminating.

Programs for Multiple Users

Although Harry BigBiz is not yet ready for a networked environment, he may grow into one as his number of machines and users increases. When Harry gets to the point where moving data by disk becomes a logistical problem because of having many machines to keep track of, in separate locations to boot, it will be time for him to form a small network.

He will be concerned with things like user training, cables and connections, servers, and having the resources (both money and people) to maintain the machines and keep the software current. These tasks, which single or small-group users hardly think about, become critical in a networked operation. Harry will also (unfortunately) become familiar with downtime, security, and service. At that point, Harry will be entering the world of Julia C. Corporate, who is about to convert a network of mainframe users to a Macintosh network.

If Julie C. Corporate does her homework, she will find that Flexware II is an outstanding network program with a complete line of dedicated modules, including general ledger, accounts receivable, accounts payable, payroll, and inventory. In addition, the program offers modules for order processing, job cost and analysis, purchasing, point of sale, service request, sales leads and tracking, and client-server management. It sports a nifty new graphical interface that makes excellent use of palettes and icons for navigating the segments (which is a big advantage over the previous interface). To get working quickly, Flexware offers training at its headquarters or by its resellers in the field.

The Great Plains Accounting series is also a terrific network program with a comprehensive line of...
dedicated programs—beyond the general ledger, accounts payable, accounts receivable, payroll, and inventory—that includes the following: cash management, order entry, purchase order, job costing, and network management, plus a system manager, a client-server manager, and an import manager. It is strongly supported by both the company and resellers, and also offers training at its headquarters or by resellers and user groups in the field.

The SBT Mac Series Six Plus is also excellent, with its easily modifiable FoxBase+/Mac code. Beyond the basic general ledger, accounts payable, accounts receivable, and payroll programs, SBT also offers a complete range of dedicated modules: sales orders, purchase orders, fixed assets, job costing, manufacturing, property management, and time billing. SBT's interface is not Mac-like; a comprehensive menu bar brings up fairly standard MS-DOS-derived data entry screens that you navigate by pressing the tab and enter keys instead of using the mouse.

Logisoft's Multiuser Desktop Accounting (MDA) also caters to networks. MDA's Omnus 3 screens are adequate but show the need for upgrading. MDA, in addition to general ledger, accounts payable, accounts receivable, and inventory, offers purchases, sales orders and quotes, a representative sales-activity module, and invoicing. MDA does not offer its own payroll, but it allows you to integrate Aatrix Software's payroll with your general ledger.

The poorest interface of the multiuser products is from Lake Avenue Software's Avenue Accounting Collection. From an accounting standpoint, the series is highly competent; and the available dedicated modules (beyond general ledger, accounts payable, accounts receivable, payroll, and inventory) include financial reporting, order entry, job costing, invoicing, purchase orders, and bank-account reconciliation. These modules, like SBT's, also run under FoxBase+/Mac, but use of the mouse is practically nil, and the screens resemble mainframe entry screens.

Softek Design's A4 Accounting, based on ACUS's 4th Dimension, offers separate modules for accounts payable and inventory, in addition to its core general ledger and accounts receivable program. A4 does not offer a payroll module. You have the advantage of working with an easily modifiable 4D code, but you have to contend with 4D, which is even slower on a network than on a single-user machine.

Making the Right Choice
FOR THE BUSINESS-ACCOUNTING PROGRAMS, AT A minimum you should have a 68030-based machine with 2MB of RAM (4MB if you’re using System 7) and a 40MB hard drive. Although many programs require less power and space, you may find yourself limited in upgrades if you have less RAM and hard drive space.

Large monitors are not necessary in bookkeeping programs but can be convenient in looking at on-screen reports and doing checking-account reconciliations (assuming the application allows you to use a full screen) because a large monitor eliminates a lot of scrolling.

Accounting is an area where one size doesn’t fit all. The key to finding the right package is understanding what your needs are today, and what they’ll probably be tomorrow. And always consult with your accountant when choosing an accounting application and make sure that he or she will be able to use the data that you will be sending. See “Editors’ Choice” for my recommendations of accounting packages likely to work for most people looking for single-user (with and without payroll), multiple-user, and networkable products. In 1992, one thing is certain: if you do your homework, there’s an accounting package out there for you.

See Where to Buy for contact information.

ALAN L. SLAY specializes in covering financial and accounting software and has been writing for Macworld since 1988.
HEN A STORAGE DEVICE—WHATEVER THE MEDIUM—OUTPACES ITS CLOSEST DIRECT COMPETITORS BY AS MUCH AS 10 PERCENT, IT'S WORTH NOTING.

BUT WHEN THAT STORAGE DEVICE IS A REWRITABLE OPTICAL DISK DRIVE—THE SLOWEST RANDOM-ACCESS STORAGE MEDIA AROUND—IT'S PARTICULARLY WELCOME NEWS.

AMONG REWRITABLE OPTICALS, PINNACLE MICRO'S NEW PMO-650 OFFERS A REMARKABLE 16 PERCENT LEAD OVER ITS NEAREST OPTICAL COMPETITOR AND IS AT LEAST 27 PERCENT FASTER THAN ALL BUT ONE OTHER DRIVE TESTED BY MACWORLD LAB. NOTWITHSTANDING PINNACLE'S HIGHLY INFLATED CLAIMS THAT THE PMO-650 IS UP TO FIVE TIMES AS FAST AS DRIVES BASED ON A POPULAR SONY MECHANISM, AND FASTER THAN MOST HARD

Optical Drives Are Getting Faster—and More Affordable

drives, our tests show that its performance is close to that of low-end hard drives. While not revolutionary, this is certainly an encouraging sign that opticals are becoming more competitive.

There have been other important developments since Macworld last tested rewritable optical drives, in our June 1991 issue. At that time, only one unit in the 3½-inch form factor was available; today there are 30 to choose from—with many selling for less than $1500. And those small, speedy units have helped push down prices of the older 5¼-inch units; last year they cost $4600 on average, and today you can choose among several models under $3000.

It's too soon to consider throwing out your hard drive, but for convenient, long-term, high-capacity archiving; for network backup; and for transporting huge color images between offices, optical drives are an increasingly attractive option.

Macworld Lab compared the relative performance of 43 optical drives, from 3½-inch units with 128MB capacities to 5¼-inch drives capable of storing up to 1GB of data. We tested them on everyday optical drive functions such as reads and writes, as well as on typical tasks, including copying large files and opening them in Adobe Photoshop and Aldus PageMaker. We informally tested each drive's handling of QuickTime—optical drives are a logical solution to the heavy storage requirements involved in displaying a QuickTime movie—and found that all drives offer adequate playback.
Two top performers: the Pinnacle Micro PMO-650 (top) and the MacProducts Magic 128 REM/MO.
How Opticals Work
MOST ERASABLE OPTICAL DRIVES ARE based on magneto-optical (MO) mechanisms. With MO drives, a high-power laser heats up a spot on the disk platter; when the metal oxides in that spot are hot, their magnetic orientation can be altered. A magnet operating on the opposite side of the disk determines each spot’s 0 or 1 orientation. Once cooled, the media can’t be altered by magnetic fields, which is why MO drives are a durable medium for archiving. When set on low power, the laser reads the magnetized spots without heating them.

Panasonic uses an alternate, phase-change, approach for some of its drives. This rewritable optical technology doesn’t require magnetization. Instead, by heating the media, the high-power laser changes the structure of a spot, making it either crystalline or amorphous. These states have different reflective properties, so a low-power reading laser can differentiate them as 0s or 1s.

Both technologies use two-sided, 51/4-inch form-factor disks and can format them for capacities of about 300MB or 450MB per side, depending on the formatting method; like an old record album, you can “play” only one side of the disk’s storage capacity at a time. The single-sided, 31/2-inch, 128MB form factor is available only in the MO format and carries about 120MB of data after formatting.

Rewritable optical drives owe their huge capacity to the precision of diode lasers. These lasers can focus on an area as small as 1 micron in length (one-millionth of a meter), thereby allowing optical drives to pack data much more densely than hard drives can.

Multifunction drives offer the ultimate in archiving flexibility by combining rewritable optical and the older write-once, read-many (WORM) formats in one drive (see “Opticals in the Spotlight” for a list of available multifunction drives). If you’ve already invested in a WORM drive (whose media can’t be erased) and have many gigabytes of archives in storage, but want to move to rewritable technology without losing access to your old records, multifunction drives are the way to go. As for the massive storage needs of a major corporation or government agency, many vendors offer rewritable optical jukeboxes—robotic disk shufflers that have capacities up to 1000GB.

The Advantages of Optical
REWITABLE OPTICAL DRIVES ARE A logical solution, primarily for long-term storage and easy transport of large files, such as customer databases, multimedia presentations, complex color images, or CAD drawings, and are a good choice for nightly network backup. But why choose rewritable optical technology over tape drives, WORM drives, removable hard drive cartridges, or removable Winchester-style hard drives?

Rewritable opticals offer a unique combination of characteristics that allow more-flexible archiving than competing technologies do. Like hard drives, optical disks can be overwritten 100,000 or more times, can be mounted on the desktop, or can be designated as the start-up device. Like WORM drives, rewritable optical disks are impervious to magnetic fields (who add their own electronic circuitry), and a similar approach used in drives based on the MaxOptix Tahiti II mechanism, sets the laser, beam-splitting prism, and light sensor in a fixed position—leaving the movable head with a light, easy-to-maneuver prism and lens.
### Optical Performance Tests

#### Overall Fastest

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<thead>
<tr>
<th>Color Key</th>
<th>Fastest</th>
</tr>
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<tr>
<td>Percent slower than fastest</td>
<td>Up to 10%</td>
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<tr>
<td>11% - 20%</td>
<td></td>
</tr>
<tr>
<td>21% - 29%</td>
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</tr>
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<td>30% or more</td>
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#### Doublewrite (in seconds)

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Time</th>
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<tbody>
<tr>
<td>Pinnacle Micro PMO-650 (Pi)</td>
<td>3.42</td>
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<tr>
<td>PLI Infinity Max Optical (M)</td>
<td>3.86</td>
</tr>
<tr>
<td>MacDirect NuDesign Optical (MO)</td>
<td>5.79</td>
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<tr>
<td>Liberty Systems 115MO (MO)</td>
<td>5.79</td>
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<tr>
<td>DGR Technologies 128REM (MO)</td>
<td>5.79</td>
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<tr>
<td>Ocean Microsystems Vista 128 (MO)</td>
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<tr>
<td>MacProducts 128 REM/MO (R)</td>
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<td>Generation Systems 128MB (MO)</td>
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<td>Mirrot Technologies 128MB Optical (MO)</td>
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<td>Reliable Erasable Optical Vista HyperSpace (R)</td>
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<td>Pinnacle Micro REO-130S (S)</td>
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#### Singlewrite (in seconds)

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### But Why So Slow?

The relatively sluggish performance of optical drives derives from three factors. Unlike hard drives, which overwrite data directly, MO drives normally use a three-pass system that first erases data on a portion of the disk, then writes new data, and on a third pass verifies that the data is correct. Panasonic's phase-change mechanism overwrites without change, which when used with efficient software and firmware, theoretically should speed up performance over MO drives. But direct overwrite did not result
in speed benefits for the phase-change drives we tested, the Maximum Storage Ductte System 5 and the Optical Access International Access MF/Gigabyte.

Second, because laser head assemblies are expensive, optical drives contain just one assembly—unlike hard drives, which can achieve superior read-write times by operating on multiple platters simultaneously. Finally, laser head assemblies are larger and heavier than hard drives' magnetic heads, which can move more rapidly across the platter and stop more quickly.

Among the standout drives are the PLI Infinity Max Optical (left) and the MaxDirect NuDesign Optical.

Nonetheless, the faster units in the higher-capacity 5¼-inch form factor we tested can also be used effectively as network servers for businesses that distribute large database files or graphics. For example, Macworld uses a rewritable optical drive with its international file server; foreign editions of the magazine dial in to download graphics or articles used in the U.S. magazine.

Increasing Speed

A CRITICAL FACTOR IN SPEEDING UP MO drives involves the verify cycle used to maintain data integrity; some vendors ship with the verify turned on, others with it turned off. With verify off, drive performance improved up to 28 percent in our spot tests. Macworld Lab tests were conducted, as usual, with all features in the default position—that's the way the consumer receives the product, and most consumers use the product just as shipped.

Most of the drives come with a DIP switch or software that allows you to turn verification on or off. Among the units we tested, those from Core International, Generation Systems, Mass Microsystems, Mirror Technologies, Procem Technology, and Relax Technology don't allow you to change the factory setting. With the Procom and Relax drives, that's a real problem, because they ship with verification off. Avoid buying units from those companies if you want maximum data security. Anyone using a drive with verify turned off should beware—even a tiny error in some files, such as a financial database or medical image, can render the rest of the data almost worthless.

RAM caches are another way to speed up optical drives. Caches improve write performance by reading data from the computer into RAM at a much faster rate than the optical media can accept it, then writing the data to the disk while handling the next demand from the computer. Caches can reduce read times by prefetching—reading more data than was requested by the Mac. In this way cache algorithms attempt to guess what the Mac will ask for next. If the prefetch does contain the next block of data requested, the Mac can read that data at high speed directly out of the cache. This eliminates the need to go back to the poky disk.

The more efficient the algorithms that control the cache, the better the cache's performance. Cache sizes vary widely, from as little as 64K to the Pinnacle Micro PM0-650's whopping 4MB. (Drives based on a new MaxOptix Tahiti II mechanism, which offers a 4MB cache option, should be available when you read this.) The larger the cache, the more potential it offers for time savings on larger files.

A recent innovation, split-head optics, is also geared to help boost an optical drive's performance. Most optical heads consist of a heavy laser, two prisms, a light sensor and a lens mounted on a movable arm—the size and weight of that assembly is hard to move fast or stop suddenly, as needed to improve read-write performance. With split-head optics, the laser, one prism, and the sensor are fixed, leaving only the lens and one prism on the moving head (see "The Split-Head Optical Advantage"). This lighter head produces faster seek times. All the fastest drives in the 3½ form factor—the PMO-650 and drives based on the new Ricoh HyperSpace and MaxOptix Tahiti II mechanisms—use split-head optics with evident success. Previous Ricoh mechanisms were generally slower and cheaper than their Sony counterparts. But the Ricoh HyperSpace—based Relax Erasable Optical Vista HyperSpace, UnBound OptiStor-HS and Rodime Systems Condor 650e have leapfrogged Sony performance while keeping prices competitive.

Eighteen months ago, most optical drives used a 2400-revolutions-per-minute spindle speed—the rate at which the disk platter turns—and only one rewritable optical unit offered 3600 rpm. Now a number of drives, including the PMO-650 as well as those based on the Ricoh HyperSpace, employ the faster rate. Some vendors, including MacProducts USA, DGR, and FWB, recently began shipping the first 3½-inch drives that spin at 3600 rpm. Those drives, based on an Epson mechanism, didn't reach the market in time for our lab tests, but we looked at a prerelease unit that showed the fastest performance in the 3½-inch market, although still below the Pinnacle PMO-650's speed.

Faster spindle speed can be helpful, but it's far from the defining factor in drive performance. The MaxOptix Tahiti II mechanism, used in PLI's Infinity Max Optical, Storage Dimensions' MCO1-1000 NR, and MicroNet's SB-TMO-1000, runs at 2200 rpm. Yet the drives from PLI and Storage Dimensions finished near the top of the pack for 5½-inch form factor, in part due to a highly efficient formatting scheme.

Ease of Use

SPEED SHOULD BE ONLY ONE FACTOR in your decision about which rewritable optical drive to buy. Ease of use is important, too, and it begins by reducing the annoyance you can encounter simply trying to mount the drive on the Macintosh desktop. While most mechanisms don't mount automatically, all the units we tested include either an INTT or a simple application to mount the drive. We had the most problems mounting two drives from Relax, the Erasable Optical Vista HyperSpace and Erasable Optical Vista E-I (based on an older, slower Ricoh mechanism); Optima's Concord 600; Core International's RM 128; La Cie's ZFP-600; Optical Access's Access RD Aria; Pin-
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- **= yes; 0 = no.**  
- **M = multifunction; MO = magnetooptical; P = phase-change.**  
- **Price includes cartridge.**  
- **A subsidiary of Microtek Lab.**  
- **Drives from this company require Mac interface sold by third parties.**
### OPTICALS IN THE SPOTLIGHT (continued)

<table>
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<tr>
<th>Company</th>
<th>Product/Mechanism</th>
<th>Size (in inches)/Capacity</th>
<th>Technology</th>
<th>Tested</th>
<th>Price(^a)</th>
<th>Termination</th>
<th>Warranty (in months)</th>
<th>Toll-Free Support</th>
<th>Support Score</th>
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\(\*\) yes; \(\circ\) no. M = multifunction; MO = magneto-optical; P = phase-change.  
\(^a\) Price includes cartridge. \(^b\) Company provides backup support only, but number is not listed in manual.  
\(^c\) Price without Retrospect is $170 less. \(^d\) Includes required interface kit.

nacle's PMO-650 and REO-130S; TASS Optical World's PL128; and MicroNet's MO-128 and SB-TMO-1000.

### Technical Difficulties

WE RAN INTO OTHER INITIALIZING AND setup snags here and there in our testing. For example, the formatting software that comes with the TASS PL128 failed to format the disk at first—success came on the charmed third try. And the speedy Pinnacle PMO-650 shows some difficulties in **firmware**—instructions in the drives' read-only memory (ROM) chips. The drive suffers from periodic reset problems, freezing either the drive or the Mac when you start up both devices at the same time. We also had to return the original test unit because a disk became jammed in the mechanism. These problems will probably be worked out by the time you read this—Pinnacle updated its firmware twice during the period of our review alone.

### On Speaking Terms

ANOTHER KEY CONCERN IS COMPATIBILITY across drives. Unlike removable cartridges, which can be used only with mechanisms of their own kind (a Bernoulli box will read only Bernoulli cartridges, for example), optical cartridges enjoy some compatibility across mechanisms.

But there are limits to this convenience. Consider this scenario. You store your company's tax data using a state-of-the-art optical drive in 1992. In 1997, you're audited by the IRS. But your optical drive has long since broken down, and its vendor is out of business. You try three others' drives, but they can't read your cartridge—so much for 10-year guarantees on media.

Among five representative 3½-inch drives, only the MicroNet drive experienced problems—it could write to a cartridge formatted on any drive except the Pinnacle REO-130S. All drives tested could read and write to cartridges formatted on the MicroNet drive, however. MicroNet attributes the problems to incompatibilities in driver software. Among 5¼-inch units, there were considerably more problems. MO and Panasonic phase-change units are incompatible; similarly, media formatted by the Relax Pioneer Multi-Function Vista and a MaxOptix Tahiti II-based drive tested in...
In general, drives based on the superb performance compensate for its circuitry, drawing cooling electronics only, bypassing the sensitive disk-platter area. Both measures greatly cartridge.

Defeating Dust
For a device that will primarily be used for archiving, reliability may be the most important buying consideration. A primary factor in data reliability for any removable medium is dust control. Pinnacle’s PMO-650, the Ricoh HyperSpace-based Relax Erasable Optical Vista HyperSpace, the UnBound OptiStor, and the Rodime Condor 650s are the best at avoiding dust—the only drives we tested that fully enclose the media during operation. Those drives also separate the heavy optical head takes time, and the read-write functions from their electronic removable medium is dust control. We had trouble getting Relax tech support to return calls, and when we did get through, the attendant was woefully uneducated about optical technology. And both Relax units are loud enough to be irritating in an office—hardly conducive to a relaxing work environment.

At all costs, avoid the Storage Dimensions MCOH-1000 NR. Although this is one of the fastest 5¼-inch units we tested, its high price ($595) and noisy operation make it a poor investment.

The choice among 3½-inch drives is easy. For speed, seven drives based on the MOST optical drive mechanism finished in a pack ahead of drives with any other mechanism. Among those, the MacProducts Magic 128 REM/MO and MacDirect NuDesign Optical are terrific, and comparable bargains. The Magic 128 has the most appealing price—$1199, compared with the NuDesign Optical’s $1298. Both had very good tech-support ratings, unlike most of their competitors, but the Magic 128 had a marginally slower test score.

Who’s on Top?
In general, drives based on the 3½-inch form factor were faster than their 5¼-inch counterparts. The reason: a simple physical advantage of less ground to cover on reads and writes. Moving the heavy optical head takes time, and the shorter the distance, the less time required. Still, the two fastest drives were 5¼-inch units because the manufacturers introduced innovations such as split-head optics in the larger size first.

The top pick for the 5¼-inch category is the $4194 Pinnacle PMO-650, whose superb performance compensates for its mediocre technical support, irregularities in mounting, and firmware problems (see “Optical Performance Tests”). PLI’s Tahiti II-based Infinity Max Optical is second—in performance and as a total package. At $4599, the drive isn’t cheap, but the price is reasonable for cutting-edge technology. PLI offers the 1GB or 650MB format options and has some of the best technical support we found.

(To judge technical support, Macworld made three calls to each vendor, asking about typical problems for users of optical drives. The responses were rated for courtesy and technical knowledge, as well as for how easy it was to get through on the tech-support line. An average rating—between satisfactory and excellent—was then calculated for each company.)

If you’re on a tight budget, consider Relax’s two drives. The Erasable Optical Vista HyperSpace is one of the fastest in its category, and at $2799, one of the least expensive. Its older sibling, the Erasable Optical Vista E-I (based on an older Ricoh mechanism), costs only $1499—less than several of the 3½-inch drives. But if you’re not overly concerned with money, beware—Relax drives have little else to recommend them. The older model finished dead last in our benchmarks—about half the speed of the fastest drive. If you’re buying optical for overnight backup, you may not care, but beware of the nonadjustable verify-off setting. And don’t plan on getting much help with these budget drives. We had trouble getting Relax tech support to return calls, and when we did get through, the attendant was woefully uneducated about optical technology. And both Relax units are loud enough to be irritating in an office—hardly conducive to a relaxing work environment.

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5¼-Inch Drives

PMO-650 This drive’s speed is a significant advance for optical technology, and its full enclosure of the media cartridge reduces data-damaging dust contamination.


3½-Inch Drives

NuDesign Fast, inexpensive, good technical support, easy to use—this is a rare combination of qualities for a storage device.


Magic 128 REM/MO This is the cheapest, and one of the fastest optical drives we tested, with excellent technical support to boot.

Company: MacProducts USA. List price: $1199.
For data on the move, Macworld Lab found SyQuest cartridge drives to be the best solution overall. SyQuest drives are available from many companies, including Liberty Systems (top). Competing cartridge technologies include Ricoh (middle, in a GCC Technologies drive) and Bernoulli (bottom, in an Iomega drive).
Do you need to move large amounts of data between Macs without tying down a network or using stacks of floppies? Are you looking for a convenient archival medium? Do you want to take QuickTime movies or other sophisticated business presentations on the road? For all these needs and more, removable-media drives—like SyQuests, Bernoullis, and super-dense floppies—offer essentially unlimited storage flexibility for anyone with a limited budget and modest amounts of data (between 20MB and 90MB). (Another form of removable media, optical disks, are covered in “Optical Update,” in this issue.)

And removable hard drives appeal to those users with bigger budgets who need to move around a lot of data, with some models providing up to 1.2GB—that’s 1200MB—of storage. Unlike fixed hard drives, removable-media drives let users remove both the recording media and the drive mechanism as one cartridge. Because they are hard drives, removable drives can store a lot of data.

Despite the variety of types of removable media, there is little variety within each type. Except for the removable hard drives, the mechanisms come from a select group of manufacturers: SyQuest Technology, Ricoh Corporation, Iomega Corporation (which makes the Bernoulli mechanisms), Brier Technology (which makes the Flextra mechanisms), and Insite Peripherals (which makes the Floptical mechanisms).

With only one manufacturer of each type of mechanism, you might expect vendors to differentiate their products by offering additional features, but they haven’t. In fact, this year’s crop of drives shows that the field has taken on the semblance of a commodities market, with many players selling similar products. While the market’s not quite yet like pork bellies and orange juice, you will need to look beyond performance benchmarks to make your own selections. Macworld Lab tests show that all products using a particular mechanism are basically alike, so choose a technology first and then a product based on price and support.

Why a Removable?
There are many reasons to choose a removable-media drive over a hard drive. A hard drive has a fixed storage capacity. Once it’s full, that’s it. With a removable-media drive you just pop a full cartridge out and pop an empty one in. And the cartridges are big enough that you can use one for backup, without the hassle of swapping stacks of floppies or waiting for a tape drive to finish saving. Depending on the cost and storage capacity of the removable drive’s media, this may or may not be a cost-effective backup method, but given that all of the drives we examined move data faster than a floppy drive does, it certainly is speedier than backing up to floppies. Removable-media drives also provide random access to data, something a tape drive cannot do; and depending on the backup method you use, you may be able to access the data directly from the cartridge without bothering to restore it to a hard drive. Try that with a tape drive.

Removable media are also extremely useful for transporting large files. The cartridges are much smaller and lighter than an external hard drive, and generally more durable. Desktop publishing service bureaus have discovered this, and most accept files stored on at least one type of removable cartridge. Cartridges can also be used for distributing data within an organization and generally are cost-effective as long as the organization keeps reusing...
the media. In some cases, depending on the cost of the data being distributed, cartridges may be appropriate for commercial distribution of data.

Removable-media drives are uniquely suited for data security. At the end of the day you can remove a cartridge from a drive and store it in a secure area, say a locked file cabinet. This is a much more effective method of safeguarding data than are software passcodes and locked floppy drive ports, since even if the entire computer is stolen, the data remains. Locking up the removable media also avoids the use of data encryption and the possible loss of the decryption key, as well as problems that proprietary formatting applications can create when you need to use data-recovery tools to get data from a drive that has failed.

Removable-media drives are also useful for archiving data, since the removable media are generally more stable in the long term than tape is. (Tape can stretch, break, and in long-term storage it sometimes suffers from print-through, where the magnetic signal that encodes your data crosses successive layers of tape and garbles data.) And data access from a removable drive is faster than from a tape drive.

Most removabless can be used as a second hard drive. In many cases their performance is close to that of a fixed hard drive. Plus a removable can usually be used as a start-up drive.

Removable-media drives also offer users the option of creating unique environments on each cartridge, such as different versions of the System or different sets of applications.

With all removable-media drives, you must follow the correct eject procedure, or you risk damaging the drive and the data on the cartridge—removing a cartridge is not the same as ejecting a floppy disk. Removable disks or cartridges must spin down and the drive's read-write heads must retract before you remove the medium. If you're impatient and remove the medium prematurely, an engaged read-write head might drag across the medium and scratch it or scramble the information on it.

All the drives reviewed here contain a mechanism from one of only six manufacturers. Each manufacturer uses different technology to produce its drives and takes a different approach to delivering the mix of features that make up a removable-media drive.

SyQuest: Widely Available, Reliable

Perhaps the best known, SyQuest drives are half-height 5¼-inch devices with cartridge capacities of either 44MB or 88MB. (A new 105MB version is expected to ship this fall.) The drives consist of a mechanism to receive a data cartridge, a motor to spin the disk inside the cartridge, a pair of read-write heads, and control electronics that include a SCSI interface. The cartridge contains a single metal disk with a magnetic coating in a plastic shell, with a spring-loaded shutter that opens to give the read-write heads access to the disk.

When you insert the cartridge into the drive, the drive motor engages the disk and starts it spinning. Contamination from dust and other particles that may have settled on the disk surface is eliminated by a combination of centrifugal force (the drive spins at 3220 revolutions per minute) and air pressure (12,000 pounds per square inch) between the heads and the disk surface. Once this purge cycle is completed, the read-write heads settle down to read-write height, at which they skim over the SyQuest cartridge below.

Much of the technology used in SyQuest drives is derived from the hard drive industry. This allows for a low manufacturing cost and the rapid integration of new hard drive technology into SyQuest products.

Drives based on the SyQuest mechanism have had strong acceptance in the market, evidenced by the large number of companies offering products based on SyQuest mechanisms and the large installed base in service bureaus. There had been a considerable number of reports of problems with older 4MB SyQuest drives, ranging from easily damaged drive heads to incompatibility with other SCSI devices and problems with different formatting software. For example, if you mounted a disk formatted with Brand A software, dismounted it, and then mounted a disk formatted with Brand B software, the Brand A driver would still be in memory and would be used for the Brand B disk. This frequently corrupted the data on the Brand B disk.

But this problem should not occur with modern drives. Version 3.4 of the

**A Buyer's Checklist**

Because, as the Macworld Lab tests show, drive performance is so similar within mechanism types, what criteria should you use to select a specific vendor for the technology you decide to buy? Use this checklist to narrow down your choices.

- How much data do you need to store on a single cartridge? If it's more than 100MB, you've got only one choice: a removable hard drive.
- If you need to exchange data with others, what drives are they using?
- If you plan to use a drive for backup or archiving, you can chart the cost curve for the drive plus the media you'll be using. Pick the most cost-effective, but also factor in the time you'll need to spend swapping cartridges if you must use a lot of cartridges.
- If you're looking at a recently released technology, remember that market acceptance often drives prices down over time, an important factor if you are planning a corporate standard or if you expect to purchase a lot of blank media over time. Look to see how many vendors offer a specific technology.
- If you plan to travel abroad with the drive, you will need a universal power supply in your drive.
- If you plan to use the drive on a variety of Macs, make sure that the SCSI termination is either external or switchable.
- Do you plan on stacking a Mac on top of the drive to save desk space? If so, you may want to look for a drive with a metal case and a zero-footprint design.
- Are you sensitive to noise? Check out the results of our sound testing to select a quiet drive.
- Price is always an issue, and you should note that not only does the price of the drive vary from vendor to vendor, but the cost of blank media varies as well. Keep in mind that, like floppy disks, blank media are all alike; so shop around for cartridges. Your dealer's prices may be higher than a local office-supply store. "Rating Removable Drives' Performance" shows typical prices.
- If you're buying a drive for home use, check the drive's FCC class rating. Only drives with a Class B rating can be sold for home use; a label should appear on the drive case saying it's a Class B device. (Non-Class B drives may interfere with radio, television, or other consumer electronic devices, as well as police scanners and other radio-based devices.)
- Narrow down your choice by evaluating vendors' technical support. Check our ratings in "Comparing Removable Media."
The new CFA version of the SyQuest Mac running System 7, the 88MB drive also offered it to vendors free with its SyQuest drives: the 88MB drives can read from, but not write to, the 44 MB cartridges. System 7 ROMs installed, versions BBA and CFA. SyQuest has received drives with the discontinued BBA version of the ROM in any drive you purchase, no matter the type.

Although a SyQuest mechanism is a SyQuest mechanism no matter who sells it, we did have difficulty with the Rodime Systems drives, caused by their different eject mechanism. Unlike with all the other SyQuest-based systems we tested, you must first press the eject button on the Rodime drive, then drag the drive icon to the Trash Can to dismount the cartridge. This is the reverse of the procedure that all other removable uses. (The manual does document this difference, but the procedure will nonetheless confuse users experienced with other SyQuest drives.)

We also ran into a difficulty with the CMS Enhancements 88MB drive. We found that the drive cycles its power (the power goes off, then back on) during a restart of the Mac. This makes it hard to use the CMS drive as a start-up device. The CMS technical-support department made several suggestions, the last of which worked but involved opening the Mac to change the SCSI ID of the internal hard drive, not something the average user will want to do.

This fall, SyQuest will offer the next generation of SyQuest mechanisms, which promises to change the SyQuest market considerably. The lata series will be a 2 1/4-inch, 42MB mechanism with programmable power-management firmware that makes it attractive for use in notebook computers. It has a 32K look-ahead buffer like the current 88MB desktop SyQuest mechanism's, sleep and standby modes, quick return from sleep mode, and good data-transfer performance. The Mesa series will be a 3 1/2-inch, 105MB mechanism with similar power-management firmware, a 64K look-ahead buffer, and good data-transfer performance. The Mesa drive may be available in the Mac market by the time you read this article.

Ricoh: Designed for Reliability

A RICOH DRIVE IS SIMILAR IN SOME respects to SyQuest drives. It too is a half-height 5 1/4-inch device with a cartridge. The drives also contain similar components (a mechanism to receive a data cartridge, a motor to spin the disk inside the cartridge, a pair of read-write heads, and control electronics that include a SCSI interface), but there the comparison ends. Ricoh drives come in just one storage capacity: 50MB. And Ricoh has built in several features to enhance the integrity of data stored on its cartridges. Some of these features are built into the drive and some are contained in the cartridge.

For example, the drive read-write heads retract inside the drive mechanism until a cartridge is inserted in the drive. You cannot eject a cartridge while the drive is still spinning, as you can on the 44MB SyQuest drives. The drive contains three electrostatic filters to remove particles (like dust) from the drive environment. The cartridges also contain filters and have seals at each open point to prevent outside air from entering the cartridge. When not inserted in a drive, the disk in the cartridge is clamped in place by two springs. All of these features were designed to enhance the reliability of both the cartridge and drive, and thus the integrity of the data.

Despite being designed for greater reliability and having a greater storage capacity than the 44MB SyQuest drives, Ricoh-based drives are not stocked by most dealers, and only a single vendor

SCSI Probe utility (written by Robert Pollic) automatically unloads the current driver from memory, ensuring that the correct driver is loaded from the disk that has just been mounted. SCSI Probe has been licensed by SyQuest and is available free on several electronic bulletin boards or directly from SyQuest. SyQuest has also offered it to vendors free with its SyQuest drives. In fact, our testing this year uncovered no instances of this problem. And an informal survey of dealers and volume buyers showed that SyQuest reliability concerns in general have disappeared.

But we did see a disadvantage in using 44MB (the 555 Series) SyQuest cartridges on some 88MB (the 5110 Series) drives: the 88MB drives can read from, but not write to, the 44MB cartridges.

If you use a 44MB cartridge on a Mac running System 6 and then insert that cartridge into an 88MB drive connected to a Mac running System 7, the 88MB drive cannot mount the cartridge. System 7 needs to rewrite the invisible desktop files before mounting the cartridge, and since the 88MB drive cannot write to the 44MB cartridge, you're stuck.

We also noticed a significant performance difference—about 10 percent—between 88MB drives with two different ROMs installed, versions BBA and CFA. The new CFA version of the SyQuest 88MB mechanism uses a look-ahead caching algorithm that reads more information than needed by the current Mac operation and stores this extra information in a buffer in case it is needed for the next operation (which is often the case). The new CFA ROM has been in all 88MB drives SyQuest has shipped since January, although some dealers may still be selling older stocks with the BBA ROM. We received drives with the discontinued BBA ROMs from APS, FWB, Generation Systems, HDI, Mac Direct, Prima Storage Solutions, and Rodime.

SyQuest does not offer an upgrade option, nor do dealers, so make sure you check the ROM version before you buy. You can check the ROM version with SCSI Probe. (If performance is an issue, make certain that you get the latest version of the ROM in any drive you purchase, no matter the type.)

Removable hard drives offer access to a large amount of data while keeping that data transportable or securable. The ETC Peripherals DataPort Twin (left) includes a SyQuest drive as well as a 210MB removable hard drive. Both La Cie's Express (top) and Mega Drive Systems' Mercury products can handle a range of drive capacities, with the Express supporting up to 240MB and the Mercury up to 1.2GB.
REMOVABLE STORAGE

Floptical drives, like these from Digital Micronics (top) and PLI, offer the advantage of high-capacity storage while also being able to read standard Mac floppy disks.

loaned us a Ricoh-based drive for testing. As you can see from the mechanisms section of "Rating Removable Drives' Performance," Ricoh’s performance is not up to that of SyQuest or Iomega drives.

Bernoulli: Crash-Resistant and Fast

THE MECHANISMS FROM IOMEGA ARE based on an effect named after Swiss physicist Daniel Bernoulli, which is why they were named Bernoulli drives. This effect causes the read-write head to float over the surface of the magnetic disk in the cartridge. The disk itself is very similar to the flexible disk inside a floppy and much different from the rigid metal disks in SyQuest and Ricoh drives. This design makes Bernoulli drives essentially immune to head crashes, and the medium is much more resistant to damage when dropped. (Head crashes are usually caused by a drive’s being bumped while operating; the read-write head then bumps the surface of the spinning medium. This can damage the magnetic coating of the medium or the read-write head, or both.) A Bernoulli drive contains the usual motor, read-write heads, and SCSI interface.

Today’s Bernoulli drives (and cartridges) have a 90MB capacity. (Older drives had a 44MB capacity; the 90MB drives can read these 44MB cartridges but can’t write to them.) Of all the drives we tested, the Bernoulli drives’ performance comes closest to that of a standard hard drive. But Bernoulli media wear out faster than hard drives, because Bernoullis are flexible. And they are still more expensive than SyQuest drives and have not been as popular in service bureaus. Bernoullis were also among the noisiest of the drives we tested.

Floptical drives, like these from Digital Micronics (top) and PLI, offer the advantage of high-capacity storage while also being able to read standard Mac floppy disks.

Don’t Abuse Your Media

Regardless of which product you choose, there are some important items to keep in mind.

- Always follow the vendor’s instructions for dismounting and ejecting media before shutting down the Mac. This will avoid the most common cause of data loss with removable-media drives.
- Store your media properly. This means keeping cartridges clean and keeping them away from dust, dirt, and other contaminants. Removable media are more sensitive to environmental contamination than floppy disks, because their data is stored more densely. Don’t use pencils to write on removable-media labels; the graphite dust can trash a drive’s heads as fast as sandpaper.
- Keep removable media out of temperature extremes like your car’s glove compartment or trunk. Roast eggplant, not data. For those of you in northern climates, if you travel with removable media in winter, let the cartridges come back to room temperature before you insert them in a drive; otherwise, condensation can end up on your drive’s read-write heads and damage them.

(For tips on using removable media, see Getting Started, Macworld, February 1992.)
Rating Removable Drives’ Performance

Different classes of removable drives show strong differences in data-transfer speed, as these averages for all products tested in each class show. We used SCSI Evaluator to measure transfer rates.

<table>
<thead>
<tr>
<th>Read (in Mbps)</th>
<th>Write (in Mbps)</th>
<th>Typical Cost per Megabyte</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bernoulli (90MB)</td>
<td>557</td>
<td>$1.25</td>
</tr>
<tr>
<td>Flextra (25MB)</td>
<td>912</td>
<td>$1.20</td>
</tr>
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<td>Floptical (21MB)</td>
<td>1113</td>
<td>$0.99</td>
</tr>
<tr>
<td>Hard drive (52MB)</td>
<td>1064</td>
<td>$0.90</td>
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<td>Hard drive (105MB)</td>
<td>1087</td>
<td>$1.00</td>
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<tr>
<td>Rool (50MB)</td>
<td>451</td>
<td>$2.50</td>
</tr>
<tr>
<td>SyQuest (44MB)</td>
<td>548</td>
<td>$4.00</td>
</tr>
<tr>
<td>SyQuest (88MB)</td>
<td>833</td>
<td>$1.60</td>
</tr>
</tbody>
</table>

Longer bars are better.

Within each class of drive, we found few differences, since all drives within a class use mechanisms from the same manufacturer. For real-world tests, we measured each drive’s ability to duplicate a 3.2MB file and a 10MB folder and to search a database for a specific record. We also averaged the drives’ speeds for opening and saving from several applications, including PageMaker and Photoshop. For noise, readings of 35 decibels (dB) are audible; at decibel levels in the upper 40s, the noise becomes annoying.

Smaller bars are better.

### Duplicate

<table>
<thead>
<tr>
<th>Bernoulli</th>
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<th>Search</th>
<th>Noise (in dB)</th>
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</thead>
<tbody>
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<td>Iomega MacTransportable 90 Pro</td>
<td>55.5</td>
<td>64.9</td>
<td>73.0</td>
<td>39.3</td>
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<tr>
<td>Liberty Systems 115 series 90MB Bernoulli</td>
<td>57.1</td>
<td>66.3</td>
<td>83.3</td>
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### Write

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<th>Noise (in dB)</th>
</tr>
</thead>
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<td>72.1</td>
<td>72.1</td>
<td>72.1</td>
<td>51.1</td>
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<tr>
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<td>67.3</td>
<td>67.3</td>
<td>67.3</td>
<td>49.0</td>
</tr>
</tbody>
</table>

### Typical Cost per Megabyte

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<th>Bernoulli</th>
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<th>Search</th>
<th>Noise (in dB)</th>
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</thead>
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<td>51.1</td>
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<td>47.7</td>
<td>47.7</td>
<td>47.7</td>
<td>49.9</td>
</tr>
</tbody>
</table>

### Shorter bars are better.

### Drive noise was less than background noise.
yet can read standard magnetic floppy disks as well as the magneto-optical Floptical disks. In this approach, data is stored magnetically while the read-head positioning information is imprinted at the factory as optical “guides.” As with Flextras, this division of data and positioning information into independent, parallel pieces allows much denser storage than does the traditional magnetic-only approach used in standard floppies.

Several of the Floptical-based units had no fans installed in their cases; this made them the quietest units we tested. Even the two with fans—the Procom Technology and TASS Optical World units—were very quiet. Because the Floptical drive is based on a floppy mechanism, it uses much less power than a hard drive and generates less heat. Leaving out a fan cuts the noise and eliminates one potential source of pollution: dust sucked into the drive by a fan. But adding a fan may lengthen the life of the drive and its power supply by reducing wear and tear due to heat.

The two Flopticals shipped to us by Rancho Technology could not be used as the start-up device. We worked with the technical-support department to troubleshoot the problem and eventually found a disconnected SCSI ID selector switch in both drives. Reconnecting the selector

### Removable Storage

#### COMPARING REMOVABLE MEDIA

<table>
<thead>
<tr>
<th>Company</th>
<th>Tested by Macworld Lab</th>
<th>Product Line</th>
<th>Capacity/Free Support</th>
<th>Password Protection</th>
<th>Free Toll-free Support Call</th>
<th>Support Score</th>
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<tbody>
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<td>APS</td>
<td>•</td>
<td>APS SyQuest</td>
<td>88MB/$559</td>
<td>SyQuest</td>
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<td>PD Removable</td>
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<td>12</td>
<td>satisfactory</td>
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<td>Digital Micronics</td>
<td>•</td>
<td>Floptical Disk Drive</td>
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<td>poor</td>
</tr>
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<td>DJI Development</td>
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<td>MagOptic 1</td>
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<tr>
<td>ETC Peripherals</td>
<td>•</td>
<td>DataPort Twin</td>
<td>210MB/$1749</td>
<td>Removable hard drive</td>
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<td></td>
<td>•</td>
<td>DataDrive</td>
<td>44MB/$429; 88MB/$559</td>
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<td>satisfactory</td>
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<td>FSB</td>
<td>•</td>
<td>Hammer Disk</td>
<td>44MB/$569; 88MB/$1059</td>
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<td>Raych</td>
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<td>Removable Disk</td>
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<td>PowerDrive</td>
<td>44MB/$549; 88MB/$649</td>
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<td>LaCie</td>
<td>•</td>
<td>Express</td>
<td>52MB/$798; 105MB/$948; 120MB/$1198; 240MB/$1548</td>
<td>Removable hard drive</td>
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<td>good</td>
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<td>Liberty Systems</td>
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<td>115 Series Bernoulli</td>
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<tr>
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<td>SyQuest</td>
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<td>Mercury External</td>
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<td>very good</td>
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<td>12</td>
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<tr>
<td>Rancho Technology</td>
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<td>RT5000 Mac</td>
<td>21MB/$553</td>
<td>Floptical</td>
<td>12</td>
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<tr>
<td>Relax Technology</td>
<td>•</td>
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<td>44MB/$539; 88MB/$599</td>
<td>SyQuest</td>
<td>unlimited</td>
<td>poor</td>
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<tr>
<td>Rodine Systems</td>
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<td>Plus</td>
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<tr>
<td>Total Peripherals</td>
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<td>TP Removables</td>
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<tr>
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<td>•</td>
<td>A-Hive Jr</td>
<td>21MB/$509</td>
<td>Floptical</td>
<td>12</td>
<td>satisfactory</td>
</tr>
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</table>

* = yes; O = no. Also offers hard drive/Floptical combinations. No media supplied with drive. Other models available with additional drive slots, higher-capacity drives up to 1.2GB. Could not evaluate support because caller could not remain anonymous.
switch made the drive functional.

Both the Flextra and Floptical mechanisms are physically capable of writing to standard Mac 800K and 1.4MB floppies, but vendors must provide a software driver to enable this capability. All the vendors that loaned us drives offer this capability.

Removable Hard Drive: Performance at a Price

**IF MAXIMUM PERFORMANCE IS YOUR**

**overriding consideration, removable hard drives have a clear edge. Three companies—Quantum (which also offers the drives through its La Cie Macintosh consumer division), ETC Peripherals, and Mega Drive Systems—deliver traditional hard drives in a removable format.**

Quantum developed the Passport XL (called the Express under the La Cie label) series of drives to deliver hard drive performance in a removable design. Each Passport cartridge is a complete hard drive sealed in an airtight, shock-mounted casing that loads into a base housing unit. The base unit can accept any of the Passport cartridges, which range in capacity from 52MB to 240MB.

The 52MB and 105MB cartridges are slower than the 120MB and 240MB cartridges due to a slower disk-rotation speed and smaller on-board RAM caches. Overall, for all removable technologies, the Passport and Express series ranked close to the best in quietness.

Another company bringing removable hard drives to market is ETC Peripherals, which has designed its own base housing unit, called a DataPort, and DataPort cartridges, which range from 52MB to 240MB.

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**SyQuest Drives** Among the technologies we reviewed, SyQuest is clearly the best choice for most users. But individual products are too similar for us to single out a specific vendor. Widely available from dealers and heavily used by service bureaus, SyQuest drives can be counted on for the long term and are reasonably priced. And with the new generation of SyQuest drives just announced, these strengths should only grow.

A third company, Mega Drive Systems, follows the same approach as ETC Peripherals. Mega Drive has designed its own docking base and cartridges that fit into that base. Unlike ETC, Mega Drive seals its cartridge units, so you cannot select and install your own drive in the cartridge. Due to their sealed design, the Mega Drive cartridges do offer better shock resistance than the DataPort cartridges. While we did not get an evaluation unit in time for formal testing, informal tests showed the Mega Drive removable drives to be very fast, comparable to those from Quantum, La Cie, and ETC Peripherals.

**Tech-Support Travails**

**BECAUSE ALL THE PRODUCTS WITHIN**

each class are roughly equal in performance, service becomes a critical factor in your buying decision. Macworld rated the technical support for each vendor by making a series of anonymous phone calls seeking help. “Comparing Removable Media” shows our scores, which are based on the support technicians’ accessibility, the technicians’ helpfulness, and the answers’ accuracy. The table also shows who offers support via toll-free calls and what their free support periods are—two signs of commitment to service.

In a few cases, our calls were not returned. We had this happen once each with CMS Enhancements, ETC Peripherals, Iomega, Quadrax, Third Wave Computing, and Total Peripherals. It happened twice with Prima Storage Solutions and Rodime Systems. (A note on Rodime: During our calls, the company was moving its technical-support group, so the service may have been unusually unresponsive.)

The manuals of several vendors who offer technical support by phone tell users to see their dealers first. That’s fine if you have a dealer you like, but otherwise it can be a negative. Although their manuals say to call a dealer first, GCC Technologies, Iomega, Procom Technology, Optima Technology, and Rodime Systems all took our calls without insisting that we call a dealer first.

Other vendors who offer technical support didn’t put information on technical support—not even their phone numbers—in the manuals, at least not in any obvious place. These included Digital Micronics, FWB, Mega Drive Systems, Prima Storage Solutions, Total Peripherals, and Tulín Technology. Other companies did refer to technical support in their manuals but did not provide a number to call, in what appear to be inadvertent omissions. These companies included CMS Enhancements and MacLand. Such complaints about documentation may seem minor, but they point to vendors’ commitment to quality and ease of use.

A new wrinkle in technical support is the use of 900 numbers. Calls to these numbers result in a charge being added to your phone bill. Of the vendors reviewed here, only Quantum Corporation uses a 900 number, for which it charges $5 per call. That price is comparable to what you’d pay for a 10- or 15-minute business call, but many businesses block access to 900 numbers.

**Choosing a Technology**

**THE CURRENT SYQUEST, RICOH, AND**

Iomega technologies are all likely to be made obsolete by the new 105MB Mesa series of SyQuest drives (which promises to offer better performance, and eventually a more reasonable cost). Still, the 44MB SyQuest drives will hold on for a while due to their installed base in service bureaus, particularly in desktop publishing.

Today, Floptical drives make little sense, because the cost is still too high and the performance too low. This is likely to change only if the media costs fall through the floor or Apple starts installing them in Macs. Flextra drives make even less sense because of their limited availability and performance.

While fast and flexible, the removable hard drives have limited application due to their high cost, but they do offer excellent performance. Consider them if cost is not an issue and the need for massive storage is critical.

See Where to Buy for contact information.

MATTHEW LEEDS works for a major software developer as its technical services manager.

Macworld Lab testing supervised by DANNY LEE.
You read a magazine. A couple of days later, you write a note to a friend recounting a memorable article. Without thinking about it, you have done exactly what a computer system does—input, store, process, and output information. Your eyes took in words and pictures, your brain remembered and thought about them, and your hands expressed your recollections and thoughts. A basic computer system takes in information through its keyboard and mouse, and it stores the information in its logic board and disk drives. The logic board processes the information. The computer communicates it through video display.

Eyes and a brain aren't enough: you can't understand words on a page unless you know how to read. Likewise, a pile of computer hardware can't process much information without a set of instructions; these programmed instructions are called software. Software provides the know-how, and hardware does the work.

**Dissecting the Electronic Brain** Open a computer and look inside. You won't see any software because it's intangible, existing as electrical and magnetic patterns in various interior components—in ROM, in RAM, on disk. If you could look inside your head, you wouldn't see thoughts and skills because they exist ethereally as neural patterns in your brain. What you do see inside a computer are the components for storing software and the data it manipulates (see “What Makes a Logic Board”).

The core set of components lies on the green plastic board at the bottom of the computer's case. This is the logic board, or system board, sometimes called the motherboard. The metal-legged “bugs” on the board are integrated circuits—chips. Just as the human brain has specialized centers for memory, reasoning, vision, speech, and so forth, the computer's logic board has specialized circuits for memory, processing, video, keyboard input, and more.

At the center of all logic board activity is the processor. It can do arithmetic, compare numbers, check conditions, and make decisions based on the results of these operations. (For a full description, see “Inside the Processor,” *Macworld*, October 1992.) A processor without memory would be as useless as a brain without memory—long on potential but short on action. Memory components on the logic board store programs and the data they manipulate.

Some memory, called ROM (read-only memory), is permanent; the contents of a ROM chip are indelibly etched into the chip during manufacture. Think of ROM as the personality and talents the computer is born with—the soul of the machine. Macintosh computers have natural talents for a graphical user interface because Macintosh ROM contains much of the software that implements that interface, as well as specifications and templates of common icons, pointer shapes, windows, menus, and other elements.

Because ROM is permanent, a computer needs other types of memory. For short-term storage, such as tracking changes to text or to a spreadsheet, the logic board uses RAM (random access memory). In your brain's equivalent of RAM, you remember such ephemera as your grocery list and directions to the ski cabin you rented for the weekend.

by Lon Poole
System
What Makes a Logic Board

Dissolve the case of a Macintosh LC II (right) and you could be looking at the parts inside any personal computer system. Every computer has an electronic brain—in its logic board, a collection of integrated-circuit chips neatly arranged on a green plastic board.

The logic board's size, the specific chips on it, and their arrangement all vary among different computer models. Still, all logic boards have a main processor chip for overall control, ROM chips for permanent memory, RAM chips for temporary memory, and a dozen or two other major chips that handle activities ranging from keyboard input to video display output.

Today's computers integrate fewer, denser chips than computers made a few years ago, thereby lowering costs and reducing logic board size (or making room for additional capabilities such as sound input). For example, the Mac LC II has one chip for SCSI and serial control where the lCl has two. Lesser chips and scores of discrete electronic components assist the major chips.

During manufacturing, precise machines place nearly all these delicate parts, providing the reliability you expect every time you start your computer.

### WHERE THE SYSTEM DOES ITS WORK

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADB</td>
<td>The ADB transceiver tracks your keyboard and mouse activities through the ADB port, and sends them to the GLU, where they await processor action.</td>
</tr>
<tr>
<td>APPLICATION</td>
<td>You open a program to do work, system software copies the program's instructions from disk into RAM, and the processor executes them.</td>
</tr>
<tr>
<td>FLOPPY</td>
<td>The processor directs the SWIM chip to transfer applications, documents, and other data between RAM and the floppy disk drive.</td>
</tr>
<tr>
<td>MODEM</td>
<td>The SCC chip transfers data serially to and from a modem, a serial printer, or another serial device connected to the modem port.</td>
</tr>
<tr>
<td>PRINTER</td>
<td>The SCC chip transfers data serially to and from a LocalTalk network, a printer, or another device connected to the printer port.</td>
</tr>
<tr>
<td>SOUND IN</td>
<td>The GLU directs the DFAC to receive analog audio from the microphone port, and to convert it to digital sound data for storage in RAM.</td>
</tr>
<tr>
<td>SCSI</td>
<td>The processor directs the SCSI chip to transfer data rapidly between RAM and disks or other devices through the SCSI connector and the SCSI port.</td>
</tr>
</tbody>
</table>
Like your own short-term memory, the contents of RAM are malleable. You can change your mental grocery list whenever you wish, and a computer can change the data and instructions stored in its RAM as needed. To RAM, information is a set of easily changed electrical patterns. RAM loses its contents when you turn off the computer or restart it because those actions interrupt the electricity that maintains the memory patterns in RAM.

People have somewhat unreliable memory in practically unlimited amounts. Computers have very reliable memory in large but limited amounts. The more powerful, more expensive, and newer computers generally come with more memory—both ROM and RAM—on their logic boards. For example, the original Macintosh came with 128K of RAM and 64K of ROM in 1984; today, a Mac LC II comes with 4MB of RAM and 512K of ROM. Each K, or kilobyte, of memory is 1024 bytes (a byte is the basic unit of computer memory), and 1MB is 1024K.

**Remembering More** The faintest ink is more reliable than the most retentive memory, so people take notes and collect books to augment their memories. To augment the RAM on the logic board, most computer systems have disk drives built in. Anything in memory can be recorded on disk, and can later be put back into memory so the computer can work with it directly.

Disks have the advantage of retaining the information stored on them even when the computer is off. They can do this because they store information magnetically, not electrically, using a technology similar to that in audio and video recording. On the downside, disk drives take longer to transfer information than RAM does. Well-designed software compensates for this discrepancy in speed by transferring the most-needed information (instructions and data) from disk to RAM and keeping it there. Think how much faster you can recall facts from your memory than you can look up facts in a book, and how you make the effort to memorize things you use frequently.

**Processing Information** People have more than one layer of knowledge for processing information. For example, reading involves two: knowing the alphabet and recognizing words. Computers have three layers of “knowledge” (actually layers of software): application programs (like a word processor or spreadsheet), user-interface software, and operating-system software.

On the Macintosh you interact with application programs through the user-interface software. Apple pioneered this approach with its Lisa and Macintosh computers as a way to foster a consistent look-and-feel among applications, hoping to make all applications easier to learn and use. Other computers forced users to interact differently with different programs, because every application incorporates its own user interface. Now some non-Macintosh computers have access to similar user-interface software, the most popular being Microsoft's Windows.

The Mac's user-interface software is called the Macintosh Toolbox. The Toolbox contains software modules called managers, which handle pull-down menus, windows, buttons, scroll bars, fonts, and other standard parts of the Mac's graphical user interface. The Toolbox also contains QuickDraw, the program that draws everything that appears on the Mac's video display. Many of the tools in the Toolbox are stored in ROM; others are stored on a disk in the System Folder, and then copied to RAM when you start the Mac.
The Toolbox and the applications access the Mac's hardware through a third layer of software, the operating system. It controls the disk drives, keyboard, mouse, video display, and all other parts of the system. The Mac is unique among popular computers because its users do not deal directly with its operating system, and they may not even know the Macintosh Operating System exists. Other computers, such as the Mac Classic and IIci, store the screen image in separate video RAM.

Information In A computer doesn't think or imagine, so it can't process anything without information from its keyboard, its mouse, or some other peripheral device. The central processor could handle input from all devices on its own, and in simpler computers it does. The more sophisticated and powerful computers distribute the workload among chips on the logic board. Some chips handle just one sort of input, and some handle several.

For example, the central processor in any Macintosh newer than a Mac Plus pays no attention to the mouse and keyboard. Instead, a separate logic-board component, the ADB transceiver (Apple Desktop Bus transmitter and receiver), communicates with them. When you move the mouse, a small processor inside the mouse calculates how far you moved (see "The Rest of the System"). This mouse's processor contains an ADB transceiver that sends mouse motion and button status to the logic board's ADB transceiver. Similarly, the keyboard contains a small processor, and it assigns a code to each key you press.

The logic board's ADB transceiver, the keyboard, and the mouse live in their own little separate world until you type or do something with the mouse. Your action sets off a chain reaction among these and other system components. Information passes from the small processor in the keyboard or mouse to the logic board's ADB transceiver, next to the VIA (versatile interface adapter) chip on the logic board, then to the central processor, and finally to a queue of recent events in RAM (see "Driven by Events"). Part of the operating-system software moves the pointer on screen to match your mouse motion. Another part of the operating system translates keyboard codes into standard ASCII character codes. The application you're using picks them up and processes the mouse or keyboard information from the event queue. All this happens in the split seconds between keystrokes and mouse-clicks.

Information Out You put information into a computer expecting to see results. The computer's foremost means of showing results is its video display. Computers handle the image to be shown on the display screen as you type or do something with the mouse. Your action sets off a chain reaction among these and other system components. Information passes from the small processor in the keyboard or mouse to the logic board's ADB transceiver, next to the VIA (versatile interface adapter) chip on the logic board, then to the central processor, and finally to a queue of recent events in RAM (see "Driven by Events"). Part of the operating-system software moves the pointer on screen to match your mouse motion. Another part of the operating system translates keyboard codes into standard ASCII character codes. The application you're using picks them up and processes the mouse or keyboard information from the event queue. All this happens in the split seconds between keystrokes and mouse-clicks.

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The Rest of the System

Video Monitor

A video monitor displays images that the computer's video circuitry converts from digital video data generated by the logic board (or by a separate video board) into analog video signals.

Three video signals drive three electron guns in the monitor's picture tube—one each for the red, green, and blue components of each pixel's color. Each gun shoots an electron beam through the neck of the tube. Magnetic coils aim the trio of beams, making them scan one line across the screen at a time.

The back of the screen is coated with colored phosphors arranged in triads of red, green, and blue. As the beams near the screen, they pass through a metal grille that further aligns them so each beam strikes the correctly colored phosphor dot. The intensities of the beams when they strike a phosphor triad determine the color and brightness you see. A monochrome monitor has one gun, one beam, and one phosphor color.

The three electron beams start at the upper-left corner of the screen and scan as a group across to the right edge, displaying the first line of the image. When the beams reach the screen's right edge, they flick invisibly back to the left edge, move down, and scan another line. When they reach the bottom, they switch off and move back up to the upper-left corner, and start over again.

Disk Drive

To store information on disk, the logic board converts digital signals from its memory into analog signals—varying electrical currents—and sends them to the disk drive. Inside the disk drive, this current flows through a tiny electromagnet called a read-write head, which floats above the magnetic coating of a rotating disk. Most disk drives have two heads, one for each side of the disk. The variations in the current going through the head set the orientation of magnetic particles in the coating. The pattern of information encodes the data.

When the drive retrieves information, the differently oriented magnetic particles induce a changing electrical

Your Computer Revealed

Inside the System
Turning to the left

Turning to the right

MOUSE
Sliding the mouse (or a trackball) moves a pointer on the screen, and clicking or pressing the mouse button lets you control the screen object under the pointer. A rubber-coated ball rotates two capstans, one for sideways motion and the other for up-down motion. Each capstan turns a slotted wheel, alternately blocking and letting pass pulses of infrared light. Light sensors generate on-off signals from which the mouse’s processor calculates horizontal and vertical distances. The mouse knows which way it is moving—left or right, up or down—because each wheel has two slightly offset sensors that always generate signals in tandem, for example left-right, left-right.

Light pulse sequence

- Turning to the left: LR LR LR LR
- Turning to the right: RL RL RL RL

KEYBOARD
Pressing and releasing keys actuates switches under the keys. A processor inside the keyboard continuously looks for switch transitions (such as a key press or key release) and sends numeric transition codes to the logic board, identifying the keys you press and release. The processor in an ADB keyboard also sends the status of the modifier keys: shift, option, delete, caps lock, control, and power on. The system software translates the transition codes and the status of modifier keys to character codes, such as ASCII (American Standard Code for Information Interchange).
Driven by Events

Your computer system spends much of its time waiting for you to do something. When you click the mouse or type, the system springs into action. Circuitry on the logic board recognizes these events, and the system software queues them in the order in which they occur. The application you are using gets each event in turn, decides what to do based on where you clicked and what you typed, and uses the system software to update the screen image. Independent circuitry on the logic board displays the updated image frequently enough to avoid flicker.

To insert a word in the text document displayed on your monitor, you click an insertion point and then type.

The mouse reports its motion and button activity to the ADB transceiver chip. As you type, the keyboard also reports your keystrokes to the ADB transceiver.

As the ADB transceiver receives mouse and keyboard information, it stores the information in the general logic unit (GLU).

The GLU asks the processor to interrupt the program controlling the computer and to have the system software deal with the waiting mouse and keyboard information.

As you type, the application asks the system software to draw the revised document using the font, size, and style you specified.

The system software determines how to change the screen image and has the processor update the image in video RAM (VRAM).

60 times every second, the GLU retrieves the screen image from RAM and sends it through the CLUT DAC for conversion to the analog video signals that drive the video monitor.

The system software (in ROM) has the processor store a record of the mouse and keyboard activity in RAM, in a queue of recent events. Then the processor returns control to the interrupted program.

Where major chips are on LC II logic boards.
EVERY QUARTER SECOND
WHAT HAPPENS
EVERY QUARTER SECOND

1. Advance time-of-day by 1/60 second
2. Check for memory error
3. Move mouse pointer
4. Process keystroke
5. Available for background process

In the 1/4 second it takes to press a key (typing at 40 words per minute), the system software interrupts the program you’re using 15 times (every 1/60 second). At each interruption, the system takes less than 1/1000 second—not even 5 percent of the time between interruptions—to complete three tasks. First, the system software advances the time of day by 1/60 second. Second, the system software checks if the application program has run out of memory without knowing so. Third, the system software gets the latest mouse motion data from the general logic unit (CLU) and updates the mouse pointer’s position in the screen image in video memory. The computer skips the three tasks if it is doing something that can’t be interrupted, such as accessing the disk. That’s why pointer motion becomes erratic during disk access.

The program you’re using gets 95 percent of the time between interruptions, and it can usually process a keystroke within 1/10 second (or four interruption periods). The rest of the time the program waits for your fingers to move. While waiting, it relinquishes control to programs that are open in the background, such as printing.

Your Computer Revealed
Inside the System

The application program (in RAM) regularly asks the system software for the next queued event. The system software sends one event at a time to the program.

The application software receives your mouse-click where in the open document (stored in RAM) to insert the text you type.


Informational graphics by ARNE HURTY.
TYPE HAS FINALLY ENTERED THE third dimension. Typographic special-effects programs have been available for some time—Brederbund’s TypeStyler, Letraset’s LetraStudio, and Alisys’s Metamorphosis Professional are just a few examples (for more on font-customizing techniques, see “Getting Started,” Macworld, October 1992). These programs can stretch, bloat, outline, and otherwise transmogrify text, but there’s one feat beyond their reach: simulating depth with that photo-realistic look.

Until recently, if you needed photo-realistic 3-D text for a publication, presentation, or multimedia production, you had to use a 3-D modeling and rendering package such as Strata’s StrataVision 3D or Macromedia’s Macromind Three-D. Buying a package like this to generate a 3-D text effect is overkill. What’s more, general-purpose 3-D packages often have limited text features—if they have them at all.

One of the biggest players in 3-D rendering has turned its attention to text. Pixar Typestry can generate photo-realistic 3-D text from nearly any TrueType or Type 1 PostScript outline font. Typestry joins a product line that includes Showplace, a 3-D package that lets you assemble complex scenes without having to tackle the underlying technicalities of 3-D modeling; and MacRenderMan, software that renders images based on files generated by Showplace and other RenderMan-compatible 3-D modeling packages. As for the competition, only one other program for 3-D type is currently available: Strata’s Strata Type 3d.

Typestry can simulate motion as well as depth. Using its straightforward animation controls, you can create the kind of animated text that pervades TV station breaks and movie-of-the-week openings. You can save completed animations in a variety of formats, including as QuickTime movies.

Although the box doesn’t say so, Typestry arrives on high-density floppy disks, not on the 800K floppy disks that nearly every other software developer ships its products on. If you have an original Mac II (the only Mac that meets Typestry’s requirements that does not have a SuperDrive), Pixar will trade the high-density disks for BOOK disks.

BUILDING LETTERS

TYPESTYRY HAS A STRAIGHTFORWARD operating style that invites experimentation. Start the program and you get an untitled document window along with a tool palette for creating new text objects,
as well as for moving, rotating, resizing, and extruding text. (You can also use dialog boxes to specify precise rotation, extrusion, and resizing values.)

To create 3-D text, you type the text in a dialog box. A Font pop-up menu lets you choose a font; but check boxes for italics, bold, and other stylistic variants are missing. To use these styles, you must have separate fonts with these attributes installed in the System file. If a font lacks the stylistic variants you want to use, you have to create them using a font utility such as Altsys's Fontographer. StrataType 3d doesn't have this shortcoming.

When you're typing new text, you can also choose one of four bevel styles to give letters a rounded, routed, or sharp-edged appearance. You can also specify the size of the bevel. When you're done, click on a button, and in a few moments a wireframe (outline) version of the object appears in the document window (see "Text on a 3-D Stage").

### Setting the Stage

**AFTER YOU BUILD AN OBJECT, YOU CAN POSITION IT, ASSIGN TEXTURES TO ITS SURFACES, AND ADJUST LIGHTING.** As in Pixar's Showplace, surfaces in Typestry are called *looks*. Typestry includes a selection of looks for common surfaces—shiny metal, stucco, bricks, wood, plastic. You can also add looks that are sold separately by Pixar and third-party developers such as The Valis Group (510/236-4124).

In the 3-D graphics world, you view objects from the vantage point of an electronic camera. Typestry lets you use one of several lenses: normal, fish-eye (exaggerates perspective), and zoom (flattens perspective). In this regard, Typestry is a bit less flexible than Strata Type 3d, which provides one lens whose focal length is continuously variable.

But Typestry's lighting is light-years ahead of Strata Type 3d's. StrataType 3d provides just one light source, while Typestry provides 18 of them: 9 front lights and 9 backlights. You can customize each light's intensity, color, and position, as well as assign electronic gels that cast shadows to simulate windowpanes, a spotlight, Venetian blinds, and more. You can also specify that a light pointed at an object move along with the object. Combine this with Typestry's animation features, and you can create a spotlight that follows a moving object.

For creating animations (another capability StrataType 3d lacks), Typestry uses a simple keyframe scheme: move an object or a light, choose Next Keyframe, and then repeat the process. Typestry calculates the intermediate frames for you.

### Rendering the Image

**WHEN YOU'RE READY TO SEE YOUR IMAGE, YOU CAN CHOOSE FROM THREE RENDERING TECHNIQUES, EACH OF WHICH PROVIDES A DIFFERENT DEGREE OF IMAGE QUALITY.** (Savvy 3-D users can also customize rendering settings.) Typestry contains an improved version of Pixar's MacRenderMan software that Pixar says is roughly 30 percent faster than the renderer that accompanies Showplace. Still, rendering is a complex process, and it's not unusual for a complex, high-quality image to take an hour to render on a Mac Iics-class machine. Typestry can render in the background, so if you have 10MB of memory or more, you can run other programs while you wait.

You can save a final image in PICT, EPS, or TIFF format. TIFF files can have an optional alpha channel—valuable if you plan to further modify the image in a program such as Adobe Photoshop.

There's still room for improvement in Typestry. You should be able to choose stylistic variants even if you don't have a screen font for them installed. Also, the program could offer the user more control over bevel shapes—Strata Type 3d provides a window in which you can use Bezier controls to design your own bevels. StrataType 3d also provides a large library of canned text-positioning effects; Typestry doesn't. And although Typestry's unique, magazine-style manual is approachable and generously illustrated, it lacks a reference section listing keyboard commands, and its one-page index is inadequate.

But these minor shortcomings shouldn't deter you from taking your text into the third dimension—provided you have the hardware to get you there. Typestry is an exciting, reasonably priced tool for designers, multimedia producers, and anyone who enjoys working with type.—Jim Heid
raphy files. Nevertheless, it can locate street addresses, draw street maps showing street names, and display pictures or QuickTime movies attached to points or areas. You can select map features either directly on the map or with data queries, and then combine selected areas into territories or prepare lists and statistics from the data.

For many types of geographic analysis, Atlas Pro has all the necessary tools. The program can lay images behind the map features using SmartPICTs, a file format that store real-world coordinates for their corners. This enables you to orient geography files correctly to a background image, say a scanned aerial photo. This feature could come in handy-for example, for quickly drawing detailed road maps and then adding specifics, like lodging in a certain price range or sites that children would enjoy visiting.

The program comes with 3.5MB of tutorial files and data for zip-code lookup, plus a 1.5MB set of reference files that include all zip codes. You also get 4.5MB of geographic coordinates and other information, including detailed and generalized boundaries for all the counties in the United States; U.S. states, cities, and interstate highways; Canadian provinces and cities; and world countries and cities. There are also files of general information such as population and demographic details about all the listed areas; the U.S. data comes from the County and City Data Book, 1988.

If you send in the registration form, Strategic Mapping sends you even more boundary files as a bonus. Additional street files, based on census data and converted to a proprietary format, cost $200 to $500 per county. Street files are also available from Atlas Pro's publisher for individual states as well as the whole United States on CD ROM or magneto-optical disk. These files can be massive; the street file for Santa Clara County, California, alone is 14MB. You can also buy higher-priced street files-GDT DYNAMAP/2000, with more-complete address information; and Etak MapBase, with better coordinate accuracy.

There's a lot to Atlas Pro, and yet it's moderately easy to learn-it would be easier if the thorough command reference guide had a decent index. The organization of the menus also slowed down my learning; commands just weren't where I expected to find them. For example, the View menu has only some of the commands for changing the view (others are on the Geo and Page menus), but it does have text-formating and window-management commands. When I needed help, however, tech support responded promptly to my voice-mail message, and the technician was courteous and knowledgeable. (Technical support is free except for the cost of the phone call.)

To make a new map, you fill in a series of dialog boxes to specify the size of the map (up to 10 pages by 10 pages) and set the scale (a little tricky to do), then select a base map and say which other maps you want to layer on top. For example, you might want to select all Nevada counties and some California counties and layer them with interstate highways. (You can add other layers later.) Generally you put each type of information on a different layer so you can manipulate the data more easily. Then Atlas Pro displays the map. If you want to make a thematic map, you then choose the data to display and how to depict it—which symbols and/or shading patterns or colors to use. You can thematically map any layer, but only one at a time. You can quickly compare data—say, population from 1980 with population from 1990—on thematic maps by mapping one factor, specifying the second in a dialog box, and switching between the two resulting maps.

If you're preparing a map for publication, you refine its appearance by formatting the legends and other text on the map. Tear-off tool, pattern, and color palettes make the process relatively easy. You can control each map layer individually—making it visible or hidden, giving it a different line width, color, pattern, and so on. You can also save a map in a draw-program format and enhance it in a draw program.

Atlas Pro is one of the most System 7-savvy programs you can buy, and it really takes advantage of publish and subscribe. For example, you could link a map to your sales-by-territory report in a Microsoft Excel or Lotus 1-2-3 spreadsheet. Then when you change the figures, Atlas Pro updates the map automatically. Or, with an Apple events script, you could create a slide show that animates how your data changes over time—for instance, a time-lapse view of customer growth by region during the past 12 months.

Unlike most GIS programs, Atlas Pro imports geography files (with the exception of street files) and attribute data to its map files, rather than linking the data to a map. That makes maps more portable, but it limits how much you can zoom a map's scale up or down. You can publish and subscribe to establish a live link to attribute data, or update the map periodically by hand to catch up with data changes.

You can create data that you want to map within Atlas Pro or import data from spreadsheets, databases, or other files. Atlas Pro directly imports dBase III Plus and FoxBase+-/Mac files. To bring in spreadsheet files, you can either subscribe to the spreadsheets or first convert them to tab or comma-delimited ASCII text. With Fairfield Software's ClearAccess you can also use DAL to query remote SQL databases to extract data.

In thematic mapping, you can set the number of data divisions and choose the classification method, such as four equal-size groups of areas. Only numeric data can be thematically mapped, however, and you can't choose your own labels for data divisions. This means that categories such as wheat, corn, and fallow must be coded as numbers in your data—1 for corn, 2 for wheat, and 3 for fallow, say—and the legend uses the same codes to distinguish them. Later you can paste text labels over the codes when you tweak the final map for presentation or printing.

Atlas Pro handles color well, choosing a sensible series of colors to represent the related data, but you can also use the program on a monochrome monitor. Redrawing takes time, however, and every time a map changes—or whenever a dialog box covers part of the map—Atlas Pro starts to redraw. Fortunately, you can halt redrawing by clicking the mouse, so you can postpone changes and redraw a batch of them at once.

Have I mentioned Atlas Pro's ability to match data points to street addresses? Combine areas into territories and group their data? Group and display data on a map by zip code area? Move objects in front of or behind other objects? Create simple bar and pie charts? Autotrace any enclosed space to create an area? Clearly, this is a powerful, feature-rich program at a competitive price. Atlas Pro is a bit like Fileber McCge's closet—packed with lots of stuff you never expected to be in there. When you open the door, however, it doesn't all come tumbling out; you may have to dig to find something.

—PETER VAN DEMARK
Powerful, Easy-to-Use Off-the-Shelf Accounting!

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TELEWARE
Current Version 3.0—Macintosh System Requirements: Mac Plus with at least 1 megabyte of memory, System 6.0 or later, hard drive with 2 megabytes of free space.

Circle 87 on reader service card
Morph 1.0

PROS: Clean, smart design; works well; inexpensive; good, concise manual.
CONS: Only morphs still images; some bugs; understaffed help line.
COMPANY: Gryphon Software Corporation (619/454-6836).
REQUIRES: Mac II; 5MB of RAM; hard drive; System 6.0.7. Recommended: 8MB of RAM; color monitor. LIST PRICE: $149.

ANYBODY WHO’S EVER BOUGHT A copy of People or Entertainment Weekly knows what morphing is. It’s the hot new film special effect, made famous by the shape-changing villain in Terminator 2 and the string of happy dancers in Michael Jackson’s “Black and White” video, wherein the image of one person or object visibly “melts” into another. Even if you play back these scenes frame by frame on a VCR, you can’t fathom how it’s done. You stare, amazed, as a person’s forehead simply gets taller, or the eyes drift apart, or the cheekbones slide into greater prominence.

Morph is a one-trick-pony utility program: you feed it a starting picture and an ending picture, and it creates a QuickTime movie (or PICS animation file, or PICT still image) showing one becoming the other. First, you have to come up with two compatible still images that will look good when morphed. You can’t use just any old images; if you tried to morph, say, a tree into a car, you’d get a blurry cross-fade instead of a crisply delineated, visible transformation. That’s why heads of people and animals are the most frequently morphed subjects. For the morphed movie from which several frames are shown here, I digitized pictures of my niece and my grandfather from a videotape, using a SuperMac VideoSpigot digitizing board.

For use with Morph, the images must be precisely the same size, must have 72-dots-per-inch resolution, and it’s best if the backgrounds are similar. If the backgrounds are different, you’re supposed to eliminate them altogether (as in the example here), using a graphics program like Adobe Photoshop. You’re in for trouble, too, if there’s a protuberance or other element in only one of the images; for example, a lady with a beehive hairdo wouldn’t morph smoothly into a picture of a bald guy. In short, you’ll probably spend a good deal of time in Photoshop messing with the size, background, angle, lighting, and other elements of the pictures you want to blend.

Into the Studio

AT LAST YOU LAUNCH THE COMPACT 275K Morph program. You open your two pictures—the start image and end image—in side-by-side windows. This is the clever part: to indicate how each element of the first picture should become the second, you click into place tiny glowing dots called key points. You place them at the corners of the eyes, along the hairline, at the tip of the nose, and so forth. As you place a key point into the start image, a corresponding glowing point appears on the end image. Since the nose tip (for example) probably isn’t in precisely the same spot in both images, you drag the end image’s dot so that it does rest on the nose tip.

Getting the Points

To teach Morph how the first image should become the final one, you place a glowing key point on each important feature, and then adjust the corresponding point in the opposite image. Using the line tool, you can draw nonfunctional white lines that help you keep track of your points (and ensure that you don’t accidentally place points out of order).

The more key points you add, the smoother and more successful your morph will be. If the images are similar to begin with, you can probably get by with as few as ten points; if they’re complex, or if the face changes angle during the process, you’ll have to spend a lot longer placing and positioning key points.

As you work, a preview feature lets you spot-check your progress. If you’re creating a movie morph—the usual case—a slider lets you select which single frame you’d like to preview. Depending on the Mac and the image size, it takes about ten seconds for the program to create a still-image preview, showing the merged result. Being ten seconds away from seeing how you’re doing isn’t ideal—you feel distant from the final product—but at least you can spot major problems (beehive hairdos, for instance) before committing them to the final movie.

When you’re done placing key points, your images look like they’ve been riddled with glowing buckshot. In a dialog box, you specify the usual QuickTime-movie settings, heed the usual QuickTime trade-offs (a movie with better picture quality takes up more space on the hard drive and has jerkier playback). Then choose Save Movie from the File menu and go to dinner; creating a morphed movie can take a while. (A 10-second sequence like the one here took 15 minutes on a Mac IIx with 8MB of RAM to generate as a QuickTime movie.)

Morph or Your Money

THE 65-PAGE MANUAL HELPFULLY COVERS special effects, common problems, and suggestions for getting the best results. It doesn’t simply point out that option-clicking on a key point brings up timing controls for its color and position shift; it also explains why that’s useful (so that you can make different parts of the image change at different times).

Alas, Morph 1.0 suffers first-release glitches. It’s incompatible with Salient’s DiskDoubler and Icom Simulations On-Cue, and it may conflict with other QuickTime software. These bugs will be fixed, says Gryphon, in the next version (in testing at press time). And Gryphon was caught unprepared for Morph’s sudden success; the overwhelmed phone staff is virtually unreachable. The company is scrambling to remedy this problem, too, saying that additional technicians are being hired, and promising to return any call within 24 hours.

It would be nice if Morph were faster; it would be nice if you could morph moving images (like the bopping multicultural morphpees in the “Black and White” video) instead of just still frames; it would be nice if the program were as continuous.
For the latest breakthrough in multimedia, turn the page.
**3D MODELING**

**MacroModel**
The first Macintosh 3D modeling program that combines the CAD-accuracy of spline-based modeling with familiar 2D drawing tools. Start with 2D objects, and extrude, lattice, sweep or skin them into 3D objects. Provides real-time visualization from any angle for instant, intuitive feedback. Supports System 7 and 32-bit color. Imports and exports polygon-based objects for compatibility with other modelers like **Swivel 3D**. Supports DXF for CAD compatibility; PICT for DTP. Add photorealistic rendering and 3D animation with **MacroMind Three-D**. Render still images with **Pixar MacRenderMan**. Export images into **Authorware Professional** applications or **MacroMind Director** productions. Version 1.0. Suggested list, $1495.

**Swivel 3D**
Professional 2.0
Create, rotate, scale and animate 3D models with this complete modeling and design environment. Hierarchically link object parts. Export 3D views and animation sequences. Swivel 3D models are compatible with **MacroMind Three-D** and **Director** for advanced animation and rendering of 3D models. Supports 24-bit color, full screen display, **Pascal MacRenderMan** output, AutoCAD-**DXF** output, **Adobe Illustrator EPS**. PICT and PICS files. Version 2.0. Suggested list, $695.

**PRESENTATIONS**

**Action!** Macintosh 1.0
NEW! Designed for business users rather than multimedia professionals, this easy-to-use tool helps you create dynamic presentations and demos complete with in-scene animation, motion, sound, text and graphics. Features 120 professional presentation templates, scene interactivity via buttons, 39 preset scene transitions, and a Scene Sorter. Supports 24-bit color and System 7. Control timing and flow with a simple timeline, instant links and buttons, and a VCR-like control panel. The best tool for presenting from your Mac. Also available for Windows. Action! Mac Version 1.0. Suggested list, $495.

Action! for Windows 2.0
The original **Action!** winner of 1991 MVP and Reader's Choice awards, with all the same easy-to-use features as the Macintosh version. Version 2.0. Suggested list, $495. Upgrade for just $79.

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**Director Players** Convert fully interactive **MacroMind Director** productions created on the Macintosh for playback under Microsoft Windows or Silicon Graphics IRIS workstations with complete interactive control of CD-Audio and digitized sound. Includes a license-free distribution policy for projectors. Windows Player Version 1.2, $995. **Macintosh Player** for Silicon Graphics IRIS Workstations, Version 1.0, $995.

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The premier multimedia authoring software for training and education. Visual programming allows non-technical users to build applications without scripting. Eleven design icons provide full authoring functionality and a powerful development platform. Full range of multimedia tools help you incorporate text, graphics, sound, animation and video in applications. Imports 3D models from Swivel 3D animation from MacroMind Director or Three-D sounds from MacRecorder as well as all standard Macintosh file formats. Runtime module lets you publish and distribute applications. Version 1.7, $795.

Authorware Professional for Windows

MacroMind Three-D™
A professional tool for creating high-quality 3D animations and photorealistic images for use in video and multimedia productions. Imports a wide range of 3D model file formats and provides a hierarchical time-line for easy animation of unlimited shapes, lights and cameras. Directly import models from MacroModel or Swivel 3D and export animations to MacroMind Director Supports video animation controllers, image special effects (bump and texture maps, shadows, etc.), 3D text from TrueType™ fonts and RenderMan® RIB. Version 1.2. Suggested list, $1495.

MacroMind MediaMaker™
New QuickTime Version! Assemble and synchronize video, CD-Audio with Macintosh graphics, sound, animation and QuickTime movies to create custom video productions. Play multiple sound channels at the same time. System 7.0 compatible. Supports Director 3.1. Fully automated Print-to-Video command allows accurate, easy output to videotape. Version 1.5. Suggested list, $695. Upgrade today for just $95! Add animated titles and credits to MediaMaker videos with MacroMind TitleMaker™, $149.

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This newest addition to our ClipMedia collection features more than 1,900 high-quality, royalty-free clips from aviation, computing, defense, education, finance, manufacturing, medicine, purchasing, retail and telecommunications and other major industries. Includes 500 sound effects, 150 animations, 35 music pieces and 700 graphic elements. Available on CD-ROM for Macintosh and Windows users. Mac version includes digital video and animation saved as QuickTime movies in addition to PICS. Industry at Work, ClipMedia 2. Suggested list, $295. Also available: Business & Technology, ClipMedia 1. Suggested list, $295.

QuickTime Version
This exciting, entry-level multimedia animation tool features a draw-like environment and tool palette for the creation of moving text and graphics with sound. Import, playback, animate, create and export QuickTime movies—even add transitions. Includes object transparency, pre-defined templates, and easy interactivity via on-screen buttons. The perfect intro to multimedia. Includes QuickPics, a $149 value, free. Version 1.1. Suggested list, $395.

QuickTime Version
Integrate these royalty-free, ready-to-use Swivel 3D models into multimedia productions, presentations and print publications.
As of right now, you can forget anything you ever knew, or even thought you knew about 3D modeling on the Mac. And get to know MacroModel.

If, for example, you thought 3D modeling was too big a leap from 2D graphics, you're in for a big surprise.

Or, if you're already into 3D but have found a striking lack of accuracy in other Mac modelers—you, too, are in for a big surprise.

Because MacroModel does what no 3D modeler has ever done before.

It combines all the numerical, "snap-to" accuracy you'd ever need for CAD with a simple user interface that'll never bog you down.

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And by building a brand-new front end that lets you design and edit in 2D—with familiar graphics tools—and move in and out of 3D space in an instant.

Ready to know more? Then turn the page. You'll find all the details on MacroModel. Plus a whole lot of good news about our full family of professional multimedia tools.
Macromedia's products, from dynamic business presentations to full-scale productions and interactive training, are designed to make your job easier. Take one glance to the right, and you'll see what we mean. What you can't see, however, is how all our products work together to make your job easier.

- How they complement each other so you always have the best tool on hand for the task at hand.
- For example, MacroModel is the hottest new tool for building accurate 3D objects.
- While MacroMind Three-D is the tool of choice for adding animation and photorealistic rendering to those same 3D objects.
- ClipMedia gives you digitized video, animations, graphics, music and sound to use in your productions.
- And MacRecorder is famous for helping you sample and customize sounds of your own.
- Pull it all together with MacroMind Director or Authorware Professional and you can create some of the best interactive productions and learning applications known to Mackind.
- (Not to mention play them back—not just on the Mac—but on Windows and SGI IRIS, too)
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BEHIND THE SCENES AT MACROMEDIA

Young Harrell — artist, holographer, virtual reality inventor, and Director of 3D Product Development — talks about Macromedia's newest 3D modeling package and how it lives up to the design team's original ideals.

What did you set out to do in designing MacroModel?

We wanted to create a modeling environment that was as easy to use as Swivel 3D, as fast as Swivel 3D, but very accurate and capable of doing anything from concept design through CAD.

We also wanted to build a core technology that would last five to ten years, that would be a key part of the technical equity of the company.

How is MacroModel more compatible with CAD than other modelers?

The accuracy is very important. So are CAD functions like 2D and 3D snapping, being able to snap to exact geometry.

That's a main difference between Swivel 3D and MacroModel. With Swivel 3D, pretty much all the modeling is approximate — it's great for presenting concepts — but with MacroModel you can actually start with a plan or drawing and by typing in numbers and snapping to points, come up with an exact representation of your object.

That you could then use to pass on to manufacturing?

Yeah, you could use it to develop a comprehensive set of drawings for engineering or to go out through DXF to a CAD/CAM environment.

What do you mean by 2D and 3D snapping?

That MacroModel is very similar to [Adobe] Illustrator and other illustration programs, in that you're always drawing on a 2D surface that's called the working plane. Most often that plane is flat on the screen, but you can place the plane anywhere in the world, say at an angle or on top of a building, and extrude a water tower, or whatever you like, in that plane.

The plan was to give people who are familiar with 2D CAD and illustration programs all of the tools they're used to using on 2D surfaces, but once they start extruding or sweeping they can jump off into the third dimension.

I think we've been pretty successful at it.

Now, for rendering, you'd really want to use Three-D or MacrenderMan, right?

That's true. MacroModel's rendering is what I'd call a draft-to-good quality rendering. For the real high-quality photorealistic rendering you'd want to go to [MacroMind] Three-D for animated rendering, or to [Pixar] MacrenderMan for still-life rendering.

You hear a lot about modeling speed. How fast is MacroModel?

Well, one of the main things we tried to achieve was to have smooth-shaded hidden-surface images of objects be updated in a reasonable time as you model them. Basically we had to write a highly optimized renderer.

Just to give you an idea, right now we're essentially comparable with the speed of Swivel 3D, so we're rendering about 1,000 polygons per second on a 11i. And on a Quadra, just in terms of the interactivity and responsiveness of the edit, we're approaching a Silicon Graphics Personal IRIS kind of speed.

So Swivel 3D and MacroModel are both modelers with roughly the same speed . . .

Yeah, that's right. But they're pretty much different tasks — going from concept modeling [Swivel 3D] to having a real numerical model with curved surfaces [MacroModel] to prepare for CAD or working drawings, or to use in animations.

What we're seeing is that people who want to graduate from display modeling to models that have real dimensions — if they're trying to model real products, or extremely large worlds, if they need curved surfaces — then they should move up to MacroModel.

And MacroModel does spline-based modeling rather than polygons. What's the advantage?

Polygons are fine to model flat surfaces. But if you have objects with curved surfaces, the advantage to representing them with curved surfaces — splines — is that you can render at various levels depending on how much time you have or how much update speed you want.

In the long run, representing curves as polygons is just an approximation. It's not accurate.

What do you love the most about MacroModel?

The thing I enjoy as a user is that when you create an object, MacroModel remembers how you created it. So if you make a Bezier line or put out a letter that has an Illustrator-like outline and then extrude it, MacroModel doesn't forget that you extruded it from his profile.

So you can go back and edit the original object and the extrusion changes too?

That's right. That's a goal we had at the beginning — and we kept it for all the different object types — that you can go back and edit the defining geometry and get updates in a reasonable time.

Other things I like are all the neat user interface things like the track ball interface, the browsers, and the numerical updating. I think it worked out really well. I think people are going to be jazzed.

Does anyone else do all this?

They're beginning to. But this is the sort of stuff you have to do at the beginning — you can't go back and add it on. So I think a lot of our competitors, once they see this, are going to have to go back and rewrite everything.

MACROMEDIA
slick and polished as Mr. Mercury in Terminator 2. But using Morph is simplicity itself. The price is certainly right. And with patience and experience, you can use Morph to perform the ultimate transformation: changing yourself from a desktop-video dilettante into a high-tech special-effects wizard.—DAVID POGUE

### DesignCAD Macintosh 3.0.1

**PROS:** Good rendering capabilities with flat, Gouraud, and Phong shading options; good 2-D and 3-D importing and exporting capabilities; directly exports RIB files to MacRenderMan; good value.

**CONS:** Slow rendering; no tutorial in the manual; can't combine objects or create holes in them.

**COMPANY:** DesignCAD (918/825-4848).

**REQUIRES:** Mac Plus; 2MB of RAM; System 6.0.5; hard drive. Recommended: Mac II with math coprocessor. **LIST PRICE:** $299.95.

### DesignCAD

**DESIGNCAD, A GENERAL-PURPOSE 3-D modeler with 2-D drafting capabilities, represents a price and performance breakthrough in 3-D modeling programs.** With a list price of $299.95—and street pricing as low as $160—DesignCAD provides modeling and rendering features usually found only in packages in the $1000-to-$2500 range.

DesignCAD is a true surface modeler, with design and editing tools—including excellent 2-D spline and 3-D surface tools—that enable you to create almost any shaped object. Because it's not a solids modeler, however, DesignCAD can't punch holes in objects or combine them through Boolean operators to create a new object. As a true surface modeler, it creates files with all the information needed to get excellent rendering results from high-end rendering programs, like MacRenderMan.

DesignCAD itself offers extensive rendering choices. Besides hidden-line and mesh surfaces (which show just the exteriors of objects), the program provides flat, Gouraud, and Phong shading, plus transparency and specular-reflection options. Each of DesignCAD's four viewing windows (front, side, top, and isometric) can be rendered independently; and within a window, you can mix rendered and wire-frame objects. You could, for example, display the planes of a room in wire-frame but fully render the contents—which will look like a transparent room containing a carefully modeled interior design.

DesignCAD has a complete assortment of design, editing, and dimensioning tools that work in a Mac-like manner. It also has locational modifiers like Claris-CAD's that let you precisely snap to or locate objects and/or points in a model. Tool palettes float in windows that you can place anywhere on screen. The program comes with a library of approximately 500 symbols. The company also offers an optional collection of 6700 symbols for $179.95.

### Four-Way Windows

**ON START-UP, DESIGNCAD DISPLAYS ALL four views in tiled windows, a way of displaying 3-D space that is familiar to anyone who has ever taken mechanical drafting.** In addition, a dynamic viewing toolbox contains simple arrow controls that let you "fly around" or "walk inside" a design. However, if you want to work on a model from the bottom or the back, you're out of luck. You can orient the isometric view to look at a model from any direction, but to modify or move objects, you must use the front, top, or side view.

The four concurrent windows come in handy for orientation, but they are not set up very practically. Every time you make a change—even when you merely select an object—you have to wait for all the windows to redraw; at DesignCAD's slow rendering pace, that can try your patience. You can halt in mid-redraw by pressing the H key, but that leaves you using the front, top, or side view.

The four-way tiled views are of limited value with 13-inch monitors. You need big windows for display at a workable scale—especially with architectural models. Of course, you can always close one or more of the views while you work. You can also save viewing preferences (background color, grid and axis lines, angle of isometric view, and so on) for the windows as a setup file for future use.

Architects may have problems with DesignCAD's window environment because true sections cannot be created through a model. You can set the Global Origin (working plane) separately for each window so you can precisely locate objects within a model, but you still see every object in front of and beyond the working plane. Working on individual objects on a building or other complex model can become disorienting—a case of not being able to see the tree for the forest. Too bad you can't temporarily hide objects from view. As a workaround you can place the objects you want to hide on a separate layer and then hide that layer—the program does have good layer controls.

### File Translation

**BESIDES THE BASIC DESIGN SOFTWARE, DESIGNCAD INCLUDES Importer and Xporter file translators that alone are worth the price of admission—many stand-alone CAD-translation packages cost about as much as DesignCAD.** Importer can import DXF (Release 10), IGES, XY or XYZ coordinates, and 2-D and 3-D files from DesignCAD's MSDL-DOS version. DesignCAD can also read or directly export PICT files, although files exchanged in that format lose accuracy. DesignCAD's Xporter program exports all those formats, plus EPS: RIB, which is MacRenderMan's native file format; and the HPGL and DMPL plotter formats.

The EPS translation comes in handy for people who need to send images of 3-D designs to page-layout programs. When converting images to EPS format, you select specific views of your 3-D models. For isometric views, you can further specify an orthographic or perspective version and set the angle of view.

I especially like the ability to read and export XYZ coordinates from DesignCAD translator programs. It's a boon for designers who need to import raw data from survey instruments to create 3-D topographic maps or to export design data to a spreadsheet for additional analysis.

### Getting up to Speed

**DESIGNCAD REPRESENTS A GREAT value among 3-D CAD modelers.** It offers powerful tools for the money, so it's hard to complain about what's missing. But even its bargain price can't compensate for some of DesignCAD's problems. The biggest shortcoming is its speed, especially in making selections, redrawing, and rendering. On complex models with many objects (like a medium-size building), simple tasks like selecting a wall to move are unacceptably slow on a Mac Iicx. I can't imagine anyone tolerating running the program on a 68000-based machine, continues.
which the developers claim is possible. The program also required considerable memory allocation (4.8MB) to open a model of a small building that had been converted from a 3-D DXF file.

Any CAD program takes time to learn, but the process is made more difficult with DesignCAD because the instructions do not include step-by-step guides or any tutorials. The company is at work on a tutorial video, but I have yet to meet a CAD video that didn't put me to sleep. The program comes with a clear and concise reference manual, but it's difficult to grasp the practical utility of a CAD tool from an out-of-context description in a reference guide. I found the technical-support staff helpful but hard to reach; at the time of this review there were only two people on the Macintosh side of the tech-support staff.

Industrial or product designers should consider adding DesignCAD to their collection. As an architect, I'm less enthusiastic, due to the four-window interface and slow speed with complex models. But DesignCAD's low price could let you buy that accelerator board you've been eyeing and still total up less than you'd have to pay for any other 3-D modeler.

—DANIEL M. GONZALES

**Automated Draw Program**

**Aludis Intellidraw 1.0**

**PROS:**
Links objects physically and dynamically;
Symbol feature permits global editing; flip-book feature permits cycling through alternative versions during on-screen presentations.

**CONS:**
No masking; can't measure angles between lines; insufficient free-form drawing capabilities.

**COMPANY:**
Aludis Consumer Division (206/628-5739).

**REQUIRES:**
Mac Plus; 2MB of RAM; hard drive; System 6.0.5.

**PRICE:** $299.

---

**Imagine a Draw Program that**

**Costs $100 less than MacDraw Pro but**

**Offers Many of the Best Object-Editing Features from Adobe Illustrator, Deneba's Canvas, and Aludis FreeHand.**

Then imagine that the program enables you to link objects together physically, so they stick together, and dynamically, so that changes made to one object affect all duplicates of the object. Now throw in custom alignment options, multipage documents with editable master-page elements, and better presentation capabilities than any other draw program. Sound fantastic? Then you haven't seen Aludis Intellidraw.

First among Intellidraw's smart features are the connector tools, which let you string objects together like charms in a bracelet. Once you connect two objects, they move, rotate, and resize together. For example, if you fix the length of a connector, Intellidraw maintains a constant distance between objects while allowing the angle to vary.

You can also use Intellidraw's alignment and distribution commands to connect objects. This means that if you link two walls in an architectural plan so that two perpendicular walls align, they remain aligned until the link is broken. Or if you distribute three columns evenly around a circular courtyard and then duplicate a column, Intellidraw automatically redistributes the four evenly. By defining the physical relationships between objects, you can perform revisions without worrying about messing up an illustration.

Intellidraw combines features found in some of the most popular Mac draw programs. For example, you can link text blocks so that text flows from one column into another, as in Illustrator. You can create intermediate blends between several objects at a time, as in Canvas, and edit those blends after their creation, as in that fellow Aldus program, FreeHand. Better yet, Intellidraw provides an independent window for editing blended objects, which visually isolates the original objects from the blended shapes. Intellidraw also mimics FreeHand by providing multiple layers, by allowing you to draw in either a preview or wire-frame display mode, and by letting you undo up to 99 consecutive operations.

Intellidraw borrows most heavily from Canvas. Like Canvas, Intellidraw can merge selected objects by tracing around their combined outlines or by subtracting the intersection of one outline from another. A third merge function, Intersect, is more limited than Canvas's. Whereas Canvas allows selection shapes with respect to the frontmost object, Intellidraw retains only the shapes that occur at the intersection of all objects, making it useless for masking. While Canvas beats Intellidraw in the combined-shape department, Intellidraw excels at measuring and labeling objects. Like Canvas, Intellidraw can calculate the height, width, or perimeter of a selected shape according to the current scale of measurement. But while Canvas goes further—additional calculating the angle between two lines, the diameter of an ellipse, and the area of any closed shape—Intellidraw alone links objects and dimension labels together so that changes made to the object are automatically reflected in its label, and vice versa.

You can match the height and width of objects so that resizing one object automatically resizes the others. If your plan or schematic drawing includes a variety of repeated images, Intellidraw can store the original as a symbol and link all duplicates to it. Then you can make global changes by editing the original image in the Symbol window, updating all duplicates at once. You can even globally replace one image with another.

Another crowd-pleaser is the flip-book feature. If you're not sure which of three logos your client will prefer, you can include all three in a prospective layout so that only one logo appears at a time. To cycle through the images in a flip-book, simply double-click on the current image.

As a planning and presentation tool, Intellidraw rates very high. Where Intellidraw disappoints is in the free-form drawing department. It lacks a Bézier-curve tool as well as much of the functionality that goes with it, such as the ability to join and split paths and to reshape simple geometric objects, and other curve-editing capabilities most intermediate and advanced artists take for granted. Also, you'll gnash your teeth trying to link curved shapes with the Connectigon tool. You can't see the points (which serve as attachment anchors) in the curved shapes while drawing the links. Nor can you duplicate a portion of a shape and convert it to a Connectigon, forcing you to constantly trace shapes to link them.

Although Intellidraw won't eliminate all your graphics woes, it's nevertheless the first general-purpose drawing tool devoted to the task of automating the creation of object-oriented artwork. Simply put, it expedites the revision process better than any other draw program.

If you're an engineer, architect, or artist whose work tends more toward planning and design than free-form illustration, Intellidraw is a great environment for drawing and demonstrating your ideas.—DEKE MCCLELLAND
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Circle 89 on reader service card
**Input Devices**

**Mouse-Trak**

**PROS**: Smooth trackball motion, built-in wrist pad. **CONS**: Must be disassembled to reconfigure buttons; awkward placement of third button. **COMPANY**: Itac Systems (214/494-3073). **REQUIRES**: Any Mac with ADB port. **LIST PRICE**: $179.

**Turbo Mouse 4.0**

**PROS**: Extensive configuration options; automated cursor placement; extra ADB port. **CONS**: Lacks handrest. **COMPANY**: Kensington Microware (415/572-2700). **REQUIRES**: Any Mac with ADB port; System 6.0.5 (for trackball plus software). **LIST PRICE**: $169.95.

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**Mouse-Trak**

IF SOUND MATTERED IN EVALUATING input devices, then Itac Systems' Mouse-Trak would easily top my list of recommended trackballs. The noise the ball makes when it rolls is as satisfying as the thunk you hear when you shut the door of a well-designed car. Mouse-Trak does have more than just sound going for it, though. The trackball is well positioned and easy to rotate, and the soft wrist-pad built into the housing makes the Mouse-Trak comfortable to use.

The two buttons that flank the trackball fall naturally under the thumb and little finger, although they could be a bit larger. In Mouse-Trak's default configuration, the left button functions like the one on a standard mouse, while the right button produces a continuous mouse-down signal for clicking and dragging. Pressing the third button is the equivalent of double-clicking, but its location between the wrist pad and trackball is harder to reach. A small switch near the wrist pad toggles between normal and ballistic trackball operation. In normal use, the cursor moves a certain distance depending on how far you roll the ball. In ballistic mode, rapid trackball movements are amplified so that the cursor moves a greater distance than it normally does when you roll the ball a certain distance, a convenient feature if you're working with a large monitor.

While Mouse-Trak's default button layout is fine for right-handed users, most southpaws will opt to reverse the functions of the two side buttons. Unfortunately, you have to disassemble the trackball and move jumper plugs to reprogram button operation. While this isn't difficult if you're handy with a screwdriver and pliers, it is possible to damage internal components while moving the jumpers. External configuration switches would be an improvement, and software control would be better still.

**Turbo Mouse 4.0**

SUPERFICially, the Turbo Mouse is almost identical to the trackball that's been a perennial favorite in surveys like Macworld's World-Class Awards. The removable ball glides freely, and the large buttons on either side provide just the right measure of tactile feedback. Its cord is removable, and the Turbo Mouse sports a second port for a mouse or other ADB device. My only quarrel with Kensington's design is the lack of a handrest—the Turbo Mouse was much easier on my wrist when I placed a soft pad in front of the trackball.

What really makes the Turbo Mouse stand out is the software, which includes a System extension and an application. The application lets you customize many of the trackball's functions. Using a feature called Custom Acceleration, you can specify how the cursor reacts to trackball motion. (This feature is similar to Mouse-Trak's speed control but allows for more precise control of cursor response.) In comparison with software from other input device vendors, the Turbo Mouse interface is simple and intuitive. What's more, custom acceleration works with other manufacturers' ADB mice and trackballs.

The Turbo Mouse application lets you program the trackball's two buttons via pop-up menus. (Functions can also be triggered by pressing both trackball buttons at the same time, in effect adding a third virtual button.) Buttons can be set to double-click, click-lock, or send a string of up to 40 characters to the Mac. Slow Cursor causes the cursor to move slowly (handy for precision work), while Axis-Only constrains cursor movement to the horizontal or vertical direction.

**Brilliant Cursor** is another novel Turbo Mouse enhancement. This feature lets you define special locations on the screen called HotSpots. When you invoke Brilliant Cursor by pressing a user-defined trackball button, the cursor snaps to the nearest HotSpot as soon as you move the ball. To assign HotSpots, you press a special key combination and click on any place on the monitor you want to define as a HotSpot. A graphic symbol marks each HotSpot (the symbols appear only while HotSpots are being defined), and clicking on an existing HotSpot clears it. When you're done, HotSpots are automatically stored for later use.

Mastering Brilliant Cursor requires some trial and error. (Fortunately, you can restore Kensington's standard HotSpots by typing %-%.) For example, I learned that assigning HotSpots to two closely spaced menus makes it difficult to select either one. After a few hours, though, I began to appreciate Brilliant Cursor, especially while working on a 19-inch monitor. By defining HotSpots carefully, you can avoid hunting around the screen for frequently used menus and palettes. Still, as ingenious as Brilliant Cursor is, HotSpots represent only absolute screen coordinates: when you move an object for which you've defined a HotSpot, the HotSpot doesn't shift with it.

All the programmable features, including Brilliant Cursor, can be made application-specific. For example, you can customize a unique set of acceleration parameters, button functions, and HotSpots for every application. Set load automatically when you launch applications; if no specific set has been defined, or if you switch to the Finder, the default Turbo Mouse button assignments and HotSpots take over.

In choosing a pointing device, you should evaluate everything from the size of your hand to the layout of your work space (see "Input Alternatives," Macworld, June 1992). Judged on the basis of hardware alone, both the Mouse-Trak and the Turbo Mouse work well, although having to disassemble the Mouse-Trak to reconfigure its buttons is a bother. On the other hand, Kensington's Turbo Mouse represents a real breakthrough in trackball software design. If you're shopping for a trackball, Turbo Mouse deserves first consideration.  

—FRANKLIN N. TESSLER
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In some respects, the program redefines Time file provides multiple actors, props, and sounds. For creating and editing actors and props, Promotion supplies a modest set of painting tools. You can't record sounds within Promotion, but you can edit imported sounds by adjusting volume levels, adding echoes and fade-ins, and playing sounds in reverse. If these controls aren't enough, you can import PICT images and SND files from other programs. Promotion even supports JPEG compression.

If you can't draw and your Mac has no microphone, you'll be glad that Promotion includes the PrimeTime CD, which retails for $100 when purchased independently. (If you don't own a CD ROM player, you can exchange the CD for floppy disks.) Chock-full of actors, props, and sounds that go together like coordinated three-piece suits, PrimeTime expands the abilities of casual users and affords intermediates the option of assembling speedy presentations at the last minute.

That is, production would be speedy if it weren't for Promotion's laborious import function. Although each PrimeTime file provides multiple actors, props, and sounds, you can import only one object at a time via a mind-numbingly slow three-step procedure of opening the host file, selecting the object you want to import, and confirming the object's name.

To animate an actor, you can draw it frame by frame using the painting tools; rotate, scale, or fade it using tweening (as in between) controls; or move it along a path. Promotion's path tools are especially flexible, letting you specify the exact point at which you want the actor to appear in each and every frame. On the downside, you can't constrain the position of a point by pressing the shift key, so it's difficult to move an actor in a straight line.

To oversee your entire animation, Promotion provides a TimeLine window that shows the number of frames occupied by each actor, prop, and sound. To better control the pace of an animated sequence during playback, you can insert events, which tell the program when to load images and sounds into memory. The loading process takes time, and when unaired by an event, it can interfere with the pace of playback. By inserting an event, you can instruct Promotion to load an object during a natural pause in a sequence so that the sequence plays back without any breaks. The TimeLine window also accommodates interactive cues, so you can insert buttons in a file that let the viewer navigate a run-time presentation at his or her own pace.

Perhaps Promotion's most amazing feature is its ambitious support for Apple automation. While other Mac programs support the four core events allowing you to open and close files remotely from a second application, Promotion supports these and 200 others, making it the most System 7-savvy animator I've seen. This means, for example, that you can readily retrieve Promotion information from within HyperCard, UserLand Software's Frontier, or another client application. Few beginners and intermediates will exploit these features, but gearheads and programmers can have a field day.

When you complete your animation, you can store it in a variety of formats. For displaying on other Macs, you can save your sequence as a self-running application that launches without Promotion installed. Promotion also exports to the QuickTime format, but it neglects an important step by failing to allow you to specify compression settings. If you want to record your animation to videotape, Promotion can automatically drive any device that supports Sony's Visica (Video System Control Architecture) protocol. Also, you can save a sequence as an After Dark screen-saver module.

If Promotion were as good as the sum of its parts, I'd recommend it with few reservations. But Motion Works has strung these capabilities together with a weak and problem-ridden interface. Granted, novices will find Promotion easier to learn than a heavy-duty animator like Macromind Three-D, but few adept users will confuse Promotion's easy learning curve for convenience. Here are just a few examples. When creating text, you can't simply enter a type size into a dialog box; you have to click and drag on tiny up and down arrow icons as if the keyboard had never been invented. The eyedropper tool works only in the foreground window, preventing you from, say, matching the colors in the current actor to the colors in a prop. When drawing an actor, you can't preview the appearance of a specific frame against its background, denying you a glimpse of the big picture. While the paint window offers an antialiasing feature that softens every frame in an animated sequence, you can't soften the actor with respect to its background, vastly undermining the utility of the function. Many operations, including antialiasing, can't be undone, and because Promotion doesn't warn you as you embark on an irreversible operation, you can very easily ruin an animated sequence. You can't duplicate an actor or prop using the Copy and Paste commands; instead you have to reimplement the Place function.

I also met with a few bugs. After I deleted a large prop from the TimeLine window, the Undo command wouldn't work, even though it was available on the menu. Since Promotion automatically updates the animation file to disk, I was unable to retrieve the prop via, say, a Revert command. Also, Promotion occasionally displayed the wrong command name. For example, choosing the Hide TimeLine command frequently displayed the TimeLine window instead of hiding it. Finally, Promotion is incompatible with SuperMac's Spectrum/8 24 PDQ video board and driver, crashing and deleting files when you save a run-time presentation to disk.

The Macintosh community cries out for a reasonably priced, moderately powerful animation package. While Promotion provides a slew of tempting features, Motion Works needs to put some serious effort into revising the interface and improving Promotion's convenience features. After all, we use software to expedite tasks, not to make them more laborious. Despite its fine features, the wearisome Promotion remains unprepared for its PrimeTime. (Go ahead, you're supposed to groan.)—OKE McCLELLAND
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Lotus cc:Mail for Macintosh
THE NEW VERSION OF THIS HYPER-Card-based personal information manager boasts a wider range of scheduling features, new printing options, and improved networking capabilities. But the update fails to address the program's most serious flaw—it's too slow.

Connections—basically, a collection of integrated HyperCard stacks and an INIT for managing alarms—is a combination daily planner, calendar, and telephone and address directory. The daily-planner module lets you post reminders, to-do items, and appointments, while a full-screen calendar provides an overview of the month. The telephone directory module offers autodialing and a Call History feature that lets you track telephone contact time. There's also a Personal Library module in which you can store letters, faxes, notes, and so on. The run-time version of Reports, included with the program, enables you to print excellent desktop and pocket directories, schedules, and other reports in several organizer formats.

Connections' strength lies in the fact that you can build direct links between entries in any of the various stacks. Once a link is in place, you can navigate between related entries with a single click. For example, you can select the name of a person to call on the to-do list, then click on the Directory icon and jump to that person in the directory. You can also navigate between the modules using a colorful, resizeable Shortcut palette.

In version 2.1, dialog boxes for setting voice alarms and scheduling recurring appointments have been redesigned for easier use; a Begin Fax feature lets you create headings for faxes, using information stored in the directory; and a new Carry Over command lets you transfer reminders to a specified future date. For group use, Connections now offers full compatibility with AppleShare 3.0 and password storage for automatic log-on to group calendars.

Each of Connections' modules is graphically appealing, but they lack the kind of conveniences that give personal information managers their power. For example, you can't add an appointment or reminder while viewing the monthly calendar; you must switch back to the daily planner module to make any changes. Also, you can't remove an appointment or to-do item by selecting it and hitting the delete key; instead, you have to choose a delete command (there is no keyboard equivalent) from the Daily menu. And while the ability to create one-click links between entries in the modules is neat, the links take too long to build and execute.

Other features just don't function logically. A new Time Stamp feature lets you paste the current time and date into any editable field, but it's disabled when it would be most practical, such as when you're filling in the Completed date field on a to-do item. I also found it strange that if you assign a reminder a due date and then check the Post in Monthly box, the reminder gets listed twice on the calendar. If you assign a reminder a due date but opt not to post it in the monthly calendar, it inexplicably shows up on the calendar anyway.

But the biggest problem is that Connections' slow performance is barely tolerable. Ironically, Concentrix Technology claims the first thing you'll notice about version 2.1 is its improved speed; the first thing I noticed was the disappointing lack of speed improvement. Posting new appointments and reminders and shifting between the program's various modules still takes too long. I also had serious speed problems using the note-taking feature in the Personal Library module; the program lagged several words behind me when I was typing at average speed.

When Connections was first released last year, it was buggy. Problems persist in version 2.1. Most notably, Font menus in Connections can become jumbled if the system contains a combination of TrueType and Adobe Type 1 fonts. If you select a particular font, you may end up with the one listed below it on the menu. Another glitch encountered involved the Begin Letter command, which uses information in the directory to type out the headings for correspondence; the return addresses on my letters were all improperly spaced and appeared along the wrong margin. (Technical support helped me edit the HyperTalk script to provide a temporary fix to the return-address problem.) Concentrix plans to provide an update that will fix the font problems.

Running Connections requires 1.2MB of RAM, and the full program—including HyperCard, the Alarms INIT, and the software needed to print the preformatted reports—takes up a sprawling 4MB on your hard drive. All in all, it's too big, too slow, and too sloppy to meet the challenge of performing as a personal information manager really should.

—JOSEPH SCHORR

MasterFinder 1.2.1

PROS: Rapid access to frequently used files and folders; permits operations on several files at once; saves catalogs of offline volumes.

CONS: Requires time to master; fixed-width window.


ASY GOOD AS IT IS, THE MACINTOSH Finder comes up short when you have to manage thousands of files and folders on a huge hard drive or, worse yet, on a network. Simply finding files can be a chore, even using System 7's built-in Find command. Fortunately, third-party vendors offer a host of clever software designed to solve the Finder's deficiencies.

MasterFinder, introduced in 1991 and since updated for System 7, is an ingenious solution, but one whose many features require some effort to learn.

MasterFinder comes in two forms—a desk accessory for System 6 users without MultiFinder, and as an application for System 7 users and for System 6 users running MultiFinder. A companion system extension that lets you shut down or restart the Macintosh from within MasterFinder is required for use with the application, but not the DA. I tested only the application version of MasterFinder for this review.

To get the most out of MasterFinder, the manual recommends that you set it to run automatically at start-up, so that it's always available (the suggested allocation is 340K). When it's running in the background, MasterFinder displays a miniature window that you can drag to any convenient location on the desktop; a single click brings MasterFinder to the foreground and zooms its window.

MasterFinder's main window is divided into four vertical sections called panes, each of which can display the contents of a folder or a disk (see "Great Panes"). In place of the customary Macintosh scroll bars, arrows at the bottom of the panes let you scroll up and down the lists of files and folders, which MasterFinder calls directories.

MasterFinder provides multiple options for choosing which directories to continue.
This side is for people who believe everything they read.

Graphing and charting capabilities
The graphing and charting capabilities of 1-2-3® make it the best Macintosh® spreadsheet for presenting data, because, unlike Microsoft® Excel, graphs and charts in 1-2-3 are in the same files as your worksheets. So you can make one-click graph type changes, pull objects across window boundaries to the worksheet, dynamically link chart titles to cell contents, and shrink charts to small icons on your worksheet.

Unified Work Environment
Our unique Unified Work Environment lets you manipulate data, text and graphics all in the same file with one set of menus and only one set of tools. Excel requires you to go into each worksheet file separately to manipulate each element.

In-Cell editing
Only 1-2-3 offers In-Cell editing so you can enter a formula directly into a cell for faster, easier editing.

True 3D capabilities
Only with the true 3D capabilities of 1-2-3 can you easily consolidate multiple spreadsheets into one file without having to link the files. 3D allows all spreadsheet functions to be performed through multiple worksheets just as they are performed down rows and across columns.

Database functionality
1-2-3 for Macintosh provides powerful internal database functionality, as well as superior and innovative built-in external data access to all major databases via DataLens.

Classic menu
1-2-3 is the clear choice for DOS spreadsheet users moving to Macintosh because only 1-2-3 offers the traditional Classic menu, which makes it easier for you to access familiar 1-2-3 commands and run macros already written for 1-2-3.

1-2-3 is easier to use than Excel. Prove it to yourself.
1-2-3 is not only the world's easiest-to-use Macintosh spreadsheet, it also provides superior technology and advanced spreadsheet functionality. Prove it to yourself. Buy a copy from your local dealer. Or call 1-800-TRADEUP, ext. 7045 for a free working model. Excel users be sure to ask about our special upgrade price.*
Great Panes  MasterFinder's main window can display up to four directories at a time.

show. For example, you can view the contents of a folder by double-clicking on it or by dragging it into any free pane. Alternatively, you can open folders or volumes by selecting them from pop-up menus. (Like Now Software's Super Boomerang, MasterFinder automatically maintains a list of recently accessed folders.) MasterFinder's window is fixed horizontally, though, so you can't add new panes or widen the four standard panes to accommodate long file names.

As in the Finder, double-clicking on an application launches it, while double-clicking on a document launches the creating application if it's available. You can print selected documents and quit applications from within MasterFinder. Like other utilities, MasterFinder lets you view and edit attributes of selected files such as memory partition, file type, and creator. MasterFinder even lets you alter certain esoteric file attributes, including some that determine how applications handle Apple events.

For the average user, MasterFinder's most potent feature is its ability to manipulate multiple files and folders at the same time. For example, you can move several files at once by selecting them and dragging them to another folder or volume. And it's just as easy to duplicate, rename, alias, or delete a group of files with a single command. Although you can do this with the Finder too, MasterFinder's panes make it much more convenient to shuffle through deeply nested directories to locate a destination folder or volume.

MasterFinder also incorporates a find command that lets you scan for files and folders by name, date, size, type, or creator. (You can't look for text within files, however.) In my head-to-head tests, MasterFinder was much speedier than System 7's Find command. Files and folders that meet your criteria are added to the bottom of a scrolling list, and frequently used search criteria can be saved for later use. Because the list isn't cleared until you say so, it's easy to combine the results of searches spanning multiple volumes. Found files and folders can be deleted, renamed, moved, or copied to another volume or folder, something that's hard to do using the Finder.

MasterFinder also incorporates a function that scans volumes and builds catalogs of their contents for later use. It's a handy way to keep track of files on high-capacity removable media like SyQuest cartridges and CD-ROM drives. Catalogs can be searched using the same criteria as MasterFinder's regular Find command. Another handy MasterFinder feature enables networked users to display a list of the devices on up to four AppleTalk zones at a time.

With its less-than-intuitive interface, MasterFinder has a somewhat steep learning curve compared with some utilities. To make full use of MasterFinder's impressive suite of functions, you have to be willing to invest some time. When I finally read the manual carefully after playing around for a few days, I realized that I hadn't discovered most of MasterFinder's capabilities. After just one week, though, MasterFinder grew from a curious utility to a valuable asset, and I recommend it highly.—FRANKLIN N. TESSLER

Great Panes MasterFinder's main window can display up to four directories at a time.

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C. Itoh ProWriter Printer

PROS: Good manual-feed slot; paper tray is adjustable and can feed envelopes; resolution-enhancement feature. CONS: Can't print TrueType fonts; cumbersome setup; below-average laser output; poor documentation. COMPANY: C-Tech Electronics (714/833-1165). LIST PRICE: $2,995; required Mac Pack kit $850.

NOT ONLY IS THE C. ITOH PRO-WRITER MORE EXPENSIVE THAN MOST PERSONAL PAGE PRINTERS NOW AVAILABLE, IT OFFERS LESS-IMPRESSION FEATURES AND SO-SO PRINTED OUTPUT.

To set up the printer, you have to install five pieces—cleaning pad, drum unit, drum counter, developer unit, and toner cartridge. The toner cartridge is messy, and before inserting the drum unit you have to clean the charger wire with a cotton swab (not provided).

Using the printer with a Mac means first installing the Mac Pack kit. This involves unscrewing the rear panel of the printer, removing the printer's serial and parallel ports, and replacing them with the AppleTalk interface. Then you have to pull out the main controller board to connect a PostScript-emulation board and an additional 1MB SIMM (all included in the Mac Pack). Finally, you must set the DIP switches on the controller board and put everything back together.

The ProWriter's Tec 1323D print engine is rated at 8 pages per minute and has an Intel 80960 RISC processor. The unit comes with 35 resident PostScript-compatible fonts from Bitstream, and a disk of screen fonts. A second paper tray ($175) and a 20-sheet output tray for the rear exit slot ($30) are also available.

The printer handled PostScript graphics adequately, but choked when handling text. Despite the printer's edge-enhancement technology, many fonts appeared unusually jagged and uneven.

Trying to print documents containing TrueType fonts consistently resulted in printing errors that completely froze up the printer. The printer's reset button never worked, and I had to repeatedly restart the printer to continue working.

Technical support was almost no help. One technician told me he had no information about the TrueType problem. I did learn that C-Tech is aware of a problem with TrueType compatibility and that an upgrade will be available around the beginning of 1993.

Overall, the construction is flimsy. The 16-character LCD display is dim. The eight buttons on the operation panel have a spongy, wobbly feel. And the lever that switches paper output from the top of the unit to the rear slot makes a disconcerting "sprainmegg" whenever you flip it.

The documentation has a skimpy index, no technical-supplement support, vague instructions, and diagrams that are difficult to understand. The main manual doesn't acknowledge the existence of Macintosh computers, while the sparsely written AppleTalk supplement gives only sketchy instructions and ignores System 7 and TrueType. Some of the instructions are so poorly written, it's embarrassing.

To be fair, the printer has its positive features. The ProWriter's low, flat design—it's less than 9 inches tall—makes it less bulky than other printers. The adjustable 250-sheet paper tray can handle paper as narrow as 3 inches wide, and can feed envelopes, too. A translucent flip-up panel lets you refill it without removing the tray from the printer. And the paper tray also has adjustable guides for feeding pages into the printer manually.

Still, with the required AppleTalk option, this printer costs more than almost every other RISC-based personal page printer currently available. Given the ProWriter's TrueType troubles, lack of a true PostScript interpreter, poor documentation, and unimpressive output, it's clearly a printer to avoid.—JOSEPH SCHORR

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BEST CARDS FOR THE 
APPLE 16-INCH DISPLAY!

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<th>16-Inch Display Interface Cards</th>
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Only E-Machines, the 16-inch company, brings you a complete family of color cards for the Apple 16-inch. And the only cards with Ethernet networking built-in. All feature acceleration, video-out, pan and zoom, multiple display support, and of course, the best prices in the industry! Call now for the dealer nearest you.
REVIEWS

Document-Management Utility

DocuComp II 1.0

PROS: Valuable office function; maximum customization of options; full feature set. CONS: Only supports Microsoft Word and WordPerfect; busy technical support; interface not Mac-like.

COMPANY: Advanced Software (408/733-0745).


DocuComp II compares the text in two versions of the same file and then reports the differences in an exhaustive, easy-to-follow form. With this capability, you can impose version-control systems (avoiding tragic errors that occur when you laboriously fix a draft and then the unfixed version goes out instead). You can also speed up the editing process on long documents. Writers can get the new draft of a document with a comparison report, a printout showing the changes made to the prior version; this makes it easy to see which of the proposed changes were made, which weren't, and what other writers have suggested.

There are obvious applications for such version-control work: contracts, budgets, curriculum plans, books, reports, technical documentation—in fact, any document longer than a page or that needs multiple drafts. DocuComp works with Microsoft Word, WordPerfect, and text-only files; the program can also read no-format information files, a file format almost any application can save files to. (Users of Microsoft Word 3 and 4, WordPerfect 1.X, WriteNow 2.X, MacWrite II, and More should use DocuComp 1.5, which is still available.)

To use DocuComp, you launch it and indicate the old version and the new version of a file. You can specify a range of reading and reporting options. Execute the Compare function, and DocuComp, without affecting the original files, delivers the Comparison Window, a side-by-side view of the two documents with insertions, deletions, and moved text, each identified by color or font style.

There are a couple of limitations, however. First, you can't see any graphics in the Comparison Window, nor can you see any changes made to fonts or blank lines. In addition, the Comparison Window is not itself a document. If you want to save the changes in a composite document for later use, you have to save a separate Comparison Report. This isn't difficult, but the process is neither intuitive nor particularly Mac-like.

DocuComp bristles with customization options; if you're a beginner at editing, you can use the default formatting options to get good results. The sole exception is in the comparison of text-only files, for which you need to describe some optional choices. The software supports all the traditional document-comparison symbols: bars next to lines that have changes in them, strike-outs for deleted text, underlining of additions, brackets to indicate a choice of two words.

The documentation is an intelligently written guide to organizing your work to make version control easier. It has a good index, and it points out the product features that seem least obvious.

Technical support is a question mark. Three different calls on different days at different times all yielded busy signals.

DocuComp II has some new features: the saved composite document retains font, style, and tabular elements. Other options include footnote handling and assignment of file type to saved files. The new version runs under System 7.0 and supports balloon help.

DocuComp II is a full-featured utility for comparing documents. While its performance is good, the interface is specialized enough that I recommend it for people who will use it at least monthly. It is an indispensable tool for any editor. And if you want to set up a serious document-management program, or if you just need to sort out versions of documents fairly regularly, DocuComp II is an effective way to go.

—Jeffrey Gordon Angus

Font-Design Software

Fontographer 3.5

PROS: Excellent freehand drawing tool; good walkthroughs in manuals. CONS: Not intuitive; renaming fonts is complicated. COMPANY: Altsys Corporation (214/680-2060).

REQUIRES: Mac Plus; 2MB of RAM; hard drive. LIST PRICE: $495.

Fontographer provides versatile tools for editing PostScript fonts and creating characters or entire typefaces of your own. It also includes utilities for editing kerning tables; adjusting character widths; converting fonts into various formats for use on Mac, DOS, and Next computers; and remapping characters to different places on the keyboard. (Version 3.51, available free on most online services, fixes the copy and paste problem found when using the background layer.)

You can create fonts four ways in Fontographer: modify an existing font, scan roughs into the program and then refine the characters, start with an existing Aldus FreeHand or Adobe Illustrator file and modify it, or draw your own characters from scratch with version 3.5's new freehand tool.

For freehand work, you can choose one of three drawing tools—a line tool, a variable-weight pen, or a calligraphy pen. As with any PostScript draw program, you can control fill patterns, line weight, the way each line ends, and the way strokes meet. The program also has an excellent autotrace function, and you can paste in PostScript outlines from FreeHand and Illustrator.

Fontographer 3.5 works well with pressure-sensitive tablets, so you can draw in a more natural way with a stylus instead of a mouse. If you don't have a tablet, you can adjust line weights with the arrow keys as you draw with the mouse.

Using the freehand tool, I drew a simple font in less than ten minutes. (It takes longer to make precise characters.) With a single command Fontographer can turn the finished characters into printer and screen fonts. (Have a good name ready, though; renaming is tricky.) Once you've created a font, you can modify it to generate others, such as expanded and condensed versions.

If you want more control creating or modifying fonts, you can use Fontographer's expert features—Hiding, Multiple Masters, and Interpolation. Font interpolation mathematically calculates a font from two source fonts. You choose the source fonts and then specify how much of each font's characteristics you want the new one to inherit. If you start with roman and boldface source fonts, for example, entering 50 percent as a weight value produces a semibold font. Hinting improves how consistently a font displays in various sizes. Normally Fontographer automatically calculates the hinting. In expert mode, you can customize it, but the process is technical and cumbersome.

Fontographer 3.5 also edits and creates Multiple Master fonts. This new format, from Adobe Systems, lets the people who design fonts give the people who use those fonts a limited ability to devise their own variations. In Fontographer, the designer decides whether users can change character weight or width and sets the limits for changes. For example, the font may come in weights from extra light to extra bold, but the Multiple Master font you design could exclude the heavy and light extremes.

With its advanced tools and access to the latest in font technology, Fontographer is an essential tool for experts who produce professional fonts.

—Jo Ann Villalobos

Freehand Tool You can use the new freehand drawing tool to draw a font directly on screen.

Value: $495. 

November 1992 MacWorld
THE BEST 16-INCH DISPLAY. PERIOD.

When it comes to your display, the best is not a luxury, it's a necessity. So why settle for less when your performance is on the line? Smaller or fuzzy screens are unproductive and fatiguing. That's why the award winning ColorPage T16 II uses the 16-inch Sony Trinitron tube, the choice for professionals. The crystal-clear ColorPage T16 II is the only display to give you the flexibility and productivity of four display resolutions. Choose the enlarged 13-inch Presentation mode or an actual size 16-inch Full Page mode that's perfect for text and graphics. For more room the 19-inch and 21-inch Two Page modes are ideal for two page layouts or large spreadsheets. The T16 II meets the world's toughest Swedish MPR II standards for unexcelled safety. And it's compatible with the Mac IIsi, IICI or Quadra built-in video. When your performance is on the line, why settle for less than the best — ColorPage T16 II — NOW ONLY $1699.

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Sensible Grammar 2.1.3

**PROS:** Fast; easy to use; excellent interface; editable rule sets. **CONS:** Often invalid recommendations; does not catch misspellings.

**COMPANY:** Sensible Software (313/774-7215). **REQUIRES:** Mac Plus; System 4.2; hard drive. **LIST PRICE:** $99.95.

**GRAMMAR CHECKERS ARE INHERENTLY LIMITED.** They cannot truly read and comprehend writing (yet), so they rely on a technique of comparing sentences to a table of English grammar rules. They can be highly trained to recognize certain patterns in sentences, such as contractions. However, unlike stand-alone applications such as WordStar's Correct Grammar and Reference Software's Grammatik Mac, and the Microsoft Word built-in grammar checker, Sensible Grammar does not catch spelling errors. If you fail to run a spelling checker before using Sensible Grammar, it may skip over grammatical, as well as spelling, errors—a point the manual fails to mention.

As with any grammar checker, the writer must consider every recommendation carefully. Along with the many incorrect and unusable recommendations Sensible Grammar offered up were a few pointers that helped me give my prose a little polish.

—JOE HUTSKO

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**Sensible Grammar's suggestion is wrong, if you fail to turn to it later. By clicking on the Log Error button, you can create a text-file record of errors. A progress gauge shows how much of the document has been checked.**

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**Altec Lansing's ACS300 Computer Speaker System**

The ultimate test of any loudspeaker is its sound. The ACS300 system is very nice to listen to, and the subwoofer gives richness usually missing from portable speakers. Low piano notes on digital recording were amazingly clear and realistic; yet the speakers handled high-volume rock 'n' roll without distortion. In comparison, the self-powered Bose RoomMate speakers seemed more clearly defined in the highs and midrange, while the Altecs were richer and smoother.

For presentations, the ACS300 can be played impressively loud, but the ACS300's 6½-foot-long specialized cables may be a problem for work on the road. In any case, Altec Lansing's ACS300 speaker system is well worth a listen.—BILL JUSTIN
MicroNet’s 44 and 88 MB SyQuest Removable Cartridge Systems.

Now there’s more than one removable cartridge system to fit your on-line data storage needs. Our 44 or 88 MB drives provide infinite storage capacity and valuable data protection – simply lock away cartridges for total security.

MicroNet’s removable cartridge systems feature 20 ms access, embedded SCSI disk controllers to assure cartridge interchangeability, and proven Winchester technology with voice coil positioners. Our popular MR-45 offers assured compatibility with an installed base of 500,000 users. And the added capacity of our new MR-90 makes it great for backing up fixed hard disks and for transporting large graphic or CAD files.

Both the MR-45 and MR-90 are compatible with Macintosh, IBM PC/AT, and PS/2, and support Netware, UNIX, A/UX, and DOS. Internal PC systems are available with host adapter, cables, and device drivers for easy installation.

Choose a MicroNet 44 or 88 MB removable cartridge drive today. Either way you go, you’re sure to pick a reliable system with unlimited storage options. Give our sales department a call at 1-714-837-6033.

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Circle 139 on reader service card
REVIEWS

NightWatch II 2.0.1b

PROS: Multiuser accessibility; flexible; does not encrypt hard drive data.
CONS: Screen saver overrides screen locking and disables disk locking.
COMPANY: Kent Marsh (713/522-5625).
REQUIRES: Mac 512K; hard drive; System 6.0.5. LIST PRICE: $159.95.

Macintosh users wake up and realize that NightWatch snoops to override some of its features and mares where you forgot to wear your clothes to work or school? At some point most Macintosh users wake up and realize that their invaluable hard drives are left in this precarious state of nakedness every day. NightWatch II provides a flexible and safe method to restrict access to your hard drive. Unfortunately, NightWatch allows crafty snoops to override some of its features and invade your private space.

You install NightWatch II in one of three ways: Diskless, Classic, or Passwordless. What differentiates these three versions are the requirements for access. For Diskless you need only a user name and a password at start-up; Classic requires a key disk in addition to the name and password; and Passwordless requires only a key disk with no password protection. I found Diskless easiest to install; but Classic provides an added level of security, requiring both a disk and the password. I wouldn't recommend Passwordless because anyone with your key disk can access your drive easily.

Installation also involves setting up a database of people who will have access to your data, including you. You enter the name and assign a password. Additionally, you can specify what days of the week and times in the day a particular person has access to your drive. It is this multiple-user approach that makes NightWatch II stand out among its competitors. Most others offer only a single-password or global-access approach. Another plus is that NightWatch II does not use data encryption as its form of protection. With most other disk-locking utilities, your data is encrypted and is only decrypted when you unlock the disk; if you forget your password or your hard drive crashes, you can kiss your data goodbye.

All three NightWatch versions provide security in two forms. The first happens when you shut down the system via the Special menu or a NightWatch II utility. This locks the drive (restarting does not lock the drive). When you start the Mac, a dialog box asks for your user name and password. The second form of security is a screen locker.

Unfortunately, using System 7, I was able to override the screen locker by manually restarting the Mac (via the programmer switch) and holding down the shift key. With System 6 I was able to do the same but had to insert a system floppy to override the screen locker. This is detrimental for a couple of reasons. First, overriding the screen locker allows complete access to the hard drive. Second, it doesn't lock the hard drive because restarting isn't a genuine shutdown. This can be a major problem or a minor one, depending on your vigilance. The bottom line is that you must perform a shutdown whenever you leave your Mac; the screen locker is not secure enough. Someone at Kent Marsh explained that correcting this problem could mean causing damage to your hard drive by constantly locking your hard drive in the background rather than just at shutdown.

Disk-locking utilities are risky at best. Kent Marsh has done a great job creating one that's safe to use and provides a decent level of security.—MATTHEW R. CLARK

Retrieve It 1.0

PROS: Searches for file names as well as text; no indexing required. CONS: Slower than indexed searching; limited file filters. COMPANY: MVP Software (415/599-2704). REQUIRES: Mac Plus; System 6.0.4. LIST PRICE: $129.

Retrieve It is a DA designed to locate files whose names or contents include designated strings of text. You can set up complex search criteria with Boolean operators (Sally OR Phil AND NOT Oprah), and you can stipulate how far apart two text strings have to lie for a match to occur. Searches can be case-sensitive or not.

To minimize search times, Retrieve It lets you restrict scans to a single folder, or to files modified within a specified time period. Searches also can be limited to documents created by any one program; you select the application from a list that Retrieve It generates for you. (Applications compressed using Salient's AutoDouble or DiskDoubler are excluded from the list. Retrieve It can find text inside files compressed by AutoDoubler, but only if you search "all files and folders" or "DDExpand files"—not if you search by the file's original creator name.) You can also search only the data or the resource forks of files.

As Retrieve It scans, it gives you a scrolling list of the names, types, and modification dates of files that meet your search criteria. Retrieve It lets you move selected files to the desktop, but you can't copy, delete, or otherwise manipulate them. Double-clicking on a file in Retrieve It's list lets you peek at its contents in a separate window. To improve the readability of files with embedded formatting information or graphics, Retrieve It allows you to remove formatting characters from the text display. You can also have Retrieve It open a document by launching the application that created it.

I compared Retrieve It with two other text-retrieval utilities, Microlcytics' Gofer 2.0 and On Technology's On Location 2.0 (see Reviews, Macworld, June 1992). As I expected, Retrieve It was much slower than On Location when scanning for text within files. The first time you use On Location, you must index all your volumes; after that On Location does an excellent job of updating indexes in the background. Because On Location searches just these indexes, not all your files, it's faster at locating text strings than Gofer and Retrieve It are. On Location was also faster than Retrieve It when searching for file names, but by a much smaller margin. File for file, Retrieve It was usually a bit faster than Gofer at text searches. But judicious use of Gofer's more-flexible search options, which let you create lists of file types to scan or exclude, made Gofer faster than Retrieve It in some cases.

For daily use, I prefer On Location because of its speed, its ability to view formatted text, and its built-in file utilities. But DA's like Gofer and Retrieve It are useful when you need to search floppies or other removable media where indexing may be impractical. Each utility has its strong points. For example, Gofer lets you copy noncontiguous selections to the Clipboard, while Retrieve It lets you search by file name. A DA combining the best features of Gofer and Retrieve It would quickly find a place alongside On Location in my Apple menu.—FRANKLIN N. TESSLER
The NuDesign Dat Drive is the newest addition to our backup line. This drive combines a very fast and accurate mechanism with optional Retrospect from Dantz Development.

Just look at these specifications...

10.9mb per minute average backup speed- Gives you the ability to get the job done fast!
High speed random access- This special feature allows you to get to your data quickly (available w/Retrospect).
Four-head Direct-Read-After-Write data verification- Assures that your data will be there when you need it.
Automatic built in head cleaner- Allows your drive to remain clean and error free.
SCSI II compatible interface- This gives your drive the ability to remain compatible for years to come.
45 watt switching power supply and a metal cabinet - Assures that your drive is well protected and powered
MTBF 50,000 hours- Means that your NuDesign drive will handle years of usage
Available with Retrospect by Dantz Development- The first name in Macintosh backup software (a 248.00 value!)

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With Retrospect Software ..........1298.00

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<table>
<thead>
<tr>
<th>Drive Size</th>
<th>Internal</th>
<th>External</th>
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</thead>
<tbody>
<tr>
<td>40 MB</td>
<td>$208</td>
<td>$268</td>
</tr>
<tr>
<td>85 MB</td>
<td>$288</td>
<td>$358</td>
</tr>
<tr>
<td>120 MB</td>
<td>$348</td>
<td>$438</td>
</tr>
<tr>
<td>170 MB</td>
<td>$428</td>
<td>$498</td>
</tr>
</tbody>
</table>

212 and 540mb... Intense Performance

The Low Power, Low Profile Conner 212mb also fits into all Macs from the Classic to the Quadra!

The 212 and 540 Conner drives are the top of the line for Conner in terms of performance and capacity. The 212 spins at 4500 RPM so that you get major performance in a very small package. Since the 212 is Low profile, Low Power it will also fit into any Mac. The high capacity 540 is the fastest drive we have tested and a perfect internal for the CX, CI, II and Quadra Series! Both drives are also available in compact or zero footprint externals.

<table>
<thead>
<tr>
<th>Drive Size</th>
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<th>External</th>
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<tbody>
<tr>
<td>212 MB</td>
<td>$578</td>
<td>$658</td>
</tr>
<tr>
<td>540 MB</td>
<td>$1048</td>
<td>$1148</td>
</tr>
</tbody>
</table>

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Hours: 8:30 - 6:00 CST, Saturdays 10:00 - 4:00
Technical Service and Order Tracking call: 312-664-8225
**Fujitsu Drives**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>330 MB</td>
<td>3.5&quot; 9ms, Syr. warr., 200,000 MTBF</td>
<td>$998</td>
<td>$1098</td>
</tr>
<tr>
<td>425 MB</td>
<td>3.5&quot; 9ms, Syr. warr., 200,000 MTBF</td>
<td>$1098</td>
<td>$1198</td>
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<tr>
<td>520 MB</td>
<td>3.5&quot; 9ms, Fast SCSI, Syr. warr., 250,000 MTBF</td>
<td>$1098</td>
<td>$1198</td>
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<tr>
<td>680 MB</td>
<td>5.25&quot; 16ms Syr. warr., 200,000 MTBF</td>
<td>$1388</td>
<td>$1488</td>
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<tr>
<td>1.2 Gig</td>
<td>5.25&quot; 11.5ms, Syr. warr.</td>
<td>$1688</td>
<td>$1788</td>
</tr>
<tr>
<td>2.06 Gig</td>
<td>5.25&quot; 11.5ms, Syr. warr.</td>
<td>$2698</td>
<td>$2798</td>
</tr>
</tbody>
</table>

- **Fast and Reliable**
- MacDirect has sold more Fujitsu drives into the Macintosh market than all of the other Mac peripheral companies combined. We have worked with Fujitsu for three years and have found their drives to be the most reliable we have ever seen. Give us a call and we will tell you why we feel Fujitsu is the perfect choice for your large storage needs!

**Optical Drives**

- **NuDesign 3.5" 128mb Optical**
  - $1298
  - 50ms access time
  - Read/Write reliable storage
  - Includes cartridge

- **Ricoh 600mb Optical**
  - $2198
  - Read write reliable storage
  - Great for archiving, color scans, etc.
  - Includes cartridge

- **Toshiba CD ROM**
  - Toshiba 3301
    - $538
    - Includes driver CD carrier and cables
    - 325ms access time
    - MacWorld and MacUsers Highest Rated CD-ROM!

- **Toshiba 3.5" 830mb**
  - Toshiba 830mb
    - $1388
    - 12.5ms Average Seek Time
    - 256k cache
    - SCSI-2

  - Toshiba 3301
    - $538
    - 12.5ms Average Seek Time
    - 256k cache
    - SCSI-2

**Maxtor Drives**

<table>
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<th>Model</th>
<th>Description</th>
<th>Internal</th>
<th>External</th>
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</thead>
<tbody>
<tr>
<td>120mb</td>
<td>3.5&quot; LPS</td>
<td>$358</td>
<td>$438</td>
</tr>
<tr>
<td>213mb</td>
<td>3.5&quot; LPS</td>
<td>$598</td>
<td>$698</td>
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<tr>
<td>760mb</td>
<td>5.25&quot;</td>
<td>$1398</td>
<td>$1498</td>
</tr>
<tr>
<td>1.2Gig</td>
<td>5.25&quot;</td>
<td>$1898</td>
<td>$1998</td>
</tr>
</tbody>
</table>

- **SyQuest 44MB & 88MB Removables**
  - 44MB Removable
    - $448.00
    - 19ms Access time
    - Both Drives include Cartridge
    - Dual AC Outlets, 40 Watt power supply
    - SCSI Select and 2 Year Warranty

- **88MB Removable**
  - $598.00
  - 19ms Access time
  - Both Drives include Cartridge
  - Dual AC Outlets, 40 Watt power supply
  - SCSI Select and 2 Year Warranty

**DAT Tape Backup**

- **ArDat 2.1 Gig Capability**
  - $1398
  - Up to 10 mb per minute backup time
  - Includes Soft Backup for Fast network and unattended backup capabilities

- **WangDat 2.1 Gig Capability**
  - $1498

- **NuDesign Dat 2.1 Gig capability**
  - **With SoftBackup**
    - $1198
  - **With Retrospect**
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  - Up to 2.1 Gig per tape
  - Our best buy ever on DAT!
  - Up to 10 mb per minute backup time
  - Available with a complete version of Retrospect for Fast Network and unattended backup capabilities.

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- **With Retrospect**
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Just look at these specifications...

- **10.9mb per minute average backup speed**- Gives you the ability to get the job done fast!
- **High speed random access**- This feature allows you to get to your data quickly (avail. w/Retrospect).
- **Four-head Direct-Read-After-Write data verification**- Assures that your data will be there when you need it.
- **Automatic built in head cleaner**- Allows your drive to remain clean and error free.
- **SCSI II compatible interface**- This gives your drive the ability to remain compatible for years to come.
- **45 watt switching power supply & a metal cabinet**- Assures that your drive is well protected and powered.
- **MTBF 50,000 hours**- Means that your NuDesign drive will handle years of usage.

**Available with Retrospect**- The first name in Macintosh backup software (a 248.00 value!)

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8 Bit with RasterOps 8XL $1798.00
24 Bit With RasterOps PaintBoard $2598.00
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- Includes 8 bit or 24 Bit Video board and cable
- 2 page display supports all Mac IIs, the SI, SE-30, and the LC

Sampo 20" Mono System $598.00
Grey Scale System $898.00
- The SAMPO is a high quality dual page display without the high cost!
- Includes 1 bit, or 8 bit Bit Video board and cable
- 2 page display supports all Mac IIs, the SI, SE-30, SE and the LC

NuDesign Full Page Grey Scale $398.00
- Plug compatible with SI, CI and Quadra (16 levels of Grey).
- Available with 1 bit interface card for all Mac IIs', SE-30, SE and LC $488.00.
- 20" Monitor manufactured by Sampo for Apollo/HP

Sony Trinitron Color System
20" $1798.00
W 8 Bit interface
24 Bit interface $2598.00

NuDesign Full Page Display
Grey Scale For CI, SI, Quadra $398
II, Ifx, FX, SE, SE-30, 1Bit $488

Umax UC-630 With PhotoShop $1148.00
- Transparency/Slide Scanner Option $798.00
- Automatic Document Feeder $498.00
- Rated four mice by MacUser (Dec '91)
- Rated fastest by MacUser (Dec '91)
- "Boasts the highest vertical resolution..." MacUser
- "Umage excels in speed and color accuracy" MacUser
- Includes Adobe Photoshop
- 8 1/2 x 14 Scanning area

Umax UC-1200S With PhotoShop $3498.00
- Transparency/Slide Scanner Option $898.00
- Incredible 1200 dpi scanning resolution recognizes 1 billion colors internally
- Single-pass design increases scanning speed
- Includes Adobe Photoshop

Sharp JX-320 With PhotoShop $1598.00
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- 8 1/2 x 11 Scanning area
- Includes Adobe Photoshop

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Circle 58 on reader service card
**On-Screen Presentation Enhancer:**

**Smoothie 1.02**

**PROS:** Converts presentations into anti-aliased screen shows; can display fonts on Macs where they're not installed. **CONS:** Can't play sounds; can't convert from QuickTime format.

**COMPANY:** Peirce Software (408/244-6554).

**REQUIRES:** Mac II; 2MB of RAM; color monitor; System 7.0; System 6.0.2 and 32-bit QuickDraw for run-time playback. **LIST PRICE:** $149.

**From Mottled to Model** Smoothie converts object-oriented slides (top) to smooth screen images.

**CD ROM—Access Accelerator**

**SpeedyCD 1.2.2**

**PROS:** Well-designed interface; good manual. **CONS:** Requires a lot of time and hard drive space to build its files; does not support High Sierra or ISO 9660 CD ROMs.

**COMPANY:** ShirtPocket Software (602/966-7667).

**REQUIRES:** Mac Plus; hard drive; CD ROM drive; System 6.0. **LIST PRICE:** $70.

**Owadays It Seems People Are Flocking to CD ROMs.** Compact discs are relatively cheap and can hold hundreds and hundreds of megabytes’ worth of data. But people are often disappointed to find that CD ROMs are turtles. The transfer rates are low, meaning data reads relatively slowly from the CD into RAM; and access times are slow. CD ROM drives are relatively slow to locate data on discs. SpeedyCD, a control panel device from ShirtPocket Software, addresses just the access-time problem by making a directory of all files on a CD and storing it on the startup volume. This effectively enables the CD to take advantage of the speedier access times of hard drives.

I expected to find that only the procedures that require frequent access to the file directory—operations such as Get Info and Find File—would show improvement. That is because these operations move the read/write head between the directory tracks to the data tracks in use. That file-system overhead is the time-glutton with CD ROMs.

To check my hypothesis I ran two tests. In the first, I opened a series of graphics and text files on the CD in the second test, I performed a bunch of Get Info operations. My results showed that files on the CD ROM open no faster with SpeedyCD than without it because there’s not much file-system overhead involved, usually just a single access. On the other hand, SpeedyCD improved speeds significantly in the Get Info test. Without SpeedyCD, the Finder took 103.12 seconds to perform a Get Info operation on a 350MB folder containing 3699 files and subfolders; with SpeedyCD it took only 14.93 seconds. Folders also opened faster with the utility installed, but because folders on CDs open fairly quickly anyway, the difference was not as noticeable.

Setting up the directory files on the hard drive takes some time and disk space. On a Macintosh IIfi running System 7, SpeedyCD built its directory files for a 568MB CD ROM (10,685 files and folders) in 27 seconds and used 2.5MB of hard drive space to save the directory databases. CD ROMs with less data require less time and space. Slower CPUs take longer to process the directories.

Because its directories are stored on the hard drive, SpeedyCD also lets you reorganize folders and files on the CD—something you ordinarily cannot do. SpeedyCD’s databases remember where the files actually are on the CD ROM, but let you arrange the directories as you like. I generally don’t refer repeatedly to the same set of CDs, and so the ability to reorganize the files and folders on them is not particularly useful (and besides, I don’t have the hard drive space to store all the databases for many CDs). In addition, many large reference collections on CD include their own fast browser utilities. On the other hand, operators of bulletin-board systems and school computer centers might find SpeedyCD very useful for organizing data for their users.

SpeedyCD has a great interface, all the right features, and a good manual (with a QuickStart card that says it all in two pages). Is it worth $70 to you? That depends. If you browse CD ROMs only briefly, or use CD ROMs that have their own internal navigation systems, SpeedyCD’s advantages are probably not worth the extra time and space it requires to build its files. But if you regularly browse through CD folders, especially if you use the same materials frequently, the investment can save you a lot of time.

—Tim Warner
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You don't need a photo lab to get output like this. A Phaser™ II SD color printer by Tektronix will do just fine. It's the only dye sublimation printer that gives you detailed, photorealistic images with crisp, clean text—that's TekColor Photofine technology. But you also get PostScript™ Level 2 and TekColor PS to match and adjust colors. Plus Pantone certification, networkability, a 24MHz RISC processor for speedy output, a $9995 price tag and a print cost of about $2 per page. All in one little machine. So much for that hut in the middle of the parking lot. Call the leader in color printers at 1-800-835-6100 Dept. 25C for a free output sample. Or call (503) 682-7450, ask for Document I222 and we'll send information by fax.

Tektronix
Computer Graphics

Children's vitamin sales
Expert Systems Aim to Capture the Specialized Knowledge of Experts

EXPERT SYSTEMS AIM TO CAPTURE the specialized knowledge (facts and rules) of one or more people (experts) and store it in a database, or knowledge base. Nonexperts can then use that knowledge base to solve problems as the experts would. Programs that do all this are called expert-system shells. Albathion Software's Entrypaq for the Macintosh is a low-end demonstration shell designed to teach you about expert systems by presenting working examples and by letting you build your own functioning knowledge bases.

Entrypaq includes a HyperCard-based expert shell for building and running simple knowledge bases, several example stacks containing working expert systems, and a reference manual. The training pack version includes a comprehensive, 400-page textbook, *Developing Expert Systems* (John Wiley & Sons, 1990). The book provides an introduction to expert-systems theory, practical instruction on building a working expert system, and a survey of current expert-systems technology. Entrypaq's reference manual complements the text nicely, describing the detailed operation of Entrypaq without delving into expert-systems theory or construction. Although you need no prior background in expert systems to understand the text or use the software, expect to put in a fair amount of time absorbing theory before you jump in and build your own knowledge base.

The program consists of a HyperCard template stack, augmented with specialized internal programming, that lets you construct a knowledge base of rules and unstructured facts. Entrypaq automatically clones the template stack when you create a new knowledge base. After you build the knowledge base, you use Entrypaq's built-in inference engine to run it. The inference engine accepts new facts about a target problem and integrates those facts with the knowledge base to produce “advice.” The stored rules test facts input by the user and generate intermediate conclusions, which then become the input to subsequent tests that produce further conclusions. The inference engine follows a chain of such tests to arrive at one or more conclusions.

The textbook example is an expert system that diagnoses problems in a beverage-canning production line. The rules cover situations that plant experts know cause problems, such as “If the tank has a pressure buildup THEN the tank needs maintenance immediately” and “If a component needs maintenance immediately AND the component is a critical component THEN the canning line needs shutdown immediately.” One of Entrypaq’s sample stacks is a complete implementation of this system.

Entrypaq’s rule processor and inference engine are implemented in HyperTalk, with complete source code supplied. Albathion also provides Entrypaq in a DOS PC implementation, based on the HyperCard clone Plus. You can export all or part of a knowledge base to a different knowledge base on either the Mac or DOS PC; Macintosh-based pictures and custom commands don’t transfer, however. You can also compile a knowledge base to significantly speed execution, although even after compiling, Entrypaq is much slower than more-expensive expert shells.

Slow performance and the HyperCard user interface rule out Entrypaq for practical expert-systems implementation. However, Entrypaq offers an excellent, inexpensive introduction. —MEL BECKMAN

Unix-Based Operating System

A/UX 3.0

**PROS:** System 7 compatible; QuickTime support; Quadra support; includes X Windows; simplified installation. **CONS:** Complex; slow by Unix workstation standards. **COMPANY:** Apple Computer. **REQUIRES:** Mac II with PMMU chips; 8MB of RAM; 80MB hard drive. **LIST PRICE:** $709.

Back when Steven Jobs was still in high school and the first mouse had yet to be born at SRI, computer scientists at AT&T’s Bell Laboratories invented a language called C and an operating system called Unix. Unix offered well-designed multiluser capabilities and a huge range of useful utilities built into the operating system itself, rather than into the applications, and it’s fair to characterize early PC operating systems (MS-DOS, for example) as pitifully underpowered subsets of Unix. Unix is so popular on networked minicomputers and workstations in universities and research institutes (it’s never been quite so significant in business) that Apple is obliged to offer a version. The challenge is daunting, since the Mac is the best current example of a graphical interface, and traditional Unix has a Stone Age, type-one-line-at-a-time text interface. A/UX 3.0 finally gets the Unix/Mac combination right.

If you have the right hardware (more on that later), and have A/UX installed, you can set up one disk partition for Unix activities and another for Mac files and switch back and forth between them effortlessly. I wrote a package of C files in Symbian’s Think C, saved them as text, and then opened them in the A/UX Text Editor and compiled them in the A/UX C compiler. A/UX’s true multitasking lets you open several Mac applications and have them running in the background as you log on to a network using Unix command windows on the Mac.

Basically, A/UX 3.0 has all the features of the 1992 standard Unix (AT&T System V, Release 2, Version 2; and Berkeley Software Distribution versions 4.2 and 4.3) running in command windows on the Mac desktop. Apple has even provided a dialog-driven system called Commando that lets you assemble a Unix command using a dialog box instead of remembering some of the intricacies of Unix syntax.

The right hardware, according to many users, is a Quadra 950 with at least 12MB of RAM and a 400MB hard drive; I used a Quadra 700 with an 80MB hard drive only with some difficulty. A/UX 3.0 is compatible with a much larger array of Apple hardware than earlier versions were—scanners, 21-inch displays, LaserWriters III and IIg, and CD ROMs. The CD ROM is responsible for a dramatic improvement in installing A/UX. Even on a 950, please note, A/UX is slow—three times slower than Unix on a midrange Sun workstation.

Unix is huge, including networking, accounting and administration software for networks, text processing, languages (not just C, but BASIC, FORTRAN, and even a version of SNOBOL). A/UX is even larger, including all this; the Command Shell system; the Commando feature for constructing Unix commands through dialog boxes; and the X Windows, MacX, and X11 systems. So A/UX is now installed from a CD ROM, with a slick installation protocol directed by a few mouse-clicks. An installation with most but not all A/UX files on the Quadra 700 took 80 minutes and 55MB of hard drive space.

If you need Unix capabilities and have hardware that can accommodate the demands of this very large operating system, you will find A/UX 3.0 easy to install and easy to use. Apple has done a good job of addressing the performance issues inherent in this hybrid-operating-system package and has done an excellent job of creating a Unix implementation a Macintosh user could actually like.—CHARLES SEITER
Perfect It.

MarkUp 2.0
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You've put a lot of work into that document. Now you just need to show it to a few people, get their comments, and it will be golden. Unfortunately, this usually means passing out copies to each reviewer in a group, then waiting to get the copies back, only to end up with a stack of papers covered with scribbled marks and little stick-on notes. So much for feedback.

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**Language That Teaches Programming**

**EdScheme 3.4**

**Pros:** Designed to teach painlessly; provides excellent error messages; enables user to create Mac-like programs.

**Cons:** Can't create stand-alone applications.

**Company:** Schemers

**List Price:** EdScheme $49.95; The Schemer's Guide $29.95

**Scheme, a dialect of the venerable LISP programming language, is designed to teach programming concepts to beginners. To the structure of LISP, Scheme's designers added a flexible lambda calculus, technical refinements from Algol, and turtle graphics from Logo. Many high schools and universities teach Scheme as a first programming language; some use it as an artificial-intelligence programming language. Scheme is clear and elegant, and it makes programming fun to learn. It forces students to think about computation and to develop good programming techniques. EdScheme, from Schemers, is an excellent interpreter for the Macintosh—and an excellent implementation.

In Scheme you construct programs experimentally, piece by piece. First, you write some code, then test-run it a couple of times, and then you write some more. Gradually a complete program emerges. Programming that way in an environment as friendly as EdScheme is not only educational, it’s downright enjoyable.

The company targets EdScheme for the beginning programmer; for example, it uses different colors to indicate different expression categories. The Mac-like editor even suggests proper indentation and helps you keep track of which nested parenthetical statement you're in (that's an innovation I would have loved when I first learned LISP ten years ago). The comprehensive error messages teach students what they did wrong. And turtle graphics make it easy to write interesting Scheme programs right from the start.

EdScheme couples power with its ease of use. It includes 64-bit floating-point arithmetic, the ability to extend the language's syntax through macros, and a complete set of file-handling facilities. EdScheme also has support for advanced programming techniques such as delayed evaluation, streams, continuations, and environments. Schemers' excellent reference guide explains all these features thoroughly. The language doesn’t support the entire Macintosh Toolbox, but instead includes the basic elements a beginning programmer is most likely to need. The only thing I miss is the ability to create stand-alone applications.

Nevertheless, it would be a mistake to label EdScheme a toy language. The program comes with source code for a game that makes use of windows, dialog boxes, menus, icons, and graphics—it's very nearly a full-fledged Macintosh application. And you can look at, and learn from, the code.

The version I tested, EdScheme 3.4, implements a subset of the standard Scheme. The publisher says that version 4.0, which is expected to ship in the fall of 1992, will be 100 percent compliant with the standard.

EdScheme can run from a single floppy drive. In a school environment, where low-end Macintoshes outnumber the fully loaded models, this is a good feature. In addition to the reference guide, you can buy a companion textbook, *The Schemer's Guide* (Schemers, 1990; $29.95). The book is written for classroom use, but you can use it to teach yourself programming. The whole package costs only $80. It’s a bargain that will give a budding programmer a good introduction to the field. The arcane art of C++ is better learned from a foundation of good programming techniques; EdScheme is an excellent tool for learning those techniques.—Bruce Scheiner

**Professional Office Management Software**

**Office Wiz 1.1**

**Pros:** Several users can work on common cases and share calendar and case-status information.

**Cons:** Single-user version is overkill; lengthy setup time and steep learning curve; overpriced.

**Company:** Oryx Associates (415/563-9971).

**Requires:** Mac LC; 4MB of RAM; hard drive; System 6.0. **List Price:** $695; multiuser version $1495.

**Office Wiz 1.1 is a 4th Dimension-based program for managing tasks, calendars, accounts, and time sheets for a service-oriented company. It comes with a sample data file geared toward a law office, along with a more generic data file for other types of users. Although adaptable, the program is clearly designed with attorneys in mind.

Office Wiz obviously represents a substantial programming effort. It attempts to replace your calendar, project- and contact-management, and accounting software with one integrated solution. It can run as a multiuser application, so data pertaining to all of its separate functions can be entered from any Macintosh on a network into a data file shared by all office employees.

Integration of all these functions has its price, and the principal price here is a lack of breadth in the individual modules (the second cost is a substantial investment of setup time). For example, the calendar is simply a list of dates, places, and the initials of relevant employees. And while Office Wiz contains certain general ledger and accounting features, it does not have payroll capability.

Office Wiz also suffers from some interface problems that detract from its functionality. To be fair, most of these are problems inherent to 4th Dimension applications and can't be programmed around. Most notably, you can have only one window open at a time. Oryx Associates tries to circumvent this limitation by adding on-screen buttons and menus so you can jump from one module to another. Office Wiz does an admirable job of ensuring that you don't enter the initials for a nonexistent timekeeper or add a new task for a client that doesn't exist. Even so, it is clumsy to constantly jumping around to different screens to add bits of information pertaining to a single case.

Office Wiz operates from the main screen, which acts as a control center for launching the user into different areas of the management system. The five main areas are calendar, billing, status, project, and office. Most of the data entry screens default to list view—another 4th Dimension interface convention. Double-clicking on any entry in the list shows the record in full. When you're in list view, buttons along the bottom of the screen provide a quick way to show all records or some (such as this week's appointments). The Next Section menu lists the various functional areas to which you can jump—from purchase orders to calendaring, for example.

Data entry verification in Office Wiz is fairly robust but not perfect. If you try to bill an invoice to a client who doesn't exist in the database you receive a prompt to add a new client. On the other hand, I was able to add myself as an employee twice with the same initials and Social Security number, a potentially hazardous flaw. Some entry screens that allow the user to pass the cost of goods to the client do not always calculate immediately.

On the whole, Office Wiz is busy. It has too many windows and too many settings to worry about. If your office absolutely requires an integrated, multiuser management solution, then be prepared to spend a lot of time setting up the software and learning to navigate it. For maximum return on your investment in the software, plan to hire Oryx Associates to further customize the software for your particular office needs.—Bill Davies
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Circle 1 on reader service card
REVIEWS

SuperDuper Utility

**PROS:** Simple; fast; progress indicator; optionally serializes copies. **CONS:** Proprietary.

**REQUIRES:** Mac Plus; System 6.0.2. **LIST PRICE:** $79.

A NYONE WHO HAS EVER TRIED duplicating even a few floppies with the Finder on a single-drive Mac will tell you that there's got to be a better way. There is. NeoConcepts' SuperDuper is a simple disk-duplication utility that deftly sidesteps the frustrating floppy shuffle. Unfortunately for NeoConcepts, the dance floor is crowded with similar programs available for considerably less money.

Upon launching the SuperDuper application, you insert the original disk at the prompt; it is read into memory in a single pass (provided your Mac has sufficient memory—about 1MB for a double-sided disk), then ejected. At this point you can either begin making copies or save an image of the original disk to a hard drive for easy loading in the future. Unfortunately, image files are not compressed, so the image of an empty double-sided disk takes up as much space as a full one: 820K. Even more disappointing is that SuperDuper images are not compatible with Disk Copy, the utility used by Apple to distribute software to its developers.

To make copies once an original disk or image has been read into memory, just feed floppies into the drive when prompted. This operation allows you to keep working in the background, but unfortunately there's no safeguard against overwriting existing data.

Animated disk icons inform you of the progress as SuperDuper automatically reformats and verifies while writing an exact, sector-by-sector duplicate of the original. SuperDuper is smart enough not to attempt copying high-density (1.44MB) disks to single-sided (400K) or double-sided (800K) disks, and vice versa. You can, however, copy the contents of a single-sided disk to a double-sided disk as well, as the other way around. SuperDuper simply reformats as it duplicates. When finished, the copy disk is ejected, and an on-screen counter increases by one. If SuperDuper encounters a problem, the disk isn't ejected until you acknowledge the alert box that appears—a safeguard that prevents you from accidentally putting the reject disk in the pile of good copies.

On my Mac IIci, copying a 1.44MB disk takes approximately 1 minute, 40 seconds; an 800K disk requires 54 seconds. Ironically, SuperDuper runs more slowly on the IIFx and Quadras because SuperDuper can't address the hardware directly.

While everyday users can benefit from SuperDuper's basic feature set, there is one option that appeals primarily to shareware or public-domain distributors. SuperDuper can automatically number disks by replacing a unique string of characters with a serial number. The characters to be replaced can reside in a Get Info window or an About box, or anywhere else on your original disk.

If you're sick of duplicating disks with the Finder, SuperDuper is an excellent alternative, but it's neither the best nor the least expensive. Apple's Disk Copy utility is widely available for free to the developer community, and DiskDup from Roger D. Bates (10899 N.W. Valley Vista Rd., Hillsboro, OR 97124) works similarly, has more features and better performance, and is available for $30 as shareware.

—Owen W. Linzmayer

StatView 4.0

**PROS:** Powerful statistics capabilities; good tools for enhancing presentations; templates for repeat analyses. **CONS:** Weak data manipulation; Results window grows awkwardly; limited ANOVA support. **COMPANY:** Abacus Concepts (810/540-1943). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive. **SYSTEM:** 6.0.4. **LIST PRICE:** $595.

STATVIEW 4.0, THE NEW VERSION of the popular statistics package, has a strong selection of statistical tests and a passable Mac interface, and enables you to prepare output for publication or slides from within the program. You can adjust most aspects of a display except the data—font, size, shading, color, and so on. If this isn't enough, simple drawing tools let you add text, graphic elements such as circles and arrows, and accents such as drop shadows.

StatView's output is dynamic—change any number, and all related presentations recalculate using the new data. A slick Split By tool lets you show the underlying structure of data in any analysis or graph. For example, a graph of blood cholesterol levels can be divided to show the data separately by gender, by age group, or by both.

Templates let you record complete analyses so you can use them repeatedly or share them with colleagues. (A library of templates gets you started.) You can set up templates to record exactly how a journal wants your graphs to look. Then when it's time to submit results to that publication, you choose the data, and the graphs are done right every time. With canned analyses in templates, a professional statistician could have a lab technician repeat an analysis each time a new sample is measured.

Unfortunately, the template can't judge whether the data is appropriate or well conditioned for that analysis. The results might then be misleading or just plain wrong.

When you enter or analyze data in StatView's spreadsheetlike form, the top 12 rows contain format and data-type controls and descriptive statistics, such as mean and standard deviation. It's handy to have them visible, but you can hide them when they're not needed. Data can be easily imported or exported as text delimited by tabs, commas, or another symbol you designate.

Despite its many strengths, I found StatView annoying to use. The ANOVA capabilities are limited, presumably so as not to compete with Abacus's comprehensive Superanova product. StatView also lacks 3-D graphs and cross-referencing among outputs—for example, you can't brush or slice scatterplots, and you can't click on an outlier data point to display its identity or value as you can in Data Description's Data Desk or SAS's JMP. Unlike many other programs, StatView can't automatically restructure data into nested form—you have to cut and paste the pieces by hand. Also StatView puts all output, graphs and tables, into a giant, scrolling analysis view. It's so hard to find a particular Result in this haystack that there's a Results browser to help you.

StatView offers a nice mix of statistical features and operating convenience, coupled with outstanding control over printed output. Its limited exploratory capabilities and many annoyances keep it from earning top marks.—Philip Stein

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REVIEWS

Easy Alarms 2.0.3

**PROS:** Lots of good features, including sound-recording and scripting. **CONS:** Complicated.

**COMPANY:** Essential Software (914/889-8365).

**REQUIRES:** Mac Plus; System 6.0.5. Recommended: Hard drive. **LIST PRICE:** $99; five users $299; ten users $499.

**ASY ALARMS IS A CALENDAR, REMINDER, AND TO-DO LIST PROGRAM WITH A PLETHORA OF FEATURES, SOME ESSENTIAL TO ANY CALENDAR PROGRAM THAT ASPIRES TO BE MORE THAN BARE BONES, OTHERS TRULY ELABORATE.**

Easy Alarms has two main windows, the calendar window and the list window. When you open a calendar, the calendar window appears, sized and positioned as it was when last closed, and displaying the current month, with events appearing in the small day boxes. The formats of events, and the fonts and styles of most of the calendar, can be changed, as can all aspects of the colors.

The list window shows a list of dates and activities. The range of dates displayed can include a single day, a week, a month, or a more complex option from the Custom View dialog box. Unlike in the calendar window, within the list window you can easily cut, copy, and paste your reminders. Unfortunately, the text doesn't wrap in either the calendar window or the list window, so if you use long reminders, you have to increase the window size or reduce the text size. Fortunately, you can do both.

Easy Alarms has plenty of nice features. The windows can be resized, and their position is retained, centered on the same spot. You can use any of your system sounds as alarms, or record your own. There are lots of printing options, including daily and weekly planners, and monthly calendars.

You can also block reminders from interrupting specific applications; a blinking Easy Alarms icon on the Apple menu icon shows you that the reminder exists.

The scripting function lets you create reminders for a wide range of facts, including shutting down the Mac, launching a program at a certain time, or making the screen flash when the text of the reminder appears. Easy Alarms also runs on a network, so you can send reminders, including both sounds and scripts, to other users. (Yes, you can make someone else's computer flash a thousand times, and no, they won't necessarily be able to trace it to you.)

My only problem with Easy Alarms is that it's too complex. There are about four ways to do some things. Opening a list window is a matter of double-clicking on a day box, or clicking and holding the mouse button and choosing Stay Open from a pop-up menu, or option-clicking on a day, or selecting a day and hitting return. There are at least as many ways to get a reminder dialog box. Is it flexibility, or is it just complicated?

The time-contingent menus offer all kinds of possibilities, but they're frequently presented in a bit of a patchwork quilt. For example, the Snooze button offers a menu of 1 minute, 5 minutes, 10 minutes, and so on, until you reach Other. You can then weave your way through two more menus, and your choices are still limited. A single menu that allows you to enter a number for minutes, hours, days, weeks, and so on, would be simpler and more practical.

I don't like the manual, but that is mostly because I don't like being patronized. See page 16—... choose 'Open Visible Calendars on Launch' from the File menu. Remember what this will do? It's not a confusing command—and is explained three pages earlier! Still, some commands seemed less than instinctive. I admit, I had to search for the meaning of "Late Limit—Forever." Perhaps I'm too critical—flexibility, options, and choices are overall positive characteristics. And overall, Easy Alarms is a fine, useful program. If you want a calendar that can do more than sound an alarm, this may be the calendar for you.

—WENDY SHARP

Educational Adventure Games

Eco-Adventures in the Oceans 1.0

**PROS:** Significant topics; lots of information; Rainforest package includes excellent book. **CONS:** Clunky navigation; sudden-death surprises typical of adventure games. **COMPANY:** Chariot Software Group (619/298-0202). **REQUIRES:** Mac Plus; second disk drive; System 6.0.2. For color: Mac II; 2MB of RAM; hard drive. **LIST PRICE:** $49.95; color version $59.95.

**THOUGH I DON'T USUALLY CARE much for so-called adventure games, I enjoyed these two.** In each, Chariot takes on the difficult task of expressing the richness of a vast ecology in a simple educational game—with creditable results.

In both games, you are an explorer who's given a mission; typically, it's to find a certain animal. While searching you can score points by pursuing other goals as well, like stopping logging or cleaning up an oil spill. The main screen shows a scene of your whereabouts, with icons you click on to look, touch, examine, or photograph; a button to summon your guide, who provides vital information; a text box; a map button; and directional navigation buttons. It's best to move methodically: click on a direction to move one square, then click on the guide button for hints and warnings, then click on Map to see where you are, then click to return to the main screen. If the guide says, for example, "the tree kangaroo is close by, to the southeast," you try moving a square south, a square east, and so on—checking the map and consulting the guide frequently.

Sometimes you meet disaster. In Oceans, the nasty Portuguese man-of-war jellyfish may appear; the ensuing sequence, where your hand swells up horribly and you die, is gross enough to delight a sixth-grader. In Rainforest, a boa constrictor is apt to drop suddenly from a tree—that's all—next game. Save often. Both games have lots of pitfalls and predators.

You're told from the start that this is an imaginary landscape: a rainforest that combines features not found together in nature, or an ocean that's a composite of all the world's oceans. At first it's disconcerting to meet Pygmies in South America; you get used to this scheme, but I think it could confuse some players about the facts.

Unlike typical adventure games, these two give you only a short time for your mission. Then you return to headquarters (whether you've attained your goal or not) to face a press conference—a multiple-choice quiz. I like this approach; it's nice to get out of the forest (or ocean), and the questions are interesting.

Rainforest comes with a first-rate book, The Rainforest Book, by Scott Lewis with the National Resources Defense Council. This smallish, well-written paperback is packed with information (but no maps and charts to help make sense of it all).

Both games are good. I prefer Rainforest (I survived longer there, and the animal sounds are lovely), it's probably the one to choose if you're getting just one, because of the book.

—FELICITY O'MEARA
Red Baron

PROS: Entertaining format; superior graphics.

CONS: Too many dialog boxes between games.

REQUIREMENTS: Mac LC; 2MB of RAM (4MB for System 7); hard drive; System 6.0.5. Recommended: Joystick. LIST PRICE: $69.95.

Red Baron, the first installment in Dynamix's Great War Planes series, has something for every aspiring ace. The game combines the realism of a flight simulator with the romance of history. In addition, it has outstanding graphics and enough realistic dogfighting to keep you playing for hours.

The 220-page manual is a history lover's dream—it's composed mostly of factual anecdotes and technical information about the World War I fighters, including a chapter on aerial tactics. Only the last 50 pages cover how to play the game.

Red Baron is a one-player game that has two modes of play. You can either enlist for the duration of WWI in career mode or fly a single mission. In the single-mission mode, you choose one of 10 missions, from tracking a zeppelin to engaging in one-on-one battles with famous WWI aces such as Manfred von Richthofen (the Red Baron). In single-mission mode, you adjust game difficulty on the Realism Panel, whose 11 settings affect factors like weather conditions, pilot blackouts, and navigation. The more realism you choose, the more difficult you make the mission. (Practice single missions to hone your skills before signing up for a career.)

Career mode challenges your skill because it has all realism factors turned off. You enlist in either the German or the English air force in December 1915 and continue until you're killed or the war ends. The 40 missions vary from routine reconnaissance to battles against the greatest aces of the war. As your victories mount, you receive promotions, command your own squadrons, and win medals.

To control your WWI fighter, you use a joystick, mouse, or the keyboard. I prefer a joystick, but if you don't have one, try the keyboard. The mouse's controls are the least precise, especially in a dogfight. You have to think three-dimensionally. An enemy plane can attack from any direction, and usually does—especially at higher levels of play—so you must keep a constant vigil on the skies all around your aircraft. To help you out, Red Baron offers six viewing angles from within the cockpit.

The one, minor complaint I have with Red Baron is the game's speed. If you play with MultiFinder turned on, the game usually crashes; if you're running System 7, it runs a little slowly. You can speed up the game by lowering the level of detail in the graphics. If the game still runs slowly, try moving the time scale to the maximum setting. If you change these settings, even on an LC the game moves along at a brisk pace.

One other small annoyance is that you have to negotiate five dialog boxes before getting to the simulation.

But these minor flaws shouldn't stop you from going out and buying Red Baron, one of the top military-flight-simulation games for the Macintosh.

Andrew Miller

GeoQuery 3.02

PROS: Quick geographical analysis of data.

CONS: Uninspired mapping capabilities.


Organizing information geographically is often the best way to understand it. GeoQuery, a custom-map generator and data-analysis program, lets you view database files and explore their relationships in geographical context. GeoQuery produces "pushpin" maps, with symbols representing database records plotted on the map; and shaded maps, with patterns and colors representing data values. In addition, GeoQuery serves as a front end to your database. Clicking on a map's data points displays individual records. Clicking on map regions gives access to data summaries and reports on selected records.

GeoQuery comes with atlas files for the United States and 11 major metropolitan areas. The program also includes files for plotting interstate highways, and a selection of data files from the 1988 State & County Handbook and the 1990 Census.

Although GeoQuery produces good-looking custom maps, the program lacks the cartographic versatility of other products, such as Atlas Pro. GeoQuery's U.S. atlas is adequate at the state level but lacks detail when cropped and scaled for localities. The metropolitan-area atlases offer better resolution, but if you need to map rural areas, you must look to the county atlases that are sold separately. (Files from different county atlases can't always be combined, so study your requirements carefully.) Atlases for Areas of Dominant Influence, Designated Market Areas, and Metropolitan Statistical Areas, used to determine TV ratings and to rank urban areas, are also available.

GeoQuery's real strength is data analysis.

It makes no provision for keyboard data entry, but it accepts records from any spreadsheet or database, so long as they're in tab-delimited format and include zip codes. GeoQuery uses zip codes to plot pushpin data points and to count records for shaded maps; however, data lacking zip code information can be ascribed to regions by name.

Once records are plotted, GeoQuery can sort data according to geographical criteria (say, records in a state) and apply those criteria to any database field. How many customers within 50 miles of Atlanta need a service call? To find out, drag a circular region and sort the collected records.

When you click on pushpins, the displayed record is a local copy, not the entry in the actual database file. However, the results from geographic sorts can be exported to spreadsheets or statistics programs for further analysis. System 7 enables GeoQuery to subscribe to database programs and receive automatic record updates. The program can also publish updated maps to page-layout or presentation packages.

At times, GeoQuery is a little unforgiving—for instance, you can't undo if you crop a map incorrectly—but overall, the program operates competently and efficiently. GeoQuery's value lies in the correlation of data and geography, and often a little geographical perspective is just the insight you need.

Carlos Domingo Martinez
Sharing files between PCs and Macs is no longer a luxury; it is a necessity. But it doesn’t have to be a foreign concept.

Lots of products on the market claim to solve your problems of sharing files across platforms, but take a careful look before you buy. Some, such as disk mounting utilities only give you a partial solution; and when your file appears on screen, you get a big surprise. You can’t read a word of it - not your text, not your formatting - it looks like garbage.

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EVERYONE KNOWS WHAT CLIP art is: ready-to-spread drawings on a disk that even the most unartistic Cub Scout-newsletter editor can slap into PageMaker for a little visual spice.

But times have changed. We're becoming a generation of forward-thinking multimedia who can't sit through a business presentation unless it looks like MTV—sound track thudding, animated growth curves twitching, sound effects cracking. So to help make your Mac just as noisy as the pros', a new product category has been created: audio clip art, for want of a better term. Some of these collections require a CD-ROM player connected to your Mac. Others are clearly designed more for fun than for serious sound-track making. But here they all are: the clangorous, the harmonious, and the totally bizarre.

Online Services

"WHOAI, YOU'RE THINKING. "WHAT ARE dial-up information services doing in a sounds review?"

Turns out, America Online (AOL), CompuServe, and other modem-accessible services are outstanding and economical sources of digitized sounds. I discovered them the night I was trying to make a demo tape of a song from a musical, in which a subway car is supposed to crash. How on earth would I get such a recording (other than waiting around the New York City subway system with a microphone)? I went onto AOL and searched for "brakes or bomb or crash or explosion," found a dozen possibilities, read their descriptions, and wound up combining a pair of them to produce the world's most realistic subway-car accident. On AOL ($4 per evening hour), there are 3000 Mac-ready audio clips; CompuServe ($12.80 per hour) has 1200 awaiting you. No disk-based source gives you that many sounds to choose from. An hour of downloading is about an 800K disk's worth of sounds.

To search for sounds on AOL, press F3, type QuickFinder (press return), and then type a keyword for the sound you're looking for (like squeak or explosion). Using CompuServe Information Manager, double-click as follows: Mac Forums, Entertainment Forum, Browse Libraries, then the sound category you want (TV, Sci-Fi, Movie, Other). Use the Libraries menu to search.

SoundClips

THESE NINE FLOPPY DISKS (OLDUVAI, $149) bring you 300 digitized sounds: office (typewriter, fax machine), human (laugh, cough, hiccup), environmental (traffic, machinery), and so on.

There was no standard Mac sound format (the sonic equivalent of a text file) until very recently. Instead, sounds come in a variety of competing formats (HyperCard, AIFF, SoundEdit, and so on); fortunately, SoundClips are normal System 7 sounds (double-click on the sound file icon to play). That makes finding, organizing, and listening to them easy. Furthermore, SoundClips have been recorded at the highest quality setting on the Mac, what wireheads call "22kHz." (Recordings in the other popular setting, 11kHz, take up less disk space but sound tinny.)

Unfortunately, the recordings themselves are not exactly top-drawer; a friend of mine with her eyes closed couldn't identify many of them. Another batch is obviously homemade: spacey synthesizer blurs, people uttering words, doors opening, and so on. But if your Mac has a microphone (or if you have a Macromedia Mac Recorder), you can do those sounds yourself.

Kaboom for Macintosh

CORPORATE PRESENTERS AND MULTI-MEDIA-HEADS: skip this one. Kaboom is 150 sounds designed exclusively for use in the Mac environment: error beeps, start-up sounds, and so on (Nova Development Corporation, $49.95). As such, Kaboom comes complete with a thinly disguised version of SoundMaster, the shareware control panel that lets you assign any sound to any Macintosh event: inserting or ejecting a disk, opening a window, emptying the Trash, and so on.

Kaboom's sounds are polished and consistently realistic, despite the fact that most were recorded at the lower-quality 11kHz. The only one that I couldn't identify by listening was "body falling on car hood" (which may say less about the recording than about my sheltered Ohio upbringing). With SoundMaster's help, you can have applause when you turn on the Mac, glass breaking when you insert a disk, and any of various "I Love Lucy" snippets when you shut down for the day. I also found that the phone rings, PA announcements, and crying babies are useful for tactfully getting off the phone.

Mr. Sound FX

YOU KNOW THAT GUY IN THE POLICE Academy movies who's always making funny sound effects with his mouth? Now you can have 75 of his warbles, whoops, and impersonations coming out of your Mac speaker (Prosonus, $29.95).

Michael Winslow certainly does a better adding machine and bottle rocket than I do. But since very few of his sounds sound more like the real thing than the real thing, it's hard to dismiss the teeny-weeny question that hounds your consciousness: Er... what's the point? On the other hand, there are also 75 non-Michael Winslow sounds, most recorded at 22kHz and perfectly useful (even if they don't have the gale-force whimsy of Kaboom). And when Winslow stops trying to out-moo real cows, he comes up with some goofball treasures, like the utterly inexplicable dialog snippet: "Mr. McEnroe—" "WHAT?!!" If you can figure out what to do with this stuff, it's certainly priced low enough. Maybe the inclusion of the redoubtable SoundMaster will give you some ideas.

Star Trek AudioClips

THE "STAR TREK" ZEALOTS at Sound Source Unlimited have gone to an unbelievable amount of trouble to assemble, edit, and secure the rights for these sounds, which are lovingly digitized from the original Paramount master reels and recorded with 22kHz clarity. There are two volumes of "Star Trek" (66 sounds each; $39.95); two of "Star Trek: The Next Generation" continues.

Where to get clip art

for the ears—and why

MACWORLD November 1992 187
(about 80 sounds per set; $69.95); and even a disk of 2001: A Space Odyssey clips (85 sounds; $69.95).

In addition to classic lines like "I’m a doctor, not a mechanic!" you get a hearty sampling of classic sound effects (tri-corder, bulkhead door hissing, transport) and hilariously hokey music cues. Choicest of all are the dialog excerpts, which have been selected according to their applicability to working on the Mac. Using the included SoundMaster (surprise!), you can make Bones say "He’s dead, Jim!" when you insert a bad disk, or "His brain is gone!" when you empty the Trash. Or, for a spine tingle when you shut down the Mac, program the disturbingly mellow voice of HAL (from 2001) to say: "I know that you were planning to disconnect me."

Cool Mac Sounds

IT’S A BOOK! IT’S A DISK! IT’S A BOOK-DISK combo! Author Craig O’Donnell is as knowledgeable as they come about desktop Mac sounds (Hayden, 150 pages). Maybe too knowledgeable: "The output is 8V peak-to-peak, source impedance 32 ohms" says the introduction (without ever defining V, peak-to-peak, source impedance, or ohms). For a topic as jargon-heavy as audio, a glossary would be welcome.

There are 50 sounds on the disk—some good, some homemade-sounding. Then there’s a collection of sound-related shareware (including, inevitably, SoundMaster) that lets you stick sounds anywhere they can be stuck. If you’re an advanced Mac audiophile and you like your shareware in one tidy package, $19.95 is entirely reasonable.

Sound Machine

SINCE SOUNDS TAKE UP A LOT OF DISK space, it’s no surprise that the serious sound collections come on CD ROMs. To play them, you need a CD ROM player (about $400).

Sound Machine (Educorp Computer Services, $49.95) is another assemblage of sounds and utilities from the nebulous world of shareware. Because it’s a collection of Educorp’s individual floppy-disk titles, you get a bunch of folders, each containing a few sounds, plus—all together now!—SoundMaster. The result: 30 copies of SoundMaster and disorganization. The curator’s taste leans heavily toward the Star Wars/Monty Python school. Many of the TV-show sounds seem to have been recorded from an awful-sounding TV speaker (without permission, I’m told). Some of them, like the "Simpsons" recordings, were recorded at a barely intelligible 7.5kHz quality. (There’s about 70MB of stuff on the 600MB CD ROM, so don’t try to convince me that the sounds were recorded at the poorer quality to save space.) I don’t mean to imply that there aren’t gems, but there’s a lot of chalk to dig through first (including multimegabytes of obsolete VideoWorks, StudioSession, and even MusicWorks files). Too bad the Search command of the HyperCard index stack doesn’t work.

Desktop Sounds

THIS CD ROM (Q UP ARTS, $99.95) IS MORE like it: 400 professionally recorded 22kHz sound effects in neatly labeled folders: Aircraft, Automotive, Combat, Destruction, Industrial, Sports, Small Machinery, and so on. (Did your eyebrows react to the Rambo-nic maleness of the topics as much as mine did?) A HyperCard stack lets you browse and hear the sounds, which are described in sometimes weird detail ("Gurgling, snorting hips happen happily frolicking"). You’re often given several different recordings of the same thing—appliance comes in several flavors with different-size groups of varying enthusiasms, for example.

Instead of general desktop silliness (like Kaboom), this CD ROM is designed for presentation or animation work. Once again, though, you have to wonder why the 600MB CD contains only 27MB of stuff. C’mon, Q up... fill ‘er up!

SoundFX

AUDIO PROFESSIONALS ARE PROBABLY half finished with their angry letters to the editor, asking, "What about 16-bit stereo sounds?" I readily admit that I have left those CD ROMs out of this review—the ones that require a $1000 stereo sound board installed in the Mac.

This pricey CD ROM (Educorp Computer Services, $179), however, strikes a clever balance: it includes each of its 250 sounds in both Mac-playable and stereo-playback-board formats. The sounds, and the variety, are outstanding. I especially liked the folder full of "environments": ambient background noise from a baseball game, a shareholders’ meeting, an accident scene, and so on. They’re long, too, some lasting more than a minute. Actually, I haven’t a quibble in the world, except that I wish there were more; in today’s dog-eat-dog multimedia world, 250 sounds, no matter how stellar, won’t get you very far.

The CD ROMs reviewed here don’t exhaust Educorp’s list of sound collections, by the way; call for a catalog. Their upcoming A Zillion Sounds disc should be the sound-monger’s fantasy.

ClipMedia

IT’S A CD FROM MACROMEDIA THAT’S crammed full of clip art, clip sounds, clip music, and (soundless) clip movies: 624MB in all. Each of the 250 sounds is included in four different formats: two 11kHz formats (which is a little silly, because you could easily convert one format to another) and two 22kHz stereo formats (one of which requires a playback board). The selection is great—four kinds of crowd noise, two different camera clicks, the entire set of telephone touch-tones—but many individual clips were recorded too softly. Don’t get this CD ROM for the sounds; but if you can afford to spend $395 for its other offerings, consider the sounds a bonus.

The Upshot

CLIP SOUNDS COME IN TWO VARIETIES: one for people who like to play with sounds while working at the Mac, and another for people who need hard-core FX for multimedia work. The playful group, I think, will be happiest with Kaboom. (Unless they’re Trekkies. You know who you are.)

In the more serious category, the most useful collection (that doesn’t require a stereo NuBus board) is Desktop Sounds. It’s a shame that its files aren’t in standard System 7 sound format (as SoundClips and Star Trek are), where you just double-click on an icon to play the sound. But I suppose any format would do for the presentation maker who’s desperate for a good hiccup.

By Any Other Name

SoundMaster, the clever control panel that lets you attach sounds to various Mac events, crops up under various pseudonyms in sound-effects collections.

This Upshot

See Where to Buy for contact information.

Contributing editor DAVID POGUE wrote Macs for Dummies (IDG Books Worldwide, 1992). He’s grateful that clip odors have not yet become fashionable.
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4:31 PM

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HARDWARE

Colorstream/DS
A color dye-sublimation printer that uses ROM boards and comes with a 24-bit PostScript Level 1 interpreter called PowerPage. The printer has two ROM board slots that can be filled with printer emulation boards, font boards, and other functional boards as they are developed in the future. Includes PAGE technology, which allows a variety of computers running different platforms to be connected to the printer at the same time. PAGE also scans the ports for print data and automatically switches to the proper emulation. The product uses AMD's 29050 RISC microprocessor, which has an FPU on-board, and it comes with AppleTalk, parallel, RS-232C, and SCSI ports. $1,900. Mitsubishi International Corp., 408/980-1100; fax 408/980-8891.

ColorTone
A continuous-tone 300-dpi dye-sublimation color printer that has built-in AppleTalk and EtherTalk support, comes with 10MB of RAM, and has a 100MB internal hard drive that supports font storage and virtual memory. The device uses GCC's proprietary controller built around an AMD 29000-series RISC-based processor and a PhoenixPage PostScript-compatible interpreter. The printer can take three-color and four-color printer cartridges. $10,999. GCC Technologies, 617/980-0888; fax 617/890-0822.

DaynaPort E/II-3
A NuBus Ethernet board that comes equipped with RI-45, BNC, and AUI ports and autoselects technology that automatically configures the board for whatever type of media it is connected to—thin, thick, or 10BaseT cable systems. The product comes with 64K of RAM and supports a variety of protocols, including AppleTalk Phase 1 and Phase 2, TCP/IP, DECnet, and OSI. $119. Dayna Communications, 801/531-0600; fax 801/359-9135.

DaynaPort E/II-3
DesignMate
A pen plotter that makes prints in up to eight colors in sizes A through D at a resolution of 0.0005 inch, or 2032 steps per inch. The device uses a brushless motor, has an eight-pen turret, and comes with 30K of RAM. CalComp says it can plot at speeds up to 20 inches per second and has a MTBF rate of over 6000 hours. Other features in-
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Pocket Port Fax Modem
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Power Package
An upgrade package for PowerBooks that includes a Go-B 80 internal 85MB hard drive from Quantum Corporation, a 4MB or 6MB memory board from Advantage Memory Corporation, and a 5600-bps send and 4800-bps receive pocket fax modem with V.22bis compression. The package also includes a nylon portfolio bag from Targus. $1199. Relray Technology, 510/471-6112; fax 510/471-6267.

PrecisionColor 8XJ
An accelerated, 8-bit color, two-page NuBus board for the Mac II and above supports monitors with resolutions of up to 1152 by 882 dpi. The board is compatible with all monitors from Radius and Apple and a variety of monitors from third-party vendors. $999. Radius, 408/434-1010, 800/227-2795; fax 408/434-0770.

RasterOps/20 Multimode
A multiple-frequency color display that uses Hitachi technology to provide support for resolutions from 640 by 480 pixels to 1024 by 768 pixels. The monitor can be used with a Macintosh or with an IBM PC with a VGA graphics adapter. It supports vertical refresh rates of 50Hz to 120Hz and can be used with any RasterOps display board as well as a variety of boards from other vendors. Berkeley Systems' After Dark 2.0v screen-saver software is included. $2499. RasterOps, 408/562-4200, 800/468-7600; fax 408/562-4065.

RenderServer
A self-contained network peripheral designed to speed 3-D rendering with an 8600 processor running at 40MHz, 8MB of RAM, on-board Ethernet, a 200MB SCSI hard drive, and a 1.44MB floppy drive. It comes bundled with PixelMacRenderMan 3.2, VideoBits' RayCar ray tracer, and Lawrence Berkeley Laboratories' Radiance ray-tracing renderer. Torque's RenderManager software and Trueplex multi processor system let users send native Mac files to any of the included renderers automatically over Ethernet. $11,500. Torque Systems, 415/313-1200; fax 415/321-1298.

SilverView Pro
A 21-inch landscape grayscale or monochrome high-resolution monitor that allows a user to see two full-size 8-1/2-by-11-inch pages on screen. The monitor displays 1152 by 870 pixels with a resolution of 72 dpi, has a refresh rate of 75Hz, and supports the SE/30, Mac II, and Quadra series. The monitor's emissions meet the Swedish guidelines for ELF and VLF magnetic emissions. $1295. With OCL antiglare, antistatic panel $1495. NuBus gray-scale board $545; NuBus or PDS monochrome board $365. Sigma Designs, 510/770-0100, 800/945-8086; fax 510/770-2640.

ThunderStorm Accelerator for Adobe Photoshop
A NuBus board based on two programmable Digital Signal Processors that are optimized to handle the mathematical functions at the computational heart of Adobe Photoshop's filters and functions. Photoshop's Gaussian Blur, Unsharp Mask, Sharpen Edges, and Sharpen More filters and the Resize function are especially enhanced. The board also features hardware accelerated JPEG compression. $999. SuperMac Technology, 408/245-2200, 800/304-3005; fax 408/524-4797.

Video F/X Plus
A Mac-based video post-production system designed to create professional-quality video productions; the product offers a dedicated module for controlling video decks, MIDI and VideoLink support; exportation of CMX, GVG, and Sony edl lists; type style effects; and Sony LaserDisc support. Also includes A/B roll, PICS animations, and Soft F/X software that creates offline graphics and provides nonlinear digital-editing features. $15,295. Digital F/X, 415/961-2800; fax 415/961-6990.

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**Fastedit/CT**
A plug-in module for use with Adobe Photoshop that enables users to manipulate high-resolution Sixel CT-format image files. With Fastedit/CT installed, Photoshop users can open and edit sections of Sixel CT image files and then append the edited areas back into the original file. 2MB min. memory. $59.95. Total Integration, 708/776-2377; fax 708/776-2378.

**Freedom of Press Professional**
A PostScript-language interpreter exclusively designed to support the Canon C10 Color Bubble-Jet Copier that, combined with a C10 PFI kit for Macintosh, allows the copier to work as a color PostScript printer with a resolution of up to 400 dpi. The package includes 35 scalable outline fonts and supports Adobe Type Manager and Adobe Type 1 fonts; it also supports the Adobe-defined PostScript color extensions for 24-bit and 32-bit images. 4MB min. memory. $395. Custom Applications, 508/667-8585; fax 508/667-8821.

**Funk and Wagnalls Standard Desk Dictionary for the Macintosh**
An electronic dictionary with definitions for over 100,000 root words that can be invoked via a hot key from within any application. Users can copy and paste definitions into word processors. The program can perform wildcard, anagram, batch-file, and reverse searches and includes a dictionary that translates 1000 common words into 26 languages. The dictionary also provides sections on computer terms, abbreviations, biographies, and it includes a gazetteer as well as a secretarial handbook. 1MB min. memory. $199.95. Inductel, 408/566-8016, 800/367-4497; fax 408/243-1762.

**Info-Mation**
A personal information-management program that lets users enter, change, or delete calls, meetings, and tasks on a single screen; automatically warns them of scheduling conflicts. Users can stick notes anywhere on screen and can keep an unlimited amount of phone numbers for any one contact entry. Import and export managers allow files from other programs to be entered, and the program has monthly and weekly (five-day or seven-day) views. The project-planner module can be used to define, prioritize, and delegate tasks across a network. 2.5MB min. memory. $189. Personal Information Management, 510/559-4211, 800/444-4746; fax 510/525-7644.

**InStat Mac**
A statistics package for students and scientists that can calculate mean confidence intervals, perform paired and unpaired t-tests, analyze contingency tables, and do linear regressions and correlations. The software can also calculate exact P values from z, t, r, F, or chi-square. It supports 30 two-state TIL indicators, DIP switches, and logic in-paper. 4MB min. memory. $95. GraphPad Software, 619/457-3900; fax 619/457-8141.

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Mainstream N<vs New Products

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A telecommunications program that distributes processing power among other applications running at the same time to enable users to perform file transfers in the background. The package includes a scripting language that can be fully compiled and a built-in script editor that handles debugging; many example scripts are included too. An Auto Dial window keeps track of the phone numbers that a user calls and automatically redials a number until a connection is made; a Smart Dial feature adjusts phone numbers based on the local area code. The application supports terminal emulations such as VT102, VT220, and TTY, as well as a variety of file-transfer protocols. 1MB min. memory. $195. Mercury Systems, 310/553-0881; fax 310/553-1291.

Mainstream News cast for QuickMail
A news-delivery system, for use with the company's satellite-based network, that distributes news gathered from a variety of services over a network via CE Software's QuickMail. Users subscribe to news services such as Reuters, AP, and UPI by paying from $50 to over $1000 per month. The software monitors incoming data from the wire services and sends stories to users based on lists of keywords. 1MB min. memory. $695. Mainstream Data, 801/584-2800; fax 801/584-2831.

NetDraw
A clip art package created for networking, systems, and communications professionals that includes over 170 objects in six categories: computing, WANs, LANs, telephony, personal computing, and patching and cabling. The software includes templates and individual symbols, saved in PICT, MacDraw, and Canvas formats. 1MB min. memory. $99.95. Network World, 508/875-6400, 800/643-4668; fax 800/756-9430.

Pharmacology Text Stack
An electronic version of Pharmacology, a textbook written by Theoharis C. Theoharides; includes the complete text, figures, diagrams, and tables appearing in the book, as well as a quizzing module. Each chapter begins with a statement of objectives and ends with a self-testing section. A set of key tables presenting the core concepts of pharmacology, a comprehensive glossary of terms, and definitions of terms are also included. Users may clip text and save it in a clippings file and mark sections of the documents for reference. Program requires HyperCard 2.1 or later version. 2MB min. memory. $135 per workstation. Keyboard Publishing, 215/832-0945, 800/945-4951; fax 215/832-0948.

PowerMerge
An application that lets users automatically update files between a desktop Mac and a PowerBook by connecting the two over a network. Users designate which files, folders, or disks should be updated, and whenever the two machines are connected, the software updates the zip code entered for shipments in the United States, allows for all UPS shipping types, and calculates Saturday deliveries. It also prints COD tags, shipping labels, UPS manifests, and summary reports. Quick Ship keeps client shipping histories and customer and client databases. 1MB min. memory. $195. ShopKeeper Publishing International, 904/222-8086; fax 904/668-9916.

Quick Mail
A news-delivery system, for use with the company's satellite-based network, that distributes processing power among other applications running at the same time to enable users to perform file transfers in the background. The package includes a scripting language that can be fully compiled and a built-in script editor that handles debugging; many example scripts are included too. An Auto Dial window keeps track of the phone numbers that a user calls and automatically redials a number until a connection is made; a Smart Dial feature adjusts phone numbers based on the local area code. The application supports terminal emulations such as VT102, VT220, and TTY, as well as a variety of file-transfer protocols. 1MB min. memory. $195. Mercury Systems, 310/553-0881; fax 310/553-1291.

QuickShip
A distributed rendering engine that works with StrataVision3D to divide rendering tasks among networked Macs. Users can simultaneously employ the processing power of all the CPUs on a network to render a 3-D image or animation. The software consists of three applications: Task Manager goes into screen-save mode. The package comes with 12 digitized images taken by photographers; other images can be added. 4MB min. memory. $49.95; additional image sets $39.95 each. MIFP Development, continues

ScreenSaver
A module for use in Berkeley Systems' After Dark screen saver that lets users display one or four 8-bit or 24-bit images on screen when After Dark goes into screen-save mode. The package comes with 12 digitized images taken by photographers; other images can be added. 4MB min. memory. $49.95; additional image sets $39.95 each. MIFP Development, continues

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**Music Madness**
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**BOOKS**

**Dan Shafer's First Book of Frontier**
A guide to UserLand Software's program Frontier, a system-level scripting language. The author also wrote the user and reference manuals for Frontier. The more-than-125-page book is subtitled 25 Things You Can Do with Frontier that Would Be Hard or Impossible Without It. The book comes with a disk that contains several utilities, as well as documentation for the software. Written by Dan Shafer, $24.95. The Reader Network, 415/367-1221; fax 415/367-1073.

**Hayden's PowerBook Power Book**
A book written for PowerBook users on issues, utilities, software, and add-on accessories that includes a vendor guide. The book also discusses applications that are "lean" enough to run on the Mac PowerBook, as well as other topics such as integrated applications. Written by Ross Scott Rubin, $24.95. Hayden, 317/573-2500, 800/428-5331; fax 317/573-2583.

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**How to Use Microsoft Word, Macintosh Version 5**
A step-by-step audiocassette course that guides users through various features of Microsoft Word 5.0, including working with text and formats, using the ribbon, using the grammar and spelling checker, outlining, creating style sheets, and performing print merges. There are four cassettes in the package, as well as a Quick Reference Guide and a disk containing practice files. $145. OneOnOne Computer Training, 708/628-0500, 800/424-8668; fax 708/626-4550.

**MC-170**
A replacement battery for the Macintosh PowerBook 140 and 170 that has a Quick Lock feature permanently attached that eliminates the need for the battery door provided with the PowerBook. The MC-170 has a hard plastic cover that snaps over the battery's terminals to prevent damage or shorting, and users can set a switch as a reminder that the battery needs to be charged. $89.95. Battery Technology, 213/725-3517; fax 213/726-3597.

**ROLADSK**
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Questions and Tips from Macworld Readers

BY LON POOLE

WHAT DO RUBBER BANDS, shirt cardboard, photo-reactive glue made for stained glass, and refills for electric erasers have in common? They can all be used to hold a SIMM in place when one or both of its retaining clips are broken. Michael T. Fussell of Missoula, Montana, favors the cylindrical eraser refill because it stay in place, and it is sufficiently springy to withstand vibration without falling out. It also looks neat. He buys an eraser refill from an office supply or drafting supply store, cuts a piece about 1/4-inch long, and wedges it lengthwise between the SIMM with the broken clip and the SIMM in front of it. Fortunately Fussell has never broken a clip on the front SIMM. (For information about the other methods of restraining SIMMs with broken clips, see Quick Tips, March 1992 and July 1992.)

HyperCard Magic

Q. I was reading “Insights on HyperCard 2” (September 1991) and it says Quick Tips explains how to fix the Home stack’s Preferences card to permit setting the user level to Painting, Authoring, or Scripting. I looked through Quick Tips but can’t find the reference. Please advise.

A. This information, which originally appeared in the April and August 1991 issues, is worth repeating. The version of HyperCard bundled with every Macintosh is meant for browsing and typing, so the Home stack’s Preferences card doesn’t show the higher user levels you mention. To reveal the higher levels, go to the Preferences card (choose Last from the Go menu), display HyperCard’s message box (choose Message from the Go menu), and type the command magic and press return. Typing magic a second time hides the higher levels again.

You can set HyperCard’s user level from any card by typing a different command in the message box. Typing set userlevel to 5 sets the user level to Scripting; substitute the number 4 for Authoring (creating buttons and fields), 3 for Painting, 2 for Typing, or 1 for Browsing. The HyperCard booklet included with a Mac doesn’t explain how to use the higher user levels. A number of books are available on the subject, ranging in price from $20 to $35. Another option is the $199 HyperCard Development Kit from Claris (408/727-8227). This kit contains five manuals and 19 example, reference, and utility stacks not bundled with the Macintosh.

Missing RAM

Q. I have consistent trouble with RAM management on my 5MB Mac IIx running System 7.0.1. For example, while using Microsoft Word 5 (whose memory size I have reduced to 1MB) I might switch to the Finder to check how much memory I have available. The About This Macintosh command usually reports system software at slightly over 2MB; add 1MB for Word, and I should have 2MB available. Instead I have only about 800K. This happens with other applications as well. The RAM is very fickle; sometimes a lot of memory is unaccounted for and other times only a few hundred kilobytes. Do you have any idea what the problem is?

A. This condition, called fragmented memory, occurs often, unless you scrupulously quit application programs and desk accessories in exactly the reverse of the order in which you opened them.

You can consolidate fragmented memory by quitting all open applications and desk accessories and then opening the programs and DAs again. Restarting the Mac also fixes fragmentation and may reduce the amount of memory used by the system software. To avoid memory fragmentation, carefully plan the order in which you open and quit programs. Open the applications and DAs you’re least likely to quit first; open last those you’re most likely to quit. When you need more memory to open a program, quit the most recently opened application or DA. If that doesn’t free up enough memory, then quit the next most recently opened program, and so on. This method frees up a contiguous chunk of memory. Quitting programs helter-skelter leads to memory fragmentation.

In theory Apple’s System 7 Tune-Up 1.1.1 is supposed to improve handling of low-memory situations, but it actually promotes fragmentation by encouraging you to let the Finder decide which programs to quit when you need more memory to open another program. Because the tuned-up Finder considers only program sizes rather than the order in which they were opened, it may, for example, quit a 1500K program to open a 1200K program, creating a 300K memory fragment. The Finder always asks your permission before quitting programs, so you can decline if you want to minimize fragmentation. Tune-Up also speeds up printing and fixes minor bugs in both System 7.0 and 7.0.1. It is available from Apple dealers, user groups, and online information services.

Incidentally, About This Macintosh

BY ANDRE HAWKINS

Andrea Hawkins
Pleasanton, California

This Macintosh tells you the size of the largest unused block of memory but not the total amount of unused memory. Your Mac may have several unused blocks of memory interspersed among the used blocks of memory (see “Memory Pie”). This condition, called fragmented memory, occurs often, unless you scrupulously quit application programs and desk accessories in exactly the reverse of the order in which you opened them.

You can consolidate fragmented memory by quitting all open applications and desk accessories and then opening the programs and DAs again. Restarting the Mac also fixes fragmentation and may reduce the amount of memory used by the system software. To avoid memory fragmentation, carefully plan the order in which you open and quit programs. Open the applications and DAs you’re least likely to quit first; open last those you’re most likely to quit. When you need more memory to open a program, quit the most recently opened application or DA. If that doesn’t free up enough memory, then quit the next most recently opened program, and so on. This method frees up a contiguous chunk of memory. Quitting programs helter-skelter leads to memory fragmentation.

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Incidentally, About This Macintosh...

MACWORLD November 1992 205
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![Mathcad Pie Chart](chart.png)

**Memory Pie**

As you open and quit programs, the unused portion of the Mac's memory tends to become fragmented into multiple small blocks. You can open a program only if there's a single block big enough to handle that program's memory needs. System 7 can neither consolidate fragmented memory nor open one program in multiple blocks of memory.

Macintosh does not account for as much as 350K of RAM that a Mac Ilsi or Iici reserves for built-in video. (Other Mac models do not use significant amounts of main RAM for built-in video.) You can use the Monitors control panel to reduce the amount of memory a Ilsi or Iici reserves for built-in video, but not by changing the ordinary color settings. You must press the option key while clicking the Option button in the Memory control panel to bring up a special dialog box in which you set the maximum number of colors or grays to 256, 16, 4, or black and white (reserving about 350K, 190K, 126K, or 94K).

**Quick Size Change**

Small text is hard to work with on screen. Is there a quick and easy way in Microsoft Word to enlarge the type (say, to Helvetica Bold 12) while I work on the screen, and then switch back to my regular style (Helvetica 10) when I'm ready to print?

![Screeshot of Word window](screenshot.png)

**Art Dobene**

Brookings, Oregon

If all text in the document is the same size, select it all by pressing Shift-A (Shift-option-M in Word 4) and then change the size by choosing from the Font menu or the pop-up menu in Word 3's formatting ribbon. If the document contains different text sizes, you must use another method.

My favorite method involves Word's style sheets and a command not normally on any Word menu, Redefine Style From Selection. You can add that command to the Format menu (or another menu of your choice). To do that, you choose Commands from the Tools menu (Edit menu in Word 4), bringing up a dialog box that lists all of Word's commands. Select the command Redefine Style From Selection from the scrolling list in this dialog box (typing the letter R scrolls quickly to the commands beginning with R; in Word 5 typing the first part of the command name selects the command in the scrolling list). Then click the Add button to put the selected command in the menu. If you prefer, you can choose any Word menu from the Menu pop-up (and in Word 5 a location on that menu from the Add Below pop-up) in this dialog box before clicking the Add button. You can also assign a keyboard shortcut for the command. After adding the command to a menu, dismiss the dialog box by clicking its Close button.

When you want to change the format of all text that shares a particular named style (such as Normal, heading 1, heading 2, or footer), you select any word having that named style and make your desired changes to it by choosing from the Font and Format menus, by typing key shortcuts, or by clicking one of the controls in the formatting ribbon or formatting ruler. Then choose the Redefine Style From Selection command. Word promptly applies your changes to all text having the same named style. In so doing, Word does not override deviations from the named style's previous definition. For example, changing the Normal style from 10-point to 12-point does not affect instances of Normal-style text that you previously selected and set to 14-point; those instances of text remain 14-point. Word propagates your changes to any named styles based on the particular named style you changed. For example, changing Normal style from 10-point to 12-point changes all other named styles that are based on Normal and that are 10-point. In this example, Word would not change a named style that is based on Normal but is 14-point.

Instead of using the Redefine Style From Selection command, you can change styles directly in the Style command's dialog box. To bring up that dialog box, choose Style command from the Format menu, double-click the style name at the bottom of the Word window next to the left scroll arrow, or type the keyboard shortcut Shift-T. For more on styles, style sheets, and the Style command, see the Word manual.

Selectively Tracking Deleted Files

*Tip* Here is a tip for people using data-recovery software such as Norton Utilities for Macintosh (Symantec Corporation, 408/252-3570 or 800/441-7234) or MacTools Deluxe (Central Point Software, 503/690-8088) to track deleted files and thereby aid in their recovery. These programs track all deleted files, including the temporary files that apply.
Remember this guy?

We do. Maybe not him personally, but what he provided — full service.

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Circle 39 on reader service card
More PageMaker Line Widths

Although Aldus PageMaker is able to create solid lines in .5-point and hairline sizes, dashed lines are available only in larger sizes. To make a .5-point dashed line, Peter Johnston of Ithaca, New York, suggests that you place a .5-point reverse line on top of a 1-point dashed line. (Aligning the lines is a little easier with PageMaker 4.2’s Control Palette.) You can also use this technique to create other nonstandard line widths.

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Audio Confirmation After you have created a new QuicKeys sequence (or you have opened an existing sequence), you can add a recorded sound from the System file by choosing Sound from the Extensions submenu of the Define menu inside QuicKeys’ Sequence dialog box. Each time you use the sequence, you hear the sound signaling the end of the sequence.

Noisy Feedback

Using a QuicKeys sequence, you can give your Macintosh noisy feedback. First you get your hands on a goofy sound or record one yourself. Put the sound into the System file. In QuicKeys (CE Software, 515/224-1995), create a new sequence or open an existing sequence and append a QuicKeys Sound extension for your sound (see “Audio Confirmation”). Some ideas: When I press F1, F2, or F3 (the extended-keyboard function keys that by convention correspond to the Cut, Copy, and Paste commands), my Macintosh reacts with the appropriate spoken message, “cut,” “copy,” or “paste.” Similar spoken responses follow after setting the monitor to a certain number of colors or grayscale, choosing a printer (with QuicKeys’ Choosy extension), switching System 7’s file sharing on or off, and so forth.

Stefan Brucke
Deurne, Belgium

Opening Canceled

Once I accidentally chose an application from System 7’s Apple menu. Horribly distraught because I really didn’t want to open that program, I quickly hit 3€-period (.) several times (this comes from my experiences with HyperCard), and miraculously the Finder stopped opening the program! Pressing 3€-period also halts opening initiated by double-clicking, choosing Open from the Finder’s File menu, or dragging a document and dropping it on an application icon.

Jeremy and Andy Monat
Indianapolis, Indiana

3€-period takes effect only if you press it within the first few seconds after opening.—L.P.

continues

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Q Time
Q Date
O Summary

Initial Values You can have FileMaker calculate initial values of a new field (the Works field here) for existing records. After FileMaker calculates the initial values, you can then change the new field to its permanent type (Text for the Works field), and you click the Options button to add a list of standard values from which to choose when entering new records.

Reversed Text

TIP QuarkXPress has trouble producing white text on a black or gray paragraph rule when printing to a non-PostScript printer. The dark paragraph rules come out fine, but the white text doesn't print—although it looks fine on screen. Here's a workaround. After reversing text out of a paragraph rule (as described in Quark's manual Using QuarkXPress, page 6.62), use the Modify command to set the background color of the text box to None. Next draw an empty picture or text box large enough to completely cover the reversed text. With the empty box selected, use the Runaround command to set the empty box's runaround to None, the Modify command to set the empty box's background color to White, and the Send to Back command to send the empty box behind the text box containing the reversed text. The white text will now print correctly.

Ward Barnett
Minnetonka, Minnesota

Automated FileMaker Entries

TIP Claris FileMaker Pro's manual tells you how to make FileMaker Pro automatically enter a value for all new records you create in a database. (You click the Options button of the Define Fields command's dialog box, and then you specify the value you want automatically entered.) What if you create a new field after you already have hundreds of records? FileMaker Pro makes no provision for automatically entering a value in a new (or old) field for all the existing records.

I stumbled onto a method for having FileMaker Pro do just that. For example, suppose you have several hundred records and you want to create a new field, Entry Date, that automatically records the date each new record is entered. You also want a date to appear in all the file's old records, and you want that date to be earlier than today's date. You accomplish this by creating a calculation field with a formula such as Date(6,20,1992). FileMaker Pro uses that formula to calculate a date value and places that value in the new calculation field for all existing records. When FileMaker finishes assigning that date value to all existing fields, change the calculation field into a date field so you will be able to enter dates (rather than calculate them) for new records. A task that could have taken more than an hour is finished in a couple of minutes.

You can use the same basic method to calculate different initial values for different types of records. For example, suppose your personnel file needs a new field to identify full-time or part-time status, and you know that all employees now on file are part-time if paid hourly or full-time if paid monthly. Simply create a new calculation field whose formula uses an If statement to assign an appropriate value for the new field based on the current value of an old field (see "Initial Values"). The formula If (Pay Rate < 100, "Part-Time" , "Full-Time") assigns the text value Part-Time if the field Pay Rate is less than 100 or the text value Full-Time if more (your hourly employees make less than $100 per hour and your salaried employees make more than $100 per pay period). After FileMaker completes the conditional calculations for all existing records, you use FileMaker's Define Fields command to convert the calculation field to a number, text, or date field according to the type of data it contains. You can also use the Define Fields command to add a list of standard values for the field; they will aid in entering new records later. (Click the Options button of the Define Fields command's dialog box, and then specify the value list.) In the personnel example, you would convert the new calculation field to a text field with a value list containing the entries Full-Time and Part-Time.

Jim Melko
Dayton, Ohio

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LON POOLE answers readers' questions and selects their tips for this monthly column. His two most recent books are Amazing Mac Facts (Microsoft Press, 1991), a collection of the best published tips; and Macworld Guide to System 7 (IDG Books Worldwide, 1991).
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Small-Business Accounting

BY JIM HEID

FOR A SMALL BUSINESS, ACCOUNTING is a necessary evil. It's necessary because any business's bottom line benefits from accurate record keeping, prompt billing, and balanced accounts. But it's evil because it takes time that you'd probably otherwise spend doing your job. It's a rare small business that has a staff accountant, so you have to periodically don a bean-counting cap and wrestle with accounts payable and receivable, estimated tax payments, payroll, and other mundanities.

To many people, the only thing worse than practicing accounting is learning about accounting, and the result is usually informal, erratic billing practices and shoddy records. Besides being a nightmare at tax time, shoe-box-based accounting systems can hurt profits. If a contractor sends out bills only when the shoe box overflows, he's losing money and giving clients interest-free loans. If a consultant records time spent with clients on scraps of paper, she loses money every time a scrap is misplaced. If a store waits until a product is out of stock before ordering more, it's losing sales every time a customer is turned away.

The selection of Macintosh accounting programs is larger than ever, with many programs geared toward the needs of small businesses. All programs handle accounts payable and receivable. Others add inventory-management features—ideal for retail or mail-order operations. Some also handle payroll.

These programs can help, but they are not sure cures for fiscal chaos. Forget plowing into an accounting program without opening the manual—you will get lost within seconds and give up within minutes. It also helps to have a familiarity with basic accounting concepts, because too many programs' manuals assume that you already know how to count beans. If you really want to be prepared for electronic accounting, you might consider taking a course in small-business accounting.

To get you started, I'll present an overview of basic accounting concepts and describe the kinds of features accounting programs provide to simplify the process.

After digesting the information here, see “Balancing the Books,” our overview of accounting programs in this issue, to get more-detailed information on what individual packages offer.

Accounting Basics

ACCOUNTING PROGRAMS ARE REALLY database managers whose data-storing and reporting features are tailored to the task of managing money—much like the personal finance programs I looked at in last March's column. Indeed, for simple small-business accounting, you might find a personal finance program such as MEGA Software's Managing Your Money, Intuit's Quicken, or Survivor Software's MacMoney easier to use than a business accounting package. All three programs' manuals show how to apply them to small-business accounting. Quicken also handles payroll, and MacMoney accepts Survivor Software's invoicing and accounts receivable add-on called InvoiceIt.

You need something with a bit more punch? Prepare for a journey into The Jargon Zone. The accounting world has its own language, cloaking in buzzwords familiar activities like paying bills and checking cash. It’s the lingo that makes accounting intimidating to many people, but once you get past it, the basic concepts behind accounting aren't that difficult.

The goal of any accounting system is to help you keep track of what you have—your assets—and what you owe—your liabilities. Assets include income, money in the bank, and equipment. Liabilities include bank loans, bills, and rent. By tracking your assets and liabilities and enabling you to analyze them, an accounting system helps you make sure that the latter don't outrun the former.

It may be stating the obvious, but the most important thing in an accounting system is accuracy. The accounting world has developed standard accounting practices whose built-in checks and balances help guard against inaccuracy. Foremost among them are the balance sheet and the double-entry system.

Maintaining Your Balance

IMAGINE ASSETS AND LIABILITIES AS BEING AT OPPOSITE ENDS OF A SEEWSAW. (I won't ask which end is heavier.) This seesaw is called a balance sheet, and it represents a snapshot of your financial condition at a given time. A typical balance sheet is a two-column report, with assets listed in the left column and claims against them—liabilities—listed in the right.

If you subtract what you owe from what you have, you wind up with what's left: the business's net worth, or equity. Hopefully, that's a positive figure. In any case, equity is always listed on the right side of a balance sheet, along with your liabilities. Why list equity along with liabilities? Because equity is, in fact, a claim—your claim—against the things owned by the business.

Assets and liabilities seep over time, but a balance sheet is always balanced—the total of assets always equals the liabilities and equity combined. This translates into an equation that forms the backbone of accounting: assets = liabilities + equity. This fundamental equation is so important that accountants have given it a pithy name: the accounting equation.

The Double-Entry System

THE ACCOUNTING EQUATION IS IMPORTANT because it accurately expresses a fact of business life: that every transaction affects your assets and your liabilities and/or equity. A double-entry bookkeeping system puts the accounting equation to work.

The cardinal rule of double-entry accounting is the accountant's variation of Newton's law: for every debit there is an equal and corresponding credit. If you earn $1000, your assets increase by $1000 and your equity increases by $1000. If you borrow $10,000 to buy a piece of equipment, your assets increase by $10,000, but so do your liabilities.

The phrase "double entry" traces back to paper-based accounting, where you would write two separate entries in a journal: one to increase an asset and another to increase a liability. This system forces accountants to think in terms of transactions: what happened? Where did the money come from? Where did it go? (The answer is the other side of the equation.)

For example, you have some cash in your hand. As you record this transaction, you increase a liability, cash due, and decrease your equity. The transaction might have been cash received from a customer, but the accounting equation still holds true.

As you can imagine, the double-entry system is easy to say but hard to do. For most businesses, the expert accountant does the work, with a computer to speed things up. For small business owners, the goal is to keep things simple—without losing precision or accuracy.
GETTING STARTED

ledger—one for the transaction’s debit and one for its credit. When all the debit and credit entries were tallied, the totals would be identical—your books would be balanced. If the debit and credit totals weren’t equal, the books were out of balance, and you knew that the ledger contained an error.

Accounting software eliminates the need to make two separate entries. When you make a debit entry, the accounting program knows to make a corresponding credit, and vice versa. There’s one less entry and one less mistake to make. And, needless to say, the accounting program handles all the addition and subtraction.

Timing Is Money

Most accounting programs use a standard accounting practice called accrual-based accounting. With accrual-based accounting, income is registered when you send a bill (not when you receive payment), and expenses are registered when you receive bills (not when you pay them). Income and expenses are calculated and totaled at regular intervals called accounting periods—usually one year or one quarter.

The opposite of accrual-based accounting is cash-based accounting, in which you record liabilities when you incur them and record assets when you actually receive them. This method is straightforward but has a disadvantage: income and expense totals can be skewed by the calendar. For example, if you invoice a large job this December but don’t receive payment for the job until next January, your 1992 income will be artificially low and your 1993 income will be artificially high. Accrual-based accounting results in more accurate income figures for a given time period. (Certain types of businesses, including publicly held corporations, are required by law to use accrual-based accounting.)

During each accounting period, you record information about each transaction in a general journal, a chronological listing of each transaction. With paper accounting systems, a journal is a book; with accounting software, the journal is typically a window (see “Keeping a Journal”). You can make entries directly in the journal window, but you may also make them indirectly. For example, if you have a retail business, you might use an accounting program that can create and print invoices. When you create an invoice, the accounting program automatically copies its total into your electronic journal.

These automatic pipelines between various parts of the program represent one of the big differences between manual and computerized accounting. With manual accounting, you often have to enter the same information in different places: you might write a sales total on an invoice, and then copy it to your general journal. Accounting software spares you this manual labor and the errors that can accompany it. Enter information once, and the program automatically records—or posts—it in other relevant places. An accounting program knows that everything is tied to everything else.

Accounting Software Features

Let’s leave the haze of accounting theory for a look at the kinds of features accounting programs provide. Along the way, I’ll show how an accounting program’s parts tie together various aspects of a business’s financial life. You’ll also get a feel for the amount of setup work required to get an accounting package up and running. To see which features the current crop of programs provide, see the features table in “Balancing the Books,” in this issue.

• General Ledger (G/L) The heart of every manual or computer-based accounting system, the general ledger is a detailed record of transactions, organized according to account. When you start out with an accounting program, you set up a chart of accounts, a database that lists each account (telephone, equipment loan, petty cash, payroll, checking, and so on), its type (asset, equity, expense, and so on), and its starting balance. When you make an entry in the general ledger, you choose the account the entry pertains to from the chart of accounts—no retyping is required. As you work in other parts of the program, the general ledger is updated accordingly.

• Accounts Payable (A/P) This portion of an accounting program pays the bills. You can write individual checks for one-time purchases and also set up recurring transactions for regular bills such as monthly rent and loan payments. When setting up the accounting program, you enter a list of all the vendors you purchase from, including their addresses, credit terms, and your preferred shipping method. All programs can print checks on preprinted check stock; most programs include catalogs for checks and other forms. Some programs can also generate purchase orders: just specify the vendor and what you want to order, and the program prints a P.O.—and also posts its total to your general ledger and accounts-payable ledger.

• Accounts Receivable (A/R) The opposite of accounts payable, the accounts-receivable ledger handles incoming money. In most programs, you can enter income items directly into the accounts-receivable ledger window, or you can create and print invoices and tell the program to post their totals to the A/R ledger. When the program posts the invoice, it also makes entries in other relevant journals, recording, for example, sales tax payable and outbound freight costs in the A/P journal. All the while, the program is following the rule of double-entry accounting, making a corresponding debit every time it makes a credit, and vice versa.

• Inventory For many businesses, buying and selling also involves tracking inventory—how many items you have in stock, how many you’ve sold, the stock continues.
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7 REASONS WHY YOU NEED A NEW WORD PROCESSOR.

Because you're ready to see what System 7 can do.

Apple calls System 7 the biggest improvement in Macintosh since Macintosh. And WordPerfect® is now System 7 savvy.

So now (among lots of other new things), WordPerfect will automatically keep track of changes that you (or someone else) might make to imported files (charts, graphics, whatever), and update your WP documents accordingly. Now, a change made in one place can be a change made in many places. Apple calls it “Publish and Subscribe,” and it works between programs on your hard drive, as well as among people on your network. Publish and Subscribe assures you that your documents will always reflect the latest information available.

And it's just one of the new System 7 tricks that WordPerfect 2.1 has mastered.

Because WordPerfect does columns better than the Greeks.

Pick a starting point, click on the ruler, and see your text in two columns. Or in three columns. Or five columns. With vertical rules beside or between them, if you like. Drag a guide on the ruler and try unequal columns. Highlight text in a box that jumps across columns.

Go crazy with the design, or stick with the tried-and-true. The point is, WordPerfect gives you formatting options that other word processors don't. And exploring them couldn't be much easier.

Because a movie is worth who-knows-how-many words.

If a picture is worth a thousand words, what's a movie worth? With WordPerfect and QuickTime, you can calculate it for yourself.

Because you'd use more graphics if using them were easy.

WordPerfect not only gives you full control over the placement of graphics in your text, it also gives you a color drawing program for modifying imported artwork (or starting over from scratch) without ever leaving the program.

You can print graphics under your text (as "watermarks") or on top (as overlays). You can use the drawing tools to rotate text to any angle that strikes your fancy (something many page-layout programs still can't do).

And WordPerfect gives you 36 border styles and 64 fill patterns — which you can use in any of 256 colors — for highlighting graphics, paragraphs, columns, pages, even blocks of text.
Apple's QuickTime is a new technology that lets you work with digital video and sound as easily as you now work with text and graphics files.

Imagine being able to place and size a QuickTime movie anywhere in a document. You could add urgency to a memo with a few well-chosen words delivered "live." Or help an audience visualize your latest brainstorm with a 3-D simulation they can start, stop and replay.

We have a feeling that words can't begin to describe all the ways you'll think of to use it.

Because you get tired of repeating yourself, yourself, yourself.

Perhaps because they've heard it's a powerful programming language, WordPerfect's macro editor intimidates some people at first. It shouldn't.

It's no more complicated than a tape recorder. Click "record" and it memorizes your keystrokes. Click "play" and it repeats them.

With no more knowledge than that, you can create a WordPerfect macro. And can spare yourself the effort of formatting M-E-M-O-R-A-N-D-U-M, T-o-F-r-o-m: (and so on) across the top of the page every time you want to fire off a memo, for example.

But simple as recording your own macros can be, we also ship a number of them with the program. For formatting addresses to print on envelopes. Placing "drop caps" at the start of paragraphs. And other jobs you'd rather not do twice.

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quantity at which you reorder, and so on. It makes sense, then, that many accounting packages also provide inventory-management features. When you set up the accounting program, you create a list of all the products you sell, along with pricing information and the quantity currently in stock (see “Accounting for Inventory”). When you use the program’s accounts-receivable section to generate an invoice, you simply select the items from an inventory window—there’s no need to type the item name or remember its stock code. When you post the invoice, the accounting program automatically adjusts your inventory records accordingly and informs you when your stock of a particular item is low.

- **PAYROLL** Employee wages also affect a business’s bottom line, so it follows that many accounting packages provide payroll-management features. During setup, you enter the name and address of each employee, as well as wage information and deduction data for taxes, savings plans, insurance, and the like. At each pay period, the program prints payroll checks and updates the general ledger. Programs that handle payroll are often updated annually to reflect the latest tax laws. In many programs, you can also associate some or all of an employee’s wages with a particular project. You can then create reports that show how much you’ve spent and earned on each project.

- **REPORTING** Accounting programs go beyond automating addition and subtraction by allowing you to view and print reports that summarize and let you analyze financial data. Every module of a program has a corresponding array of reports. You can print financial statements such as balance sheets and earning reports. You can print employee tax documents such as W-2 forms and year-to-date earnings summaries. You can print aging reports that categorize accounts receivable according to date—find out which customers pay within 30, 60, or 90 days. (Some accounting programs can also print collection letters for late accounts.) You can print inventory reports to show which items you should reorder, which are back-ordered, and much more. Many programs can also put their reports in graphical form, creating graphs and pie charts that summarize tables of numbers (see “Graphic Accounting”).

### Integrated or Modular?

**YOU THINK YOU ARE READY TO TAKE THE PLUNGE—but how do you pick a program?** Start by deciding between an integrated package and a modular one. Most small-business accounting programs are of the integrated variety—they include most or all of the aforementioned features. A few examples of integrated accounting programs include Sofsyn’s Accountant, Inc.; Computer Associates’ ACCPAC Simply Accounting; Peachtree’s Peachtree Accounting for Macintosh (formerly atOnce); and Teleware’s M.Y.O.B.

Modular programs are like Maces with expansion slots—they accept add-ons that provide new features. One example is SBT Corporation’s Series Six Plus. It includes G/L, A/R, and A/P modules, but can be expanded to handle payroll, time billing, job costing, property management, and more. When you’re shopping for a modular program, evaluate not only the features it includes, but also the ones you can add later.

Some modular programs have actually been written using high-end database managers such as Borland’s Software’s OmniVision 5 or Microsoft’s FoxBase+/Mac. The advantage of such an approach is that a consultant or programmer who is experienced in one of these database programs can customize the accounting package to handle unique accounting or reporting needs. The drawback is that such programs are often more complex and a bit harder to use. Integrated accounting programs generally take better advantage of the Macintosh’s interface, providing tool palettes and icons that correspond to common accounting functions.

If you offer several people on a network to be able to access your accounting system simultaneously, you’ll want a package that supports multiuser access. Some integrated packages are available in multiuser versions, but most modular programs are of the modular variety.

### Ease-of-use Issues

Ease-of-use issues and feature lists are important, but what counts most is how well a given package fits your business. If you’re an attorney, inventory features won’t mean much to you. If you have a bookstore, why pay for time-billing features? Narrow the field to the products whose features best mesh with your business. Then, you may want to talk with your accountant or a consultant to settle on a specific program. If your accountant or tax preparer is familiar with a given program, that may influence your choice. You’ll be able to simplify life in early April by supplying a disk instead of a duffel bag full of paperwork.

If you’re an accounting neophyte, you may also want to consult an accountant when setting up your program. He or she can advise you on the best ways to set up your chart of accounts, payroll deductions, and other details. After you’ve set up the program, you may want to use it in parallel with your current accounting system for a brief time to avoid being shut down by unforeseen wrinkles.

Getting an accounting program up and running means more than copying it to your hard drive. But then, no other category of software so directly affects your business. And only tax-preparation software has the same ability to get you in trouble with the government. Accounting software isn’t for the impatient or the disorganized. It requires careful planning and diligent upkeep (not to mention a religiously followed backup routine). But in return, it gives you error-free math, less tedium, and hopefully, more time to do what you’re really in business for.

### Where to Buy

SoftPC makes your Mac an IBM compatible. With SoftPC, the new Macintosh computers are more than just powerful and portable. They are also the most compatible computers available. Now they can run a whole world of MS-DOS software. Because SoftPC™ from Insignia Solutions lets you run any MS-DOS program on a Macintosh. Even over a Novell PC network. And SoftPC works on any Mac, from the Plus to the new Powerbooks and Quadras.

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Tips and Techniques for Power Publishers

With an assist from the Apple LaserWriter, Aldus PageMaker begat desktop publishing in 1986. Since then, thousands of graphic arts professionals, corporate communicators, and just plain folks have made PageMaker their page-layout tool of choice. But Aldus has faced stiff competition in cornering the market of desktop publishers, most notably from QuarkXPress. Aldus's latest industrial strength PageMaker 4.2, which adds a number of improvements, including a scripting language, support for Apple events, and Aldus Additions—plug-in modules for PageMaker additional features. For more information on PageMaker, call Aldus at 206/628-2320; fax 206/343-3360.

Special thanks—for their tips, tricks, and patience—go to Jo Ann Villalobos, Macworld's senior production editor; Olav Martin Kvern, who with Macworld contributing editor Steve Roth, is the author of the excellent and recommended Real World PageMaker 4 Industrial Strength Techniques (Bantam Books, 1990); and the team at Aldus technical support.

Take Control with Scripts

The PageMaker scripting language is very powerful. Normally you run a script by choosing Run Script (under Aldus Additions in the Options menu). See “Aligning Objects Using Scripting” for an example of a script in action. However, you can run scripts faster by using System 7 and CE Software's QuicKeys. QuicKeys 2.1.2 can send and receive System 7 Apple events (provided you're running CE Software's CEIAC application, included with QuicKeys) and can use Apple events to communicate with PageMaker. Suppose you wanted to create a QuicKey to switch between measurement systems. It's almost impossible to create the right sequence of clicks and drags to get QuicKeys to do this from the pop-up menus in PageMaker's Preferences dialog box accessed from the Edit menu. Here, in ten steps, is how to get QuicKeys to send PageMaker a script to switch measurement systems.

1. Invoke QuicKeys while PageMaker is open.
2. Choose Apple Events from the Extensions submenu in the Define menu. (If you don't see this extension, you have to locate it on your QuicKeys disks and install it.)
3. In the Apple Events Extension dialog box, choose PageMaker 4.2 from the Send Event To pop-up menu.
4. Choose Custom Event from the Event pop-up menu. QuicKeys adds a new, empty Apple event list to the dialog box, just below the Event pop-up menu.
5. Click on the New button. QuicKeys displays the Parameter Number 1 dialog box, where you can enter the specific information you want to send to PageMaker, and the Apple events QuicKeys will use to send it.
6. Enter a description in the Description text-edit box. Enter ---- (four hyphens) in the Keyword text-edit box. Choose Text from the Parameter Type pop-up menu (QuicKeys will enter TEXT in the Parameter Type text-edit box).
7. Type in measurement units (inches, inches; be sure to put the comma and semicolon in this programming statement) in the Data text-edit box to tell PageMaker to change the measurement systems.

Aligning Objects Using Scripting

People have been asking for a simple object-alignment feature in PageMaker since the program first appeared. While Aldus still hasn't put that feature in PageMaker, you can do a fair amount of alignment using scripting. Here's a script to align the tops of two objects. The lines that begin with two hyphens (--) are comments. PageMaker will ignore everything from the hyphens to the next carriage return.

```
--align tops script
redraw off
--get rid of the guides on the page
deletelast guides
--put a guide at the top of the last object in the drawing order
guidehoriz last top
--select the first object in the drawing order
select 1
--move the selected object to the guide we positioned earlier
move top guide 1
--turn redraw on again
redraw on
--end script
```

--end script
units of measurement used in both the vertical and horizontal rulers to inches. If you wanted to change both of the rulers to picas, you'd type measureunits picas,picas.

If you wanted to change the horizontal ruler to picas, and set the vertical ruler to 16-point increments, you'd type: measureunits picas, custom.16.

8. Click on OK to close the dialog box.

9. Back in the Apple Events Extension dialog box, choose Qut from the Return Value pop-up menu. In the Class text-edit box, enter misc and in the ID text-edit box, enter doc. Assign a key to your macro, and close the dialog box.

10. Close QuicKeys, take a deep breath, and in PageMaker, press the key you've assigned. If your current measurement system is different from the one you've specified in the Apple Events QuicKey, you'll see the tick marks in the rulers change to the new units of measurement. Now that you've learned how to send Apple events to PageMaker from QuicKeys, you can put done under a key—it's a lot faster than using Run Script.

A Style All Your Own

It's easy to create a style from formatted text. First, set a few words using the type specs that you want. Highlight the text, hold down the % key, and click on the No Style choice from the Styles palette. This will call up the Edit Style dialog box, with the type specs of those highlighted words already entered. All you have to do is give your style a name, then click on OK.

When applying a style to a paragraph, avoid overwriting any manual specifications you've added by holding down the shift key when selecting the style from the Styles palette. This will apply general specs from the newly applied style, but will not overwrite any special fonts, rules, or point sizes. This is especially useful when you're using special characters from another font in the paragraph, such as the $ key symbol, which is found in the Chicago font.

Getting the Right View

For convenience in traveling through your document, hold down the % key and option keys, then use the mouse to pull down and select the view you want (such as Actual Size) from the Page menu. Voilà! Each page you turn to appears in the view you chose from the menu.

To see a page at Fit in Window, hold down the shift key as you click on the page icon at the bottom left-hand corner of the screen.

To get an overview of your document, here's how to produce an on-screen slide show of the document's pages. Set each page to the Fit in Window view (see above). Then, hold down the shift and option keys, while choosing Go to Page from the Page menu. PageMaker shuffles through the document repeatedly, starting at the first page and pausing for a moment at each page or spread. Clicking the mouse stops the show on the current page.

Don't Do It the Slow Way

You don't have to wait until PageMaker redraws the screen before you press on with your work. For example, here is a fast way to change paragraph leading. First, select a paragraph. Now, without pausing when the screen redraws, type %-T (Type Specifications), press the tab key to move to the Leading field, key in a value, then hit the return key. This beats pulling down the Type menu, especially if you want a point value other than those values in the PageMaker menu; and the screen redraws much faster once you've made your change.

Here's another time-saving tip. Select an object with the arrow tool; use a combination of the % key and an arrow key to nudge the object 5 pixels at a time in the direction of the arrow key. Holding down the arrow key repeats the nudge quickly, and lets you move objects into place with precision.

Avoid using the Type Specs menu to specify reverse type. Instead you can use the pull-down Type Style menu; but the quickest method is to use the Colors palette (%-K).

With the type selected, choose Paper as your color. To verify that this is indeed the same as Reverse type, notice the color or choice (Paper) as well as the type style (Reverse) when you open the Type Specs menu (%-T).

Borrowed Characters

Way back when PostScript printers first came out (like the original LaserWriter), a lot of the typefaces—Times and Helvetica, for instance—were missing some characters, like © and ™. So PageMaker was set up to borrow those characters from the Symbol font. However, newer fonts include these characters, so substituting the generic Symbol characters can create problems, because you may get different results on the printer from what you see on screen. To tell PageMaker that you are using fonts with special characters included, turn off the Use Symbol Font for Special Characters check box in the PostScript dialog box, accessible from the Print dialog box. If you've got old fonts and the special characters don't appear on a printout, try turning this option on.

Easier Indexes

If you want to enter every occurrence of a particular text string into your index, first open the Story editor (%-E). Then press %-% to display the Change dialog box. Type the string in the Find What text-edit box. Press tab and type ^ in the Change To text-edit box. Select the range of text you want to index, and then click on the Change All button. PageMaker finds every occurrence of the text you entered in the Find What field and enters it as a first-level index entry.

If you want to index several occurrences of a name containing a middle name or middle initial, type a nonbreaking space (by typing option-space character) between the first name and the middle name as you enter the name in your story (or, if you've already entered the name with a normal space, search for the name and insert a nonbreaking space). Enter a nonbreaking space (^s) as you type the name in the Find What text-edit box, then follow the rest of the index sequence above.

To remove all of the index entries in your publication (including index entries in the other publications in the current book list), hold down %-option-shift and click on the Remove button in the Show Index dialog box. Think about this before you do it. Do you really want to delete all the index entries in your publication? To remove all the cross-references, hold down %-%option and click on the Remove button. To delete all the cross-references you've entered since you opened the dialog box (or pressed Accept), hold down the option key and click on the Add X-Ref button. OK, so you deleted index entries or cross-references in your publication and now you want them back. If you haven't closed the Show Index dialog box yet, you can hold down the option key and click on the Remove button, or click on Cancel. Otherwise, you're left with the Revert command in the File menu.

Sharing the Wealth

If you've got a PageMaker tip that's made your life a bit easier, share it with other Macworld readers by sending it to Quick Tips, Macworld, 501 Second Street, San Francisco, CA 94107. m

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### PRINTERS

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<th>Cartridges:</th>
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<tr>
<td>Singles</td>
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<td>$97</td>
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<th>Monitor</th>
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<td>Relisys RE-1422</td>
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<td>Two-Year</td>
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<td>LZR 1560™</td>
<td>$4,495</td>
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<td>- 300 or True 400 Dots-Per-Inch Resolution</td>
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<td>- Postscript Level 2</td>
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<td>- 15 Pages Per Minute</td>
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"Excellent" - MacWorld, Sept '92

E-Machines ColorPage T16 II

- 16" Sony Trinitron
- Four Resolutions:
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- 19" Dual-Mode Sony Trinitron Display
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Compare NewGen against anybody’s printer

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- SCSI port • Ethernet expandable • 35 fonts
- PC-Mac autoswitching
- Canon engine

Call

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Umax UC630 Color Scanner
- 600 dpi • 24-bits
- Recognizes 16.8 million colors
- Supports black/white & gray scale
- Includes Photoshop

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- PC-Mac autoswitching
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Wacom microFlex Plus PS/17 $1209

TI micro Flex Plus PS/35 $1325

9ppm printer engine • True Adobe Postscript Language
Appletalk interface & 1.5MB RAM included on all models
1MB TI Upgrade $39 • Replacement Toner $12

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Actual MAC Capacity: 42mb
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SyQuest Drives feature:
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• SyQuest Drives include a TWO YEAR Warranty, one cartridge & necessary cables
• SyQuest Cartridges carry a ONE YEAR Warranty

SyQuest REMOVABLE TECHNOLOGY

New ELS Series

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Unformatted Model Product Description Actual MAC Capacity Internal External
42mb EL542 3.5" Low Profile 19ms 40mb $189 $249
52mb LP550 3.5" Low Profile 9ms 49mb $215 $275
80mb LP Select 3.5" Low Profile 9ms 80mb $419 $519
85mb EL585 3.5" Low Profile 17ms 82mb $275 $335
105mb LP1055 3.5" Low Profile 9ms 100mb $335 $395
120mb LP1205 3.5" Low Profile 10ms 116mb $409 $469
120mb PRO120 3.5" Low Profile 9ms 120mb $529 $629
127mb EL127 3.5" Low Profile 19ms 124mb $339 $399
170mb EL170 3.5" Low Profile 19ms 160mb $429 $489
240mb LP240 3.5" Low Profile 10ms 234mb $649 $709
425mb PRO425 3.5" Half Height 8ms 406mb $899 $959

ELS drives have 32K cache, low power consumption, MTBF of 250,000 hrs and TWO Year Warranty. LPS drives have 4K-256K cache, MTBF of 500,000 hrs, and TWO Year Warranty. GoDrives have 32K cache, low power consumption, MTBF of 150,000 hrs, and ONE Year Warranty.

Maxtor 3.5" Disk Drives

Unformatted Model Product Description Actual MAC Capacity Internal External
120mb 7120XT 3.5" Low Profile 15ms 121mb $349 $409
207mb 7213 3.5" Low Profile 15ms 202mb $Call $Call
330mb LXT-340 3.5" Half Height 15ms 324mb $389 $399
535mb LXT-535 3.5" Low Profile 15ms 510mb $1219 $1279
645mb XT-6760S 5.25" Full Height 16.5ms 533mb $1349 $1449
1.2GIG PC-125 5.25" Full Height 12ms 997mb $1729 $1829
1.7GIG PC-175 5.25" Full Height 13ms 1433mb $2199 $2299

Motorola 5.25" Disk Drives include a ONE Year Warranty. Motorola 3.5" Disk Drives include a TWO Year Warranty. Internal Full Height Drives fit the Mac II, IIx, II+, and Quadra 800 only.

Tape Backup Systems

Capacity Model Description Media Access Time External
155mb Teac MT2ST/NSO Analog CT600N 5-7MB/s $489
600mb Teac MT2ST/F50 Analog CT600F 7-10MB/s $999
2.0GIG WangDAT 1300XL DAT, DDS 4mm 10-15 MB/s $1329
3.5GIG WangDAT 3920 DAT, DDS-DC 4mm 10-15 MB/s $1549
2.0GIG HP 5570A DAT, DDS 4mm 10-15 MB/s $1389
3.5GIG HP 55480A DAT, DDS-DC 4mm 10-15 MB/s $1819
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$759
SyQuest ClubMac Dual 88mb
$979
SyQuest ClubMac Dual 44mb & 88mb*
$949

44mb Cartridge (10 pack-$56 each)
$64

88mb Cartridge (10 pack-$96 each)
$99

Seagate Optical Drives

Unformatted Model Product Description Actual MAC Capacity Internal External
248mb ST3283 3.5" Low Profile 12ms 235mb $659 $719
420mb ST1408N 3.5" Half Height 14ms 406mb $1059 $1119
525mb ST1501N 3.5" Half Height 14ms 500mb $1198 $1258
1.2GIG ST1220N 3.5" Half Height 10.5ms 100mb $2119 $2179
320mb ST43400N 5.25" Full Height 10.5ms 100mb $1249 $1349
645mb ST4762N 5.25" Full Height 15ms 633mb $1825 $1885
645mb ST4767N 5.25" Full Height 11.9ms 634mb $1549 $1649
1.6GIG ST41200N 3.5" Half Height 17ms 130mb $2099 $2199
2.1GIG ST42100N 3.5" Half Height 19.5ms 190mb $2949 $3049
1.6GIG ST41600N 5.25" Full Height Elite-1 11.5ms 1307mb $2399 $2499
2.4GIG ST42400N 5.25" Full Height Elite-2 11ms 2050mb $3299 $3399
3.4GIG ST43400N 5.25" Full Height Elite-3 11ms 2700mb $4999 $5099

Seagate Drives include a ONE Year Warranty.

Call for more information

Call 1-800-258-2650

ClubMac Optical Drives

Model Capacity Description Seek External
CMO-DD3000 Teac 126mb 3.5" Half Height 45ms $1195
CMO-LF3004 Panasonic 126mb 3.5" Half Height 45ms $1185
CMO-3100EE Ricoh 126mb 3.5" Half Height 45ms $1249
CMO-3600 Ricoh 594/652mb 5.25" Full Height 28ms $2995
CMO-5030EE Ricoh 594/652mb 5.25" Full Height 66.7ms $2149
128mb Cartridge 3.5" Single Sided $39
594/652mb Cartridge 5.25"-512/1024 bytes/sec $99

All ClubMac Optics include ONE cartridge and ONE Year Warranty.
### RASTEROPS®

**THE ART & SCIENCE OF COLOR**

<table>
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<tr>
<th>Color Display Adapters</th>
<th>Gray Scale/Monochrome</th>
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<tr>
<td>RasterOps ProColor 32</td>
<td>$3195 ClearVue/GSXL $449</td>
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<td>RasterOps PaintBoard 24</td>
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<td>RasterOps PaintBoard Lj</td>
<td>$829 ClearVue/LC $309</td>
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<td>RasterOps 24Mx</td>
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<td>RasterOps MixQ</td>
<td>$1165 ClearVue/GS30 $619</td>
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<td>RasterOps 24Sx</td>
<td>$619</td>
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<tr>
<td>ColorBoard 264/SE30</td>
<td>$999 All RasterOps products are backed by a 3 Year Warranty</td>
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<tr>
<td>RasterOps 8XU</td>
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<td>RasterOps 8BL</td>
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### NEC

**Silentwriter Model 95**

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<th>MultiSync Monitors</th>
<th>$1378 MultiSync 3FGx</th>
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<td>Mac FG 8X Interface</td>
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<td>Mac FG 24X Interface</td>
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### DAYSTAR

**PowerCache**

- (Mac LC, SE/30, I1x, Icx, IIsi, IIsJ)
  - $575 33 MHz PowerCache
  - $799 40 MHz PowerCache
  - $795 40 MHz PowerCache with 68882
  - $1149 50 MHz PowerCache

**Cache Cards**

- (Mac IIfx model includes DualPort Adapter)
  - FastCache IIfx $298
  - FastCache IIfx with 68882 $375
  - FastCache IIsi $216
  - FastCache 040 (128K cache for Q700/900) $265

- Expansion Boards for Mac LC & IIsi
  - PowerMath LC $115

**All RasterOps products** are backed by a 3 Year Warranty

---

### New Lower Prices

<table>
<thead>
<tr>
<th>PowerCache</th>
<th>$575 33 MHz PowerCache</th>
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<tr>
<td>MACCON 3.64K Thick/Thin/10BaseT (Most MACs)</td>
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<tr>
<td>MACCON+ 64K Thick/Thin or Thick/10BaseT</td>
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<tr>
<td>Friendly Net Adapter Thick or Thin or 10BaseT</td>
<td>$79</td>
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<td>EN/SC10T SCSI Etheret with 10BaseT</td>
<td>$248</td>
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<td>EN/SC10TPB SCSI Etheret with 10BaseT for PowerBooks</td>
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<td>EN/SC SCSI Etheret w/ Thick, Thin, 10BaseT</td>
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<td>EN/SCPB SCSI Etheret w/ Thick, Thin, 10BaseT for PowerBooks</td>
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<tr>
<td>10Th-hub12 - 12port 10BaseT Hub</td>
<td>$499</td>
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<td>10Th-hub8 - 8port 10BaseT Hub</td>
<td>$249</td>
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<tr>
<td>AH11012 - 12port Smart Hub (Upgradable to SNMP)</td>
<td>$625</td>
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<td>AH17012 - 12port Smart Hub with SNMP</td>
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<tr>
<td>AH1702 - AH1012 W/Asante VIEW SW</td>
<td>$949</td>
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<tr>
<td>AH1704 - AH1701 W/Asante VIEW &amp; SNMP</td>
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### Macintosh Memory

- **PowerBook 140/170**
  - 2MB Memory Module $117
  - 4MB Memory Module $195
  - 6MB Memory Module $245
  - Quadra 950
    - 16mb Module $269
    - 256 VRAM $33

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<td>16MB X 8 - 80ns</td>
<td>$479</td>
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<tr>
<td>Video (Q700/900)</td>
<td>$265</td>
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### Modems • Modems • Modems

- **SupraFAXmodem**
  - 14.400 Baud FAX/MODEM/V.32bis, V.42bis w/ microphone and faxSTF & cables | $359 |
  - 14.400 Baud, FAX/MODEM, V.32bis, V.42bis w/ Quickklink II & cables | $359 |

- **VIVA Fax Modem**
  - 14.400 Baud, V.32bis, V.42bis w/ microphone and faxSTF & cables | $359 |
  - 14.400 Baud, V.32bis, V.42bis w/ Quickklink II & cables | $359 |

- **Telebit Worldblazer (T-3000)**
  - 14.400 Baud, 19,200 Baud using PEP, V.32bis, V.42bis | $669 |

- **PSI**
  - ComStation(24/4848 S4 fax modem) $159 PowerPort Bronze(24/48 S4 fax modem) $215 |
  - ComStation(4/40 S4 fax modem) $515 PowerPort Silver(64/64 S4 fax modem) $435 |
  - PowerModem(24/48/48 S4 fax modem) $199 PowerPort Gold(14/40 S4 fax modem) $595 |
  - PowerModem 10-42 (24/48 S4 fax modem V.42bis, V.42bis) $249 |

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### Graphic Displays

- **SuperMatch 20” Dual Mode Trinitron** $2499
- **SuperMatch 17” Multimode Color** $1089
- **21” Platinum (Black and White)** $999

### Digital Video Boards / Acceleration

- **Video Spiqot (NuBus or IIsi)** $499/119
- **Spiqot and Sound (NuBus)** $755/$193
- **VideoSpiqot Pro (NuBus or IIsi)** $193/$355
- **ThunderStorm** $SCall

### Graphic Cards

- **Spectrum/24 Series III** $1175
- **Spectrum/24** $755
- **Spectrum/24 Accelerator** $419
- **Spectrum/24 PQO** $829

### ClubMac

- 3 Marsick • Irving, CT 06240
- 1-800-258-2650

### Sales, Info, Int'l Technical Support 24 Hour Fax Line

- (714)768-5130 • (714)768-1490 • (714)766-8354

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Seeking Macintosh information, and lots of it? Look no further than MACWORLD Expo/San Francisco 1993. MACWORLD Expo has it all; there's amazing exhibits, brand new products and Macintosh excitement. And if you're seeking concentrated, in-depth information on a variety of subjects, look no further than the MACWORLD Expo Conference Program.

Creative Vision In A Changing World
MACWORLD Expo/San Francisco 1993

The Conference Program at MACWORLD Expo/San Francisco 1993. TWELVE Conferences in One!
The MACWORLD Expo/San Francisco 1993 Conference Program offers more insight and expertise than ever before. To get your Macintosh "drive" up and running in the morning, the Keynote Address by Apple Computer and friends is an absolute must. Plan to attend up to 12 intensive conferences whose topics reflect the growing sophistication of Macintosh users. With MACWORLD Expo's one-price conference admission, you can create your own agenda. Spend as much time as you'd like at any or all of these conference seminars:

1. The Design Conference. Pushing the desktop envelope. Electronic prepress expertise. Professional color input/output. 3-D modeling and rendering. Interactive publishing.
2. The Enterprise Computing Conference. Tools and technologies available (and on the horizon) to address development issues facing IS departments, including client/server, cross-platform, GUI, object-oriented design, and more.
3. The Programmer/Developer Conference. For in-house developers, veteran independents, and novice Mac techies alike: the latest on IAC, AppleEvents, OCE; database engine technology; XTND; transitions from mainframes to Macs; and more.
4. The How-to-Get-Started Conference. Complete guidelines for those who are brand-new to the Mac, or need a concentrated lesson on popular Mac applications.
5. The Advanced User Conference. Experienced users share their expertise for getting more mileage out of the PowerBook, desktop publishing, and System 7's power user features.
6. The Connectivity Conference. Users and vendors share insights on flourishing in a multi-platform environment, cross-platform databases, understanding client/server technology, Mac/PC integration on a LAN, Macs and UNIX workstations battling for your desktop.

7. The Science/Technology Conference. Stellar applications of the Macintosh in laboratory and scientific settings, plus user feedback and industry updates on the Mac's role as a computing platform in these areas.
8. The Home Office/Small Business Conference. Reduce the chaos and maximize your efforts in a Mac home/small business. Look at hardware/software designed to save you time and money, and seek disaster-avoidance strategies.
10. The Special Interest Group Conference. Compare Mac notes with others in a similar setting — and develop an invaluable "user network." Here you will find sessions on the Mac in law, health care and real estate.
12. The Education Conference. Fourteen education-specific sessions make this the world's largest and most information-rich collection of Macintosh topics designed especially for educators! An excellent opportunity for educators, administrators, and students nationwide to show and be shown new and classic examples of the Mac as a teaching tool — including multimedia, CD-ROM, HyperCard, networking, QuickTime for teachers, the Mac in math and science, and much, much more.

And don't miss the UGWUMP (User Group Welcoming/Unwinding/Meeting Place)
— MACWORLD Expo's "People Networking Parlor" for user groups. Share success stories, exchange newsletters and literature. Learn how to start a user group in your area!
We’re pleased to offer a complete package of savings, discounts, and convenience to make your MACWORLD Expo/San Francisco experience even more enjoyable. Whether you’re flying, driving, or staying overnight, we have you covered! Let’s start by getting you to San Francisco—

**AA Save Up To 38% on American Airlines!**

You’ll receive substantial savings when you fly American Airlines to MACWORLD Expo/San Francisco. As the official airline of MACWORLD Expo, American is again pleased to offer discounts of up to 38% on your fare. Dial 1-800-433-1790 and ask for Star File #S-0113AL. You’ll automatically receive the preferred rates.

**Hertz Discounts**

If you’re planning to rent a car, you’ll get a great rate from Hertz. Call 1-800-654-2240, ask for Meeting #2285, and be sure to tell the reservations operator you’re attending the best Macintosh show, MACWORLD Expo.

**Preregistration Savings**

Preregister for MACWORLD Expo/San Francisco by December 1 to save $15 on all Conference Sessions* and Exhibits ($75 now vs. $90 cash at the door), or $10 on Exhibits-only admission ($20 now vs. $30 cash at the door). When you preregister, you receive your admission badge in advance so you can walk right into MACWORLD Expo. There’s no waiting in line.

**SPECIAL EXPO OFFER:**

**6 Issues of Macworld Magazine**

Your registration fee to MACWORLD Expo/San Francisco will include a six-issue subscription to Macworld Magazine. To receive your six issues, simply fill out the Special Expo Card at one of the Macworld booths during the show. Your first issue of Macworld Magazine will be mailed to you soon after the conclusion of MACWORLD Expo.

**Early Bird Registration**

If you miss the preregistration deadline on December 1, you can still register before the start of the show! On-site Early Bird Registration is from 11 a.m. to 3 p.m. on January 5, at the full registration rates of $90 (cash at the desk) for all Conference Sessions*, Exhibits, and $30 for Exhibits-only admission (cash at the desk).

**Prerecorded Information**

To listen to prerecorded information about MACWORLD Expo/San Francisco 1993, call the MACWORLD Expo Information Hotline at 617-361-3941 (24 hours a day, seven days a week). We’ll see you in San Francisco!

**Hotel Accommodations and Sweepstakes!**

Every San Francisco-area hotel listed below is offering MACWORLD Expo discounts and participating in the MACWORLD Expo Hotel Sweepstakes! To receive the preferred rates and enter the sweepstakes, simply call one of the hotels and mention you’re going to MACWORLD Expo.

There’s a limited number of rooms available at preferred rates, so make your plans early! When making your hotel reservation, and your choice/reservation is indicated on your preregistration form, you will automatically be entered to win one of three prizes. Every participating hotel will have a first, second, and third prize winner:

**First Prize:** MACWORLD Expo will pay for your hotel (room & tax for one reservation only) for the duration of your stay at the Expo! (Four nights maximum.)

**Second Prize:** MACWORLD Expo will pay for your hotel (room & tax for one reservation only) for the duration of your stay at the Expo! (Four nights maximum.)

**Third Prize:** MACWORLD Expo will reimburse you for your preregistration fee: $20 Exhibits Only, or $75 Conference and Exhibits! (Registration for one person only.)

**Note:** To qualify, please indicate on your preregistration form the name of the hotel you will be using (Question #52). Please be sure to mention MACWORLD Expo, and make your reservation before the December 1 preregistration deadline.

**Shows Hours**

<table>
<thead>
<tr>
<th>Exhibition Hours</th>
<th>Conference Hours</th>
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<tbody>
<tr>
<td>Jan. 6: 10 a.m. - 6 p.m.</td>
<td>10:30 a.m. - 5:30 p.m.</td>
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<td>Jan. 7: 10 a.m. - 6 p.m.</td>
<td>10:30 a.m. - 5:30 p.m.</td>
</tr>
<tr>
<td>Jan. 8: 10 a.m. - 6 p.m.</td>
<td>10:30 a.m. - 5:30 p.m.</td>
</tr>
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<td>Jan. 9: 10 a.m. - 4 p.m.</td>
<td>10:30 a.m. - 3:30 p.m.</td>
</tr>
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</table>

*All conference sessions are a first, second, third prize winner. MACWORLD Expo is sponsored by Macworld, the Macintosh Magazine, an IDG Communications publication. MACWORLD Expo/San Francisco is an independent trade show produced by World Expo Corporation, and managed by Michal Hall Associates and not affiliated with Apple Computer, Inc. Mac and Magneto are trademarks of Apple Computer, Inc. World Expo is an IDG company, the world’s leader in information services on information technology.
Kaleidoscope of Discovery

Wednesday, January 6 - Saturday, January 9, 1993 at Moscone Center

When you look out over the exhibit floor at MACWORLD Expo, it’s like looking through a kaleidoscope. Just a slight turn to the left or right, and you get an entirely new and fantastic view. In every direction, there’s something different. Something dynamic. Something daring.

These new and fantastic sights are what MACWORLD Expo is all about: presenting a creative vision to stay ahead of our changing world. At MACWORLD Expo, the Macintosh becomes a kaleidoscope, an instrument of constant change and fascination.

What You Seek Is What You Get

As the world’s largest Macintosh event, MACWORLD Expo showcases uses and applications for the Mac in Networking, Spreadsheet Analysis, Databases, Education, Research, Word Processing, Accounting, Law, CAD/CAM, Forecasting, Design, Publishing, Illustration, Animation, Music, Programming, Entertainment and Multimedia (to name but a few.)

What you seek is what you get: you’ll find all the latest in hardware, software, peripherals and services at MACWORLD Expo!

MACWORLD Expo/San Francisco 1993: When and Where

This year’s MACWORLD Expo/San Francisco promises to be bigger and better than ever: over 500 companies will cover 300,000 square feet of space at San Francisco’s newly expanded Moscone Center. Mark your calendars for January 6-9 to see the Macintosh at its absolute best.

The Conference Program

In addition to the 500-company strong Exhibition, MACWORLD Expo/San Francisco also offers a complete Conference Program of intensive seminars. Guided by a distinguished faculty comprised of those who truly lead the Macintosh industry, as well as cutting edge users who are driving the demand for technology, the Conferences offer insights that are simply not available anywhere else. You can expect to come away from MACWORLD Expo smarter, more productive, and inspired!

The Education Conference

If your specialty is education, assign yourself to MACWORLD Expo’s MacResource Center. Sponsored by Apple Computer, Inc. and A+ Publishing, the Center is a place for Macintosh-using educators to take a break from the show floor, discover new software solutions and review the Official MACWORLD Expo Guide for Educators. Visit the Center and you may be eligible to win free software, Apple gifts, or a brand new PowerBook computer.

If You’re Used to Looking at Life Through a Window, May We Recommend a Kaleidoscope?

If you’re a committed DOS user, MACWORLD Expo/San Francisco still has something for you. First, you’ll see the unique advantages offered by the Macintosh; you’ll find solutions on the Mac that are just not possible with DOS. You’ll also learn about Mac/DOS connectivity and how to take best advantage of both systems. To put the power of Macintosh to work for you, make your Mac connection at MACWORLD Expo/San Francisco!

The Multimedia Conference

The demand for multimedia sessions at MACWORLD Expo has grown so great that we’ve developed a separate, full-scale, two-day program to accommodate all the multimedia topics you’ve been requesting — and more! More than 20 multimedia sessions will dazzle and delight attendees with: real-world experiences of multimedia users fresh from the trenches; popular-demand topics on creating exceptional quality productions and presentations with both high-end and low-end multimedia tools; state-of-the-art reports from the industry’s leading vendors on the most exciting new developments in the hottest multimedia technologies; an invaluable treasury of how-to tips, insights and guidelines; and how users are applying multimedia technologies to deliver the most powerful messages possible to a target audience.

Don’t Miss Out on Incredible Preregistration Savings

Preregister NOW for MACWORLD Expo/San Francisco to take advantage of incredible savings! When you return the attached preregistration card with your payment by December 1, you’ll save $15 on all Conference Sessions* and Exhibits ($75 now vs. $90 cash at the door), or $10 on Exhibits-only admission ($20 now vs. $30 cash at the door). Preregistration not only saves you money, it also saves you time. When you preregister, we send you your admission badge early so you can walk right into MACWORLD Expo. No fuss. No waiting. You get a jump on the thousands of people expected at the Expo!

The deadline to receive your preregistration discount is fast approaching. Fill out the attached form today and send it in with your payment by check or credit card. If the registration form is missing from this ad, or if you have any other questions, call the pre-recorded MACWORLD Expo Information Hotline at 617-361-3941. Then get ready to see Macintosh’s creative vision in a changing world. You’ll see wonderful things through the kaleidoscope of MACWORLD Expo.

MACWORLD EXPOSITION

Recycled Paper
**PREREGISTER FOR MACWORLD EXPO/SAN FRANCISCO**  
**BY DECEMBER 1 AND SAVE $10 TO $15**

The largest Macintosh event in the world will be in San Francisco from Wednesday, January 6 through Saturday, January 9, 1993 at Moscone Center. And when you preregister by December 1, you’ll save time and money.

Please choose your package and fill out the form completely. Incomplete forms will be returned.

**One form per person; make photocopies for additional people.** Please do not staple check to form. Registration forms received after December 1 will be returned. **PURCHASE ORDERS CANNOT BE ACCEPTED. ALL REGISTRATION FEES ARE NONREFUNDABLE.** Send completed forms to:

**MACWORLD Expo/San Francisco**  
P.O. Box 4010  
Dedham, MA 02026

Please register me for:  

- **Package One $75**  
  Conference sessions’ and exhibits. Preregister by December 1 ($90 cash only at the door).

- **Package Two $20**  
  Admission to exhibits only. Preregister by December 1 ($30 cash only at the door).

Please send my registration badge and further information to:

- **U.S. Attendees:** You will be mailed your badges on or about December 20. Be sure to check box indicating where badge should be sent.  
- **International Attendees** (including Canadian): Your badge will be held for pick-up at the Non-U.S. Preregistration counter at Moscone Center for pickup beginning Tuesday, January 5. If you want your badge sent to you instead, check the appropriate box below and add $45 to your preregistration fee. Fill in your exact street address (no P.O. boxes) and include your telephone number and country code. We will Federal Express your badge directly to you.

**Special Expo Offer**  
6 issues of MACWORLD Magazine: Your registration fee to MACWORLD Expo/San Francisco will include a six-issue subscription to Macworld magazine.

To receive your six issues, simply fill out the Special Expo Card at one of the Macworld booths during the show. Your first issue of Macworld Magazine will be mailed to you soon after the conclusion of MACWORLD Expo.

**Check if applicable.** I’m an international attendee and would like my badge shipped by Federal Express. Enclosed is an additional $45.

Please send my registration badge and further information to:

- **Company Address**

Please check one:  

- **Home Address**

Please fill in your exact MACWORLD Expo/San Francisco street address (no P.O. boxes) and include your P.O. Box, telephone number and country code. We will Federal Express your badge directly to you.

Please check if applicable. I’m an international attendee and would like my badge shipped by Federal Express. Enclosed is an additional $45.

If mailing to company address:

- **Title**

- **Company**

- **Address**

**Account Number**

Expiration Date (include all numbers) __/___/___

Card Holder Signature (Signature necessary to be valid)

If card holder is other than registrant, please print cardholder’s name below:

Last Name ______________________ First Name ______________________

Cash only at the door. After December 1, you must register at the show.

Please check the appropriate information:

|----------------------------|-----------------|-----------------------|-------------|-------------------------------|--------------|---------------------------------|---------------|----------------|-----------------|---------------------|-----------------|------------------|-----------------|-----------------|-------------------|-------------------|-----------------|

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

- **Macintosh (128K, 512K(E))**
- **Macintosh Plus**
- **Macintosh Classic/Classic II**

**Which hotel are you using?**

- **MACWORLD Expo Hotel**

**Sweepstakes by entering your participating hotel choice here:**

*MACWORLD Expo conference sessions are on a first-come, first-served basis with no guaranteed seating and are subject to change without notice. All registration fees are nonrefundable. Do not staple check to form; combine forms with check or money order to MACWORLD Expo, P.O. Box 4010, Dedham, MA 02026.
**Magic Hard Working Tools For Your Macintosh**

**Publications and Awards**

- "THE BEST DESIGN & CONSTRUCTION FOR THE MONEY" - MACUSER MAGAZINE, JULY 1992
- "WINNER OF THE 1992 MACWORLD MAGAZINE EDITOR'S CHOICE AWARD!" - NOVEMBER 1992

**Magic ModeMs**

<table>
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<th>Model</th>
<th>Description</th>
<th>Speed</th>
<th>Price</th>
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<tr>
<td>Magic AFX</td>
<td>2400bps modem, 9600/14400bps fax, class 1, Group 2 &amp; 3 fax, software</td>
<td>2400bps</td>
<td>$89</td>
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<tr>
<td>Magic FX V.42</td>
<td>2400bps modem, 9600bps send &amp; receive class 2 &amp; Group 3 fax, software</td>
<td>$139</td>
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<tr>
<td>Magic FX V.32</td>
<td>2400bps modem class 2, Group 3 fax, V.42bis &amp; MNP5, software</td>
<td>$189</td>
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<tr>
<td>Magic VX V.32bis</td>
<td>14400bps modem, 14400bps class 2, Group 3 fax, V.42bis/V.32bis &amp; MNP5, software, cable</td>
<td>$289</td>
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**Magic Hard Drives**

- **40MB Hard Drive** $175
- **520/1020MB Quantum LP** $219/$329/$359
- **240/425MB Quantum** $599/$999
- **425/520MB Fujitsu** $1199/$1299
- **80MB Toshiba** $1350
- **Magic 1.2GB Seagate** $1999
- **Magic 1.5GB Micropolis—5 Yr Warranty** $2099
- **Magic 2.1GB Seagate** $2799

**Magic 256/128 Optical**

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<tr>
<th>Model</th>
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<tr>
<td>Magic 45R &amp; 88R</td>
<td>Tape Included With All Magic Optical Drives</td>
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<td>Magic 14400bps</td>
<td>Magic 150/250MB Tape Backup</td>
<td>$599</td>
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<td>Magic 2400bps</td>
<td>Magic 525MB/600MB Tape Backup</td>
<td>$999</td>
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<td>Magic 3.5&quot;</td>
<td>Magic 2.0GB DAT Backup</td>
<td>$1299</td>
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<td>Magic 4.1GB</td>
<td>Magic 1.0GB DAT Backup</td>
<td>$1499</td>
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<td>Magic 6.0GB</td>
<td>Magic 2.3GB DAT Backup</td>
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<td>Magic 5.0GB DAT Backup</td>
<td>$3799</td>
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**Magic CD-ROM**

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<tr>
<td>Magic CD-ROM</td>
<td>Magic Toshiba CD-ROM (XM3321)</td>
<td>$549</td>
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<tr>
<td>Magic NEC CD-ROM (CDR74)</td>
<td>Magic Toshiba CD-ROM (XM3321)</td>
<td>$699</td>
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</tbody>
</table>

**Magic Tape**

- **Magic Tape** $599
- **Magic 1.0GB DAT Tape Backup** $1499
- **Magic 2.0GB DAT Tape Backup** $2895
- **Magic 3.0GB DAT Tape Backup** $3799

**Magic SCSI**

- **Magic CD-ROM** $3799
- **Magic 5.0GB DAT Tape Backup** $1499
- **Magic 2.3GB DAT Tape Backup** $2895
- **Magic 3.0GB DAT Tape Backup** $3799

**Magic CD-ROM**

- **Magic Toshiba CD-ROM** $549
- **Magic NEC CD-ROM** $699

**Magic CD-ROM**

- **Magic Toshiba CD-ROM (XM3321)** $549
- **Magic NEC CD-ROM (CDR74)** $699

**Magic III I & Mirror Card** $299

**Magic III I Cable** $49

---

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---

**New! Magic AFX-24/96 PowerBook FaxModem**

- Mounts internally in any Macintosh PowerBook, Group 3, Class 1 Fax

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**Magic CD-ROM**

- **Magic Toshiba CD-ROM (XM3321)** $549
- **Magic NEC CD-ROM (CDR74)** $699

**SCSI Accelerator**

- **Magic III I & Mirror Card** $299
- **Magic III I Cable** $49

---

**Magic Hard Drives**

- **40MB Hard Drive** $175
- **520/1020MB Quantum LP** $219/$329/$359
- **240/425MB Quantum** $599/$999
- **425/520MB Fujitsu** $1199/$1299
- **80MB Toshiba** $1350
- **Magic 1.2GB Seagate** $1999
- **Magic 1.5GB Micropolis—5 Yr Warranty** $2099
- **Magic 2.1GB Seagate** $2799

**Magic 256/128 Optical**

- **Magic 45R & 88R** $549/$999
- **SyQuest 45 & 88 Cartridges** $699/$119

---

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RAILGUN 030 PRO *

030 Accelerators with Built-in Video Output,
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LZfSet/Realtech/Quickset 8MB Kit ... $499
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NEC Silentwriter Model 95 2MB .......... $159
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B E S T D E L I V E R Y , C A N I N S U R E

B E S T Q U A L I T Y , C A N I N S U R E

B E S T S A T I S F A C T I O N , C A N I N S U R E

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B E S T P R I C E , C A N I N S U R E

B E S T V A L U E , C A N I N S U R E

B E S T Q U A L I T Y , C A N I N S U R E

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MICROSOFT WORD $ 310

QUARK XPress 3.1 $ 545

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High Quality Pressure-Sensitive Graphics Tablet w/Cardless Pen

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<table>
<thead>
<tr>
<th>Model</th>
<th>RAM</th>
<th>Hard Drive</th>
<th>Price</th>
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<tr>
<td>MAC Classic II, 4MB</td>
<td>40MB</td>
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<td>MAC LC II, 4MB</td>
<td>40MB</td>
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<td>3999.00</td>
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<td>PowerBook 145, 4MB</td>
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<tr>
<td>Other PowerBooks</td>
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<td>425.00</td>
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## Monitors

<table>
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<tr>
<th>Model</th>
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<tr>
<td>Apple 12&quot; RGB</td>
<td>399.00</td>
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<td>Apple 13&quot; RGB</td>
<td>599.00</td>
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<td>Apple 16&quot; RGB</td>
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<td>Lapis GS Portrait</td>
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<td>Lapis Mono Portrait w/card</td>
<td>599.00</td>
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<td>Radius Pivot Mono</td>
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<td>Sigma Power Portrait</td>
<td>699.00</td>
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<td>Seiko CM1445&quot;</td>
<td>569.00</td>
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<td>Sony 1304 14&quot;</td>
<td>659.00</td>
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<td>Sony 1320 for LC II only</td>
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## Printers

<table>
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<th>Model</th>
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<td>Stylewriter</td>
<td>349.00</td>
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<tr>
<td>Personal Laser LS</td>
<td>599.00</td>
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<td>Personal Laser NTR</td>
<td>1698.00</td>
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<td>Laserwriter IIF</td>
<td>2794.00</td>
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<td>Laserwriter IIg</td>
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<td>1459.00</td>
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<td>GCC WIDEBRIDGE 360</td>
<td>1459.00</td>
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<td>HP Deskwriter C</td>
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## Peripherals

<table>
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<th>Model</th>
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<td>89.00</td>
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<td>Apple Extended Keyboard</td>
<td>159.00</td>
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<td>HP ScanJet Ic</td>
<td>1399.00</td>
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<td>Imagic Twincom H4 Fax/Modem</td>
<td>349.00</td>
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<td>Kensington TurboHouse</td>
<td>129.00</td>
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<td>Lapis VideoCard 8 Bit Color</td>
<td>159.00</td>
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<td>Apple 16&quot; Monitor</td>
<td>379.00</td>
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<td>MacPro Plus Keyboard</td>
<td>139.00</td>
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<td>PSI Powerbook Fax/Modem</td>
<td>199.00</td>
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<tr>
<td>Raster Ops 26 SX Card</td>
<td>599.00</td>
</tr>
<tr>
<td>Radius 25X Card</td>
<td>599.00</td>
</tr>
</tbody>
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From the company that made optical storage affordable comes the new DGR 256REM, offering more removable data storage than ever before in a 3.5 inch magneto-optical format. The 256REM packs 256 megabytes of data on 3.5 inch cartridges – double the capacity of existing 128MB optical drives. That's 256MB of fast storage for storing scanned images, quicktime movies, audio files, or archiving critical data. And, of course, when you use up all 256MB, simply insert another inexpensive 256MB cartridge and you’re ready to go.

The DGR 256REM boasts over a 50 percent increase in performance over current industry standards for magneto-optical technology. With an average access time of 35ms and a rotational speed of 2400rpm, all-out performance translates into transfer rates up to 1,228kb per second.

The new 256REM can read and write to current 3.5 inch optical drives making it compatible with your existing 128MB formatted data. It also conforms to both ANSI and ISO standards. Multiple cartridges can be formatted for different machines, making it a versatile player in a multi-platform environment.

DGR also manufactures the high performance 128REM Turbo optical and the economical 128REM optical. All DGR drives come ready to use - complete with cartridge, one year warranty, toll-free technical support, and a 30-day money back guarantee. DGR Price. DGR Performance. DGR Reliability. DGR Technologies.

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  - CALL
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  - CALL
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  - CALL
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  - CALL
- **Apple LaserJet**
  - CALL
- **Apple LaserWriter NTR**
  - CALL
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- **Apple LaserWriter IIG**
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  - CALL
- **PlusWriter**
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  - CALL
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  - CALL
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The ETC DataPress offers a robust bouquet of features that includes "real-time" hardware data compression, SCSI bus expansion, and more at a price that is pleasing to the palette.

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The DataPress, which ships with More Disk Space™ by Alysis, offers the fastest and most complete system for squeezing space out of your hard disk drive. And its speed is unparalleled. The DataPress doesn't use slow background software tricks. When it writes a file to your hard disk, the data is compressed—"real-time"—so that there is no chance of lost data or time.

Plus, it's easy to use. Just plug the DataPress into the SCSI port on your Macintosh, and install the software. From there, the DataPress can transparently compress and decompress any file anywhere on your SCSI chain—including those on your internal drive! Just save a file and it's compressed. It's that easy.

Besides data compression, the DataPress enables you to expand the capabilities of your SCSI bus. It is a gateway to another complete SCSI chain of seven additional devices. And there's more. At the core of the DataPress is ETC's SmartPeripheral™ Engine, an innovation that brings dumb peripherals to life. Empowering them to do things they've never done before. In this engine we've used a Flash EPROM that allows you to add future SPE Options by "double-clicking" on an auto-installing icon.

What are SPE Options? These are programs that run on the DataPress to add features like: disk mirroring, super volumes, RAID, encryption, and continuous off-line storage of removable magnetic media.

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<thead>
<tr>
<th>Warranty</th>
<th>Third Wave DAT Drive</th>
<th>The Other Guys</th>
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<tbody>
<tr>
<td>Price</td>
<td>5 years 1395.00</td>
<td>2 years 1399.00</td>
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<tr>
<td>Compression (GB)</td>
<td>1595.00</td>
<td>1699.00 (5GB)</td>
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<tr>
<td>Firmware Upgrade From Tape</td>
<td>Chip replacement</td>
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<td>Upgrade Method</td>
<td>User Install Vendor Install</td>
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<td>Form Factor</td>
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<tr>
<td>MTBF</td>
<td>50,000 hours 40,000 hours</td>
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<tr>
<td>Software</td>
<td>Retrospect Retrospect</td>
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**SOFTWARE RETROSPECT**

- Optical 128P: 1299.00
- Optical 128S: (5-year warranty) 1499.00
- Optical 600: (5-year warranty) 2099.00
- 45 SR (SyQuest) w/cassette: 446.00
- 80 SR (SyQuest) w/cassette: 575.00
- DATdrive 2GB: 1385.00
- DATdrive 5GB (five year warranty): 1695.00

**DISK DRIVES**

<table>
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<tr>
<th>MTBF</th>
<th>Internal</th>
<th>External</th>
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<tr>
<td>50,000 hours</td>
<td>40,000 hours</td>
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**DAT**

- Go 80**: 459.00 529.00
- Go 120**: 519.00 609.00
- 120 MB: CALL CALL
- 240 MB: 1199.00 1299.00
- 830 MB: 1419.00 1519.00
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<table>
<thead>
<tr>
<th>DAT Model</th>
<th>INTL</th>
<th>EXTL</th>
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<tbody>
<tr>
<td>APSDAT 1299</td>
<td>$199</td>
<td>$1699</td>
</tr>
<tr>
<td>2.6-5 GB Compression DAT Desktop and Portable Units: Archive-Based Mechanisms. Call for Maxell 60- &amp; 90-meter tapes. Ask about our Internal DATs for Quadra 900/950</td>
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<tr>
<th>Maxtor Model</th>
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<tr>
<td>MB 120</td>
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<td>213</td>
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<td>760</td>
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<td>1.2G</td>
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<td>MB 52</td>
<td>$229</td>
<td>$299</td>
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<td>Go • 80</td>
<td>399</td>
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<tr>
<td>Go • 120</td>
<td>499</td>
<td>N/A</td>
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<tr>
<td>105</td>
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<td>SQ-555</td>
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<td>SQ-5110</td>
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<tr>
<td>MB 520</td>
<td>$1149</td>
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<td>1.2G</td>
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<th>Toshiba Model</th>
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<tr>
<td>CD-ROM 330IB</td>
<td>$699</td>
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<tr>
<td>Includes APS Reference &amp; Entertainment Library</td>
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<th>Toshiba Model</th>
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<tr>
<td>MB 830</td>
<td>$1349</td>
<td>$1449</td>
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</table>

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Silhouette Trackball ................. $85
Curtis MVP Trackball ............... $85

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CAPITALIST PIG
32
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118
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MACINTERCOMM
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KODAK ESSO WITH M-POWER PRO...358
MAXTOR 60 MB EXTERNAL...316
MULTI-AD CREATOR...499
NEC DIAL IN MODEM...506
NORTON UTILITIES 2.0...58
VIDIO PRESENTER PRO...229

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**Optical Drives**

256 MB 3.5" Optical

Puma 128 MB 3.5" $1399
Puma 256 MB 3.5" $1699

All PowerCards & PowerCaches come brand new, in original DayStar boxes. All sales final.
## Hardware

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
</tr>
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<tbody>
<tr>
<td>CM1440 Hi-Res Monitor</td>
<td>539.00</td>
</tr>
<tr>
<td>PowerCache 33MHz</td>
<td>639.00</td>
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<tr>
<td>PowerCache 40MHz</td>
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<td>PowerCache 50MHz</td>
<td>1299.00</td>
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<td>Rocket 25</td>
<td>1299.00</td>
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<td>Rocket 25mHz</td>
<td>1615.00</td>
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<td>Rocket 33mHz</td>
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## Mass MicroSystems

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<tr>
<th>Description</th>
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<tr>
<td>DataPAK 45</td>
<td>499.00</td>
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<tr>
<td>DataPAK 88</td>
<td>699.00</td>
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## Input Devices

<table>
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<tr>
<td>StringRay Trackball</td>
<td>55.00</td>
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<tr>
<td>Kensington Turbo Mouse 4.0</td>
<td>105.00</td>
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<tr>
<td>Software Tools</td>
<td>345.00</td>
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<td>Miracle Piano</td>
<td>345.00</td>
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<tr>
<td>30-Day Money Back Guarantee</td>
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<td>12X12 Tablet (Standard)</td>
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<tr>
<td>12X12 Tablet (Electro-Static)</td>
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## Modems & Faxes

<table>
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<tr>
<th>Description</th>
<th>Price</th>
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<tr>
<td>PowerPort Bronze</td>
<td>229.00</td>
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<tr>
<td>PowerPort Silver</td>
<td>449.00</td>
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<tr>
<td>PowerPort Gold</td>
<td>699.00</td>
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## Global Village

<table>
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<th>Description</th>
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<tr>
<td>PowerStation 5 (14.4 FAX)</td>
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<td>PowerStation 4</td>
<td>329.00</td>
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<td>PowerStation 2</td>
<td>279.00</td>
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<td>Turbo PS/300P (400 DPI)</td>
<td>1699.00</td>
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<td>PowerStation 3 (14.4 V.32)</td>
<td>459.00</td>
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<td>PowerStation 1</td>
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<td>Turbo PS/W300P (300 DPI)</td>
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<td>PowerView</td>
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## Software

### Business

<table>
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<tr>
<td>Illustrator w/ATM</td>
<td>359.00</td>
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<tr>
<td>Photoshop 2.0</td>
<td>545.00</td>
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<td>Aldus 3 - 30 Day MBG</td>
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<td>FreeHand 3.1</td>
<td>489.00</td>
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<tr>
<td>PageMaker 4.2</td>
<td>489.00</td>
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<tr>
<td>Quark - 30 Day MBG</td>
<td>269.00</td>
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<tr>
<td>Quark XPress 3.1</td>
<td>579.00</td>
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### Utilities

<table>
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<td>Apple</td>
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<tr>
<td>Appleshare 3.0</td>
<td>169.00</td>
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<tr>
<td>AppleShare Remote Access</td>
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<td>QuickTime Starter Kit</td>
<td>149.00</td>
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<td>PC Exchange</td>
<td>309.00</td>
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<tr>
<td>System 7</td>
<td>90.00</td>
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<tr>
<td>Berkeley - 30 Day MBG</td>
<td>269.00</td>
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<tr>
<td>PWB - 30 Day MBG</td>
<td>124.00</td>
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<td>Hard Disk Tool Kit</td>
<td>224.00</td>
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<td>MAXA + 30 Day MBG</td>
<td>149.00</td>
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<tr>
<td>SAIENET SOFTWARE - 30 Day MBG</td>
<td>69.00</td>
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<td>Symantec 30 Day MBG</td>
<td>149.00</td>
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<tr>
<td>Norton Utilities V2.2</td>
<td>95.00</td>
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<tr>
<td>SAM</td>
<td>65.00</td>
</tr>
</tbody>
</table>

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**Upgrade Your Mac or Buy a New Mac?**

<table>
<thead>
<tr>
<th>Configuration: 480</th>
<th>340</th>
</tr>
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<tbody>
<tr>
<td>RAM</td>
<td>Yes</td>
</tr>
<tr>
<td>HD</td>
<td>Yes</td>
</tr>
<tr>
<td>68030 processor</td>
<td>Yes</td>
</tr>
<tr>
<td>32-bit data path</td>
<td>Yes</td>
</tr>
<tr>
<td>Mem up to 16MB</td>
<td>Yes</td>
</tr>
<tr>
<td>Co-processor socket</td>
<td>Yes</td>
</tr>
<tr>
<td>Built-in video support for FPD</td>
<td>Yes</td>
</tr>
<tr>
<td>Virtual Memory under System 6</td>
<td>Yes</td>
</tr>
<tr>
<td>4MB RAM Disk</td>
<td>Yes</td>
</tr>
<tr>
<td>Street price</td>
<td>$1400</td>
</tr>
</tbody>
</table>

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Laserwriter llF/llG $2699/$3399
Powerbook 145 4/40 CALL
P .B 140 4/80,2/120 2599/2899
P .B 170 4/40,8/80 3599/4099
HP Scanjet llP/llC $899/$1395
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NEW AND USED 
BOUGHT AND SOLD
We also offer
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SONY,UMAX,NEWGEN,
QMS,NEC,SIGMA-DESIGN

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MACWORLD November 1992 277
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**We only sell New Systems**

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- **Prices are subject to change without notice**

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- **No shipping charges if ordered by phone**

**Multiple locations**

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- **FAX: 818-708-6399**

**800-223-4-MAC**

### MACINTOSH

<table>
<thead>
<tr>
<th>Please call for the New Mac Line!</th>
<th>New Low Pricing Classic</th>
<th>OC</th>
<th>+1</th>
<th>Ai</th>
<th>PowerBook</th>
<th>Quadra 700</th>
<th>Radius</th>
<th>NeXa Monitor</th>
<th>SuperMac</th>
</tr>
</thead>
</table>

**Entire Macintosh Line**

New and Used, Bought and Sold

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**Compare Our Prices, Quality & Service.**

We'll pay cash for your Macintosh Equipment.

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**Catalog**

**Computer Systems**

**Macintosh**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
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**Radius**

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**Great Buys**

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**QMS**

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**Scanners**

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<tr>
<td>6000</td>
<td>6000</td>
<td>$1199</td>
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** самых лучших**

**Powerbook**

<table>
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<tr>
<th>Model</th>
<th>Description</th>
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<tbody>
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<td>145 4/80</td>
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<tr>
<td>170 4/40</td>
<td>Powerbook 170</td>
<td>$1399</td>
</tr>
</tbody>
</table>

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**New**

8 MEG SIMMS
16 MEG SIMMS
FOR QUADRA 950 CALL NOW!

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# MEMORY DIRECT!

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## HARD DRIVES

<table>
<thead>
<tr>
<th>Type</th>
<th>Internal</th>
<th>External</th>
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<tbody>
<tr>
<td>Maxtor 80 Meg</td>
<td>$289</td>
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<td>Maxtor 120 Meg</td>
<td>$359</td>
<td>$415</td>
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<tr>
<td>Fujitsu</td>
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<td>Call</td>
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<tr>
<td>Syquest Removable</td>
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<td>$459</td>
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## QUADRA SPECIALS

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## SIMMS

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## NOTEBOOK MEMORY

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## DAYSTAR ACCELERATORS

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<td>Fast Cache ci</td>
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## MAXIMUM MEMORY SPECIAL

**16 MEG SIMMS**

<table>
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<td>★ 88 MEG</td>
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## SYQUEST CARTRIDGES

<table>
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<tr>
<td>44 MEG</td>
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<tr>
<td>88 MEG</td>
<td>$116</td>
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</table>

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- **Macromic Macll Thick 10Base T, 10K**: $169
- **Macromic Thin/10 Base T**: $169
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- **StarConnector EN RJ-45 ALU**: $135
- **StarConnector EN RJ-45 AUL**: $135
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- **Tinbrook/Remote 3.0**: $127

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- **$103**

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- **Optima 32/Software**: $149
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- **Classic II 16MHz Math**: $65

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703/689-9953 Fax
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<td>Netware for Macintosh Novel</td>
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#### Utility Software

<table>
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<th>This month</th>
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<td>Norton Utilities for Macintosh Pro</td>
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<td>Microcom</td>
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#### The AmCoEx Index of Used Macintosh Prices

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<thead>
<tr>
<th>Machine/RAM/ Hard Drive</th>
<th>Average Sale Price</th>
<th>Monthly Change</th>
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<tbody>
<tr>
<td>Mac Plus/1MB/none</td>
<td>$300</td>
<td>$-25</td>
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<tr>
<td>Mac Plus/2MB/20MB</td>
<td>$425</td>
<td>$-50</td>
</tr>
<tr>
<td>Mac SE/2MB/20MB</td>
<td>$850</td>
<td>$+50</td>
</tr>
<tr>
<td>Mac Portable/1MB/40MB</td>
<td>$750</td>
<td>$-100</td>
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<tr>
<td>Mac Classic/2MB/40MB</td>
<td>$750</td>
<td>$0</td>
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<tr>
<td>Mac SE/30/2MB/40MB</td>
<td>$1700</td>
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<tr>
<td>Mac LC/2MB/40MB</td>
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<td>Mac II/4MB/40MB</td>
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<td>Mac IIsi/3MB/40MB</td>
<td>$1775</td>
<td>$-50</td>
</tr>
<tr>
<td>Mac Ii/4MB/60MB</td>
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<td>Mac IIci/4MB/80MB</td>
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</tr>
<tr>
<td>Mac IIci/4MB/80MB</td>
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<tr>
<td>Apple 12-inch</td>
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<tr>
<td>R&amp;W display/board</td>
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<tr>
<td>Apple 13-inch</td>
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<tr>
<td>LaserWriter Plus</td>
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<tr>
<td>LaserWriter IINT</td>
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Index provided by the American Computer Exchange of Atlanta, Georgia. It reflects sales during the week of August 13. Configurations include keyboard and exclude monitor and display board for noncompact models.

Source: Exclusive Audits & Surveys research from more than 250 Macintosh retailers and selected mail-order vendors. Covers sales during July 1992.
Mirror Introduces Desktop Performance For Your Powerbook...

With Mirror's exciting new peripherals, your PowerBook can function just like a desktop machine, with a high resolution monitor and plenty of storage.

The Mirror PowerVision, an internal video board for the PowerBook 140 or 170, works with a variety of standard monitors, including our NEW 14-inch Color Display and 15-inch Grayscale Display. With 0, 2 or 4 MB of on-board RAM, the PowerVision's pass-thru connector lets you use existing RAM, and our installation video makes setup a snap (professional installation also available).

The Mirror ViewPort is a 15-inch monochrome display with a built-in SCSI video controller and QuickDraw acceleration for performance rivaling internal video boards. Ideal for PowerBooks, the ViewPort brings big screen power to any Mac with a SCSI port. (continued)

The NEW Mirror 14-inch Color Display
$399

Mirror PowerDock
battery powered base unit and charger
$199

Mirror Pocket Hard Drives
80 MB $599
120 MB $749
Includes SCSI cable for PowerBooks and standard Macs--a $100 value!

PowerVision internal video adapter board includes tools and a comprehensive installation video. from $549

Systems including PowerVision board and display from $948

*Use your PowerBook battery and AC adapter. #Call for other options.
Drive and DAT Tape Drives, Mirror offers the capacities, speed, features and prices you want.

Once you've used a Mirror high-resolution display, you'll wonder how you ever lived without it. Our monochrome full-page and two-page displays deliver bright, sharp screen images for word processing, spreadsheets, database management and publishing.

For graphic design, illustration or pre-press, choose a Mirror color display. Available in 14-inch, 16-inch and 20-inch models, there's a Mirror color display that's right for every job.

The top-rated Mirror Color Scanner makes it easy to add sharp, vivid color images to your work at an unbeatable Mirror price; just $1199 including Adobe Photoshop.

If you need a printer, take a close look at the MirrorImage 309 Laser Printer and the MirrorImage 415 Tabloid Laser Printer. With Postscript Level 2, RISC processors, sophisticated paper handling and durable, high-speed printing engines, these printers work hard, so you don't have to.

All Mirror products are backed by our famous 30-day, "love it or return it" policy, and the best customer support in the business. Call today to see for yourself.

MIROR

1-800-643-0625

ORDER DIRECT

19-inch Two-page Display w/monochrome video card $799
21-inch Two-page Display w/monochrome video card $999

15-inch Grayscale Portrait Display $399
w/monochrome video card $549

Makin' Tracks

Circle 125 on reader service card
The NEW Mirror 14-inch Color Display is the latest version of our best selling color monitor. Designed to work with the built-in video of your Mac LC, IIci, Illci, or Quadra--or with Mirror's PowerVision video board for PowerBooks; this display features razor-sharp focus and brilliant color and it's still only $399!

The Mirror Pocket Hard Drives
and optional Mirror PowerDock redefine storage convenience. For moving data between machines, or to expand your PowerBook's capacity, these tiny drives fit anywhere. Slip the Pocket Drive into the PowerDock and use a standard PowerBook battery to power the drive while you travel. When you're back home, the PowerDock does double duty and charges your spare battery.

Whatever your need, whatever Macintosh model you use, Mirror has high performance peripherals to match.

Our complete line of storage systems can handle any task. From our critically acclaimed hard drives and CD-ROM, to our high performance 128 MB Optical...

<table>
<thead>
<tr>
<th>Drives</th>
<th>Int.</th>
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<td>DAT Tape Drive</td>
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<tr>
<td>CD-ROM Drive</td>
<td>$599</td>
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20-inch ProView Triton Display, 8-bit
w/ 24-bit video card $2,499

20-inch ProView V Color Display, 8-bit
w/ 24-bit video card $1,799

16-inch Triton Display $1,099
w/ 8-bit video card $1,499
w/ 16-bit video card $1,599
w/ 24-bit video card $1,799

16-inch Color Display $799
w/ 8-bit video card $1,199
w/ 16-bit video card $1,299
w/ 24-bit video card $1,499

14-inch Color Display $399

NEW Lower Price!

Mirror 600 Color Scanner, with Adobe Photoshop $1,199

*You pay shipping costs (and a small sales tax in CA). For bulk pricing, call 800/323-8190. Prices are for U.S. orders only; call for international pricing. All prices subject to change.
Introducing Turbo Mouse 4.0

With the all new Brilliant Cursor™ technology, you can actually make the cursor jump to any spot on the screen.

While the cursor may hop or skip with some trackballs, Turbo Mouse® has always been known for its ultrasmooth movement.

Now, the latest version of Turbo Mouse is known for something else—jumping. Our new Brilliant Cursor technology makes it possible.

With it, you can move the cursor instantly to predefined HotSpots on the screen, such as the File and Edit menus and the Trash icon.

First, you define your HotSpots. Then, click a button and move the ball in the direction you want to go. The cursor automatically jumps to the predefined HotSpot. You can even program in different HotSpots for different applications and for different users.

And Brilliant Cursor technology is not all that's new with Turbo Mouse 4.0. Also new is advanced acceleration with three levels of control and Enhanced Mouse Buttons that let you execute one of seven programmable commands. For example, send a Print command with just one click using Send String. Or move the cursor with ultra precision using Slow Cursor. Even save different combinations of commands for each of your favorite programs.

Then there's the award winning Turbo Mouse hardware. Hardware that has won more awards than any other input device.

Hardware that has consistently been voted "Best Input Device" by Macintosh users worldwide. Features include a large comfortable ball, "easy-click" buttons, long-lasting precision stainless steel bearings, and two ADB ports for chaining other devices.

Turbo Mouse 4.0 is fully System 7.0 compatible. To receive information by fax, call 800-535-4242, dial 82 and request document 320. For general information, call 800-535-4242. Outside the US, 415-572-2700.