Betsy Mill put it all in perspective when she wrote to us, “I love [Microsoft] Excel as much as my microwave oven but no love is perfect.”

Well, Betsy, get a load of this. We think new Microsoft Excel version 3.0 is the closest thing to perfection ever seen in a spreadsheet for the Mac. For one good reason.

Power made easy.

The new Toolbar, for instance, reduces common, time-consuming tasks down to one step.

Highlight a row or column of numbers, hit the $\sum$ button (that’s Autosum*), and voilà – it all adds up.

Do quick, push-button formatting.

Use outlining features to collapse

*Plus shipping and handling and applicable sales tax. If you are a registered user of Microsoft Excel, watch your mailbox for an upgrade coupon. Offer good only in the 50 United States. In the 50 United States, call 1-800-513-1501, Dept. 9212. For information only.

Microsoft Excel is a registered trademark of Apple Computer, Inc.
Mac spreadsheet users use Microsoft Excel. What are we doing wrong?

version 3.0. The result responsiveness course.

Take a look at the new Toolbar. In one step, you can now access style sheets, outlining features, AutoSum, formatting options, drawing tools, charts of all kinds and macros. Go to town.

or expand worksheets without having to create multiple files.

As for charting, we took our cue from Paul Woods, who began his letter with the salutation, “Charts, charts, charts!”

Hey, Paul – check out the picture and caption for the full scoop.

Did we mention that you can consolidate up to 255 worksheets at a time, regardless of format?

Or the Goal Seek feature, which lets you put in the total you want and works backwards from there to fill in the variable you need?

Or the fact that this is the first System 7.0 application available?

Plus, you can update to version 3.0 for $129. If you acquired your current version of Microsoft Excel on or after 12/7/90, the upgrade is only $50. Call (800) 541-1261, Department Q83, to find out more.

By the way, Bryan Larson: we said hi to Bill for you. He sends his regards.
### DEPARTMENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>How to Contact Macworld</td>
<td>12</td>
</tr>
<tr>
<td>MacBulletin</td>
<td>19</td>
</tr>
<tr>
<td>Commentary/Jerry Borrell</td>
<td>25</td>
</tr>
<tr>
<td>Letters</td>
<td>35</td>
</tr>
<tr>
<td>Art Beat</td>
<td>41</td>
</tr>
<tr>
<td>The Iconoclast</td>
<td>55</td>
</tr>
<tr>
<td>Conspicuous Consumer</td>
<td>65</td>
</tr>
<tr>
<td>Updates</td>
<td>81</td>
</tr>
<tr>
<td>News</td>
<td>91</td>
</tr>
<tr>
<td>New Products</td>
<td>203</td>
</tr>
<tr>
<td>How To/Quick Tips</td>
<td>211</td>
</tr>
<tr>
<td>How To/Getting Started with Customizing Databases</td>
<td>227</td>
</tr>
<tr>
<td>How To/Insights on Adobe Illustrator</td>
<td>233</td>
</tr>
<tr>
<td>Where to Buy</td>
<td>237</td>
</tr>
<tr>
<td>Best-Sellers</td>
<td>290</td>
</tr>
</tbody>
</table>

**On the Cover**

For in-depth coverage of today's powerful DTP tools, see "Scanners in View," page 146; "Top-Notch Type," page 130; "Color Monitor Mirage," page 114; and "The Prepress Edge," page 138. (Illustration by Ron Chan.)

**In News**

The monochrome/gray-scale HP DeskWriter C moonlights as a three-color printer, page 91.

**The Iconoclast**

Apple gets cozy with IBM—and the future looks grim, page 55.
FEATURES

Color Monitor Mirage ............................................. 114
By Charles Seiter As competition heats up in the 8-bit world, it gets harder to tell color monitors apart. We help you translate the differences into a sound buying decision.

Seeking ELF Relief .................................................. 124
By Rory J. O'Connor Monitor makers have responded to consumer health concerns by designing displays with reduced electromagnetic emissions. Macworld Lab tests 32 color monitors to find out if those efforts have paid off.

The Prepress Edge ............................................. 138
By Joe Matazzoni Today's electronic prepress options make it possible to do four-color publishing on the Mac—with quality results and fewer costs.

Scanners in View ............................................... 146
By Steve Roth Macworld Lab puts 13 gray-scale scanners through their paces to separate the top contenders from the pretenders.

Top-Notch Type .................................................. 130
By Jim Heid Having access to powerful font technology isn’t enough to make you a skilled typographer. In this fourth and final part of our series on digital type, we show you how to use Mac typographic tools to your best advantage.

Scanners in View
Find out which ones are the winners in the gray-scale world, page 146.
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*Suggested retail price. LaserScript, LaserScript LX, LaserWriter, and the Abaton logo are trademarks of Earth Systems, Inc. Other brand names and product names are trademarks or registered trademarks of their respective companies. In Canada call 1-800-661-5161.
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Equipment required: any Macintosh computer with at least 1 megabyte of RAM, one or more floppy disk drives, or a hard disk, and system 4.1 or later. Guaranteed to work with all printers and monitors or your money back. CheckFree not available outside the U.S. Not copy protected.
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Title ___________________________ 
Company name ___________________ 
Company address __________________ 
City __________________ State ______ 
Zip __________________ Day phone (__________) 
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□ by business for office use. 

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If prize claimed is a Radius product, it will be shipped to company address shown above. 

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1. Rub off the ink from any three (out of six) boxes appearing on the face of this card for a chance to uncover a prize. If you uncover the same prize description in three boxes, and comply with the rules below, you are a winner of that prize. To claim your prize see Rule #3 below.

2. The following prizes are available:

<table>
<thead>
<tr>
<th>Prize Description</th>
<th>Prizes Available</th>
<th>Odds of Winning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radius PrecisionColor™ Calibrator</td>
<td>500,000</td>
<td>1 in 2</td>
</tr>
<tr>
<td>Radius Impressth™ Compression</td>
<td>500,000</td>
<td>1 in 2</td>
</tr>
<tr>
<td>Software</td>
<td></td>
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</tr>
<tr>
<td>$200 cash rebate off a Color</td>
<td>1,000</td>
<td>1 in 1,000</td>
</tr>
<tr>
<td>Pivot™ Display</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$500 cash rebate off a Radius</td>
<td>1,000</td>
<td>1 in 1,000</td>
</tr>
<tr>
<td>Rocket™ Accelerator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete Radius Color System</td>
<td>5</td>
<td>1 in 200,000</td>
</tr>
<tr>
<td>valued at $12,000</td>
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<tr>
<td>*Suggested list price $495.</td>
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<tr>
<td>**Suggested list price $179.</td>
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</tbody>
</table>

3. Follow these instructions to claim your prize:

<table>
<thead>
<tr>
<th>Prize</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radius PrecisionColor™ Calibrator</td>
<td>Purchase any Radius Two Page Color Display and mail in your winning game card, a copy of the warranty card (from a Radius Two Page Color Display), and a copy of your invoice (dated August 1 through November 30, 1991) from an Authorized Radius Reseller to verify proof of purchase.</td>
</tr>
<tr>
<td>Impressth™ Compression Software</td>
<td></td>
</tr>
<tr>
<td>$200 cash rebate</td>
<td>To receive a check for $200, mail in your winning game card, a copy of the warranty card (from your Radius Color Pivot™ Display) and a copy of your invoice (dated August 1 through November 30, 1991) from an Authorized Radius Reseller to verify proof of purchase.</td>
</tr>
<tr>
<td>$500 cash rebate</td>
<td>To receive a check for $500, mail in your game card, a copy of the warranty card (from your Radius Rocket™ Accelerator) and a copy of your invoice (dated August 1 through November 30, 1991) from an Authorized Radius Reseller to verify proof of purchase.</td>
</tr>
</tbody>
</table>

Note: All Radius product purchases must be made between August 1, 1991 and November 30, 1991, and received by December 31, 1991. Mail all prize claims described above to: Radius Winners P.O. Box 4346 Santa Clara, California 95056-4346

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*Surge protectors are not lightning arrestors and cannot be guaranteed to protect against direct hits.
Apple to Bring its 21-Inch Color Monitor to the U.S.

In October Apple is expected to offer its Macintosh 21" Color Display to customers in the U.S. for the first time, according to sources close to the company. Apple announced the two-page monitor in early June for early-July shipment but so far has distributed it only through its subsidiaries outside the U.S. The monitor has been the target of criticism from third-party vendors who feel that its introduction infringes on a critical market that they pioneered (see July MacBulletin and September News). Assembled in Italy using a Japanese CRT tube, the monitor is designed to reduce VLF and ELF magnetic-field emissions. The monitor's international guideline price was set at $5550 at the June announcement.

Apple Posts Record Loss

In the wake of massive layoffs, Apple Computer reported a $53.1 million loss for the third fiscal quarter, which ended in June. The loss resulted from a $224 million one-time charge due to the heavy costs of the layoffs, restructuring of Apple's management and manufacturing, and other cost-reducing measures, according to Apple. Total revenues were up in the same quarter, from $1.365 billion last year to $1.529 billion. Apple chairman and CEO John Sculley predicted that the restructuring will make Apple more competitive in the future.

Thunder Boards Rev Up Mac Graphics

SuperMac has announced the Thunder/8 and Thunder/24, 8-bit and 24-bit graphics boards that can drive large-screen monitors and accelerate QuickDraw by up to 500 percent. Both boards display resolutions from 512 by 390 up to 1152 by 870 on monitors ranging in size from 12 inches to 21 inches. Both also have a connector for adding future enhancements from SuperMac, possibly including image compression or additional acceleration. The two boards work with System 7 and will be compatible with 68040-based NuBus Macintoshes expected from Apple, according to a SuperMac representative. The boards support Apple's Macintosh 21" Color Display, which is currently available only outside the United States. The Thunder/8 has a list price of $1899, and the Thunder/24 lists for $4999. Both were expected to ship in August. For more information, contact SuperMac at 408/245-2202.

Apple Discontinues Many Hard Drives, May Deal with Microtech

Apple has agreed to farm out all of its external hard drives to Microtech International, according to sources close to the companies. As part of Apple's recent restructuring, Microtech will manufacture Apple-labeled external drives and ship them to Apple for distribution. The sources said that the move will allow Apple to concentrate its resources on designing future personal computers. Apple recently removed

(continues)
all but one of its external hard drives from its price list, leaving only the Apple Hard Disk 80SC still shipping.

**Hayes Introduces High-Speed Modem**

Hayes Microcomputer Products has introduced the V-series Ultra Smartmodem 14400 modem, which has a line speed of 14.4 Kbps and offers V.42bis modulation for data rates of up to 38.4 Kbps. The modem can connect to ISDN, X.25, and IBM SNA networks. It provides synchronous communication via Hayes AutoSync, supports PABXs, and can talk to the installed base of proprietary Hayes V-series Smartmodem 9600 modems. The Ultra 144, slated to ship in August, will list for $1199. For more information, contact Hayes at 404/441-1617.

**Shiva Hublet Expands 10BaseT Networks**

Shiva Corporation has announced the Hublet, a port repeater that lets Ethernet administrators expand their 10BaseT networks without running extra cables to the wire closet. A single 10BaseT outlet with a Hublet attached supports up to four workstations, Macs, IBM PCs, or other devices. The Hublet requires that the 10BaseT network include the Link Test protocol. Shiva expected to ship the port repeater in late July at a list price of $399. For more information, contact Shiva at 617/252-6300.

**Watching the Clock**

The number of calendar keepers and information managers for the Mac is burgeoning. One of the most full-featured, MyTimeManager (MTM), adds some System 7 features in version 3.5. MTM has day, week, and month views of a calendar as well as a scrolling list of unscheduled to-do items. The program can filter items by user-definable categories and other criteria; provides free-floating text memos; and can search memos and calendar items. MTM’s alarm feature does not require an INIT; which is a mixed blessing (MTM doesn’t slow down the Mac as INIT-based alarm systems do; on the other hand, MTM must be running to notify you of an alarm). MTM does not allow you to drag events between days; you must change the calendar setting of a task just to move it, and MTM does not let you schedule overlapping events or interrupt an event. Under System 7, MTM can pass messages among MTM users, has an in/out board feature, and can schedule meetings for groups. It lists for $79.95. For more information, call MacShack at 617/876-6343.

**New Money**

Intuit is bumping the version number of its checkbook manager, Quicken, from 1.5 to 3.0 and redirecting the program’s focus to personal-finance management. With 3.0 you can set up expense categories and subcategories and assign transactions to them with pop-up lists; split transactions across multiple categories; create recurring transactions with or without fixed amounts; manage net worth and loans; and customize the program’s eight home reports and eight business reports. The new Quicken has a built-in spreadsheet and can maintain a general ledger, accounts receivable, and accounts payable. It lists for $69.95. Intuit is at 415/322-0573. Quicken is still nouveau riche next to MECA’s Managing Your Money 4.0, which shipped last winter with a vast set of tools for dealing with such financial issues as life insurance and pensions, estimating taxes, saving for your kids’ college expenses, building a portfolio, analyzing investment opportunities, estimating life expectancy, and planning for retirement. Managing Your Money lists for $119.95. MECA is at 203/256-5000.

**Big Projects**

Mac project managers are getting some big help. Micro Planning International is fielding a simplified package called MicroPlanner Manager; the formerly privately distributed Task Monitor is now available commercially; and mainframe vendors are sniffing out the Mac market (see following bulletin). The $595 MicroPlanner Manager has an internal desktop with folders for charts, reports, and projects. It supports creating projects in outline, table, Gantt, or PERT view; has a flexible report-design module; supports multiple baselines; and can split tasks to optimize resource allocations. Micro Planning is at 415/389-1420. Monitor Systems’ $695 Task Monitor is a high-end scheduler (a resource module is in development). It provides pessimistic, optimistic, and most-likely completion dates; has five work-breakdown structures; can draw dependency lines on the Gantt chart; and can arrange the PERT chart based on task dates. Monitor Systems is at 415/949-1688.

**Artemis Lays Plans for the Mac**

Lucas Management Systems, which publishes the mainframe project-management package Artemis, will market a $2000 Macintosh package called Schedule Publisher. Schedule Publisher’s most unusual feature is its ability to incorporate reports designed with draw or presentation software. It also provides translators for exchanging data with Artemis on minicomputers and mainframes. Lucas Management Systems is at 703/222-1111.

**Database Publishing**

Timeworks’ Publish-It Easy version 2.1 is proof that System 7’s interapplication communication won’t be the death of omnibus programs. The new Publish-It, which is System 7–compatible, adds an internal database and mail merge capability to a full-featured page-layout package. The database can hold 32,000 records with up to 255 fields. The program’s price remains $249.95. Timeworks is at 708/559-1300.
The NoRad Shield™ is the only product that performs the tasks others try to do. Some claim to reduce ELF and VLF radiation, but fall short when test time arrives. Most of them cut down radiation in the electric field only. The NoRad Shield blocks the entire range of electric fields and the high range of magnetic fields.

- **Electric Radiation** - Virtually the entire spectrum of electric field radiation is blocked by more than 99.99% - from ELF through VLF and beyond, up into the microwave range.

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Some screens reduce glare, but actually increase reflections because they're made of polished glass. The NoRad Shield's high-resolution screen tackles these two problems handily and also eliminates the static field which attracts dust to your monitor and propels dust to your skin and eyes.

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MacUser March 1990

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Publish March 1990

Guess

Introducing the ScanMaker family of affordable flatbed and slide scanners.

Microtek's color scanner has consistently earned awards, praise and top ratings as the best value in scanning. But, if you thought we'd rest on our laurels, we've got news for you.

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If all this weren't enough, both ScanMaker models include the latest image processing software. Enhance, refine and separate your images with the full version of Adobe Photoshop for the Macintosh or PhotoStyler from U-Lead Systems for Windows 3.0.

So, whether you're working in black and white or color, with photographs or 35mm slides, get a ScanMaker scanner from Microtek. We won't be content until you're satisfied.

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Workstation-class graphics performance on your Macintosh!

SuperMac's new Thunder series of 8- and 24-bit accelerated color graphics cards provides you with awesome power—that results, as never before, in split-second responses on your screen!

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Thunder supports the widest range of color displays, up to 21 inches in size. It provides pan and zoom in hardware, and a Virtual Desktop—of up to eight square feet for poster-size projects. Plus, on-board GWorld memory, for faster manipulation of large color images.

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IBM and Apple: What's It All Mean?

How Apple Prepared for the Year 2000

BY JERRY BORRELL

We all did it. Tore at our hair, beat our breast, swore at corporate executives, and expounded on our own interpretation of what it meant for Apple to announce that it will be doing business with IBM. No one can be blamed for that. Apple Computer has been this country's favorite rags-to-riches saga for 15 years. The company has seemed destined to have a Henry Ford-like influence on America, its role all but defined for PBS documentaries.

But the announcement from the two companies' public relations groups was suspiciously timed, sandwiched as it was between repeated criticism of John Sculley's salary (in Time, Newsweek, Business Week, Fortune, and Forbes) and the announcement of Apple's third-quarter loss of $53.1 million. It was too easy to think that the announcements were manufactured solely for the purpose of creating a diversion from bad press. Unfortunately, the announcement was so sudden that it harmed the credibility of the official explanations of the development.

For the record, here are the official reasons for Apple's deal with IBM: to share microprocessor technology, to share the development of a company and a future object-based operating system (not the current Macintosh Operating System), to share networking technology, to share multimedia technology, and to plan for future multiprocessor computing environments. (In other words, to plan for that elysian time when computers manufactured by several companies will all be able to run the same software.) The unofficial reasons are to divert the press (as mentioned above) and to teach Microsoft a lesson.

What Does Apple Get?
The thing that left many of us scratching our heads was the question of what precisely did Apple get out of such a deal. You know, the tangible thing. The reason that sent Apple staff knocking at corporate doors in Armonk, New York. What were John Sculley and Mike Spindler actually thinking about?

One answer is found in the need for a new generation of microprocessors. Apple, like most other computer manufacturers, is beholden to the developer of the particular microprocessor that is the heart of its products, Motorola's 68000. Personal computers are based on similar microprocessors made by different manufacturers. Most of us recognize Intel and Motorola, which make the most popular microprocessors. Intel's famous 8086 family of processors and Motorola's 68000 family are classified as CISC chips: complex instruction set computers. But a newer architecture came into vogue some years ago, called RISC, for reduced instruction set computers.

RISC architecture became popular for several reasons, some of which had to do with the business proposition that the technology was available from a source hungrier and cheaper than Intel, Motorola, and others. As a result, a once little (now big) Silicon Valley company called MIPS made a fortune for its founders by licensing RISC microprocessors to companies like Sun Microsystems and Digital Equipment Corporation. (For a great article on this subject, see Upside magazine, July 1990, p. 28. You can reach Upside at 415/377-0950.)

The most important reason RISC architecture has become popular is that a computer's microprocessor spends most of its time doing the same thing many times. The sets of instructions it processes most of the time are redundant, so a microprocessor built to handle those types of calculations more efficiently, such as a RISC chip, is much faster than a general-purpose microprocessor.

(A brief digression—now there is a shift in the direction of microprocessors toward architectures that are a hybrid of the two approaches, called CRISP, for complex reduced instruction set computers.)

My main point has to do with Apple's belief that the future of its personal computers lies with RISC—(continues)
based technology, and with the ongoing problems that Motorola has had in developing its own RISC processor, called the 88000. The 88000 is generally thought to be no contender against future RISC microprocessors from MIPS, or even from Sun Microsystems (which developed its own

As a result of the Apple-IBM agreement, people buying and using Macintosh technology will get access to better components. It’s hard to gripe about that.

RISC microprocessor, called SPARC, some years ago). These issues left Apple executives wondering how the company was going to come up with a generation of much more powerful computers, with 10 to 20 times today’s level of performance—not just another miserable 30 percent to 100 percent performance enhancement (as in, Boy, the cursor really comes back fast with an fx!).

Enter IBM—rife with financial woes, a generation of workstations based on IBM’s proprietary RISC chip, falling market share in mainframes and personal computers, and publicly asked questions like how IBM can make a return on its technology investments such as semiconductor design and manufacturing. Combine IBM’s state with the frame of mind of some Apple executives who are looking at early progress reports on Apple’s 88000-based next generation of personal computers, due out in 1992, and a joint agreement begins to make sense.

Now add IBM’s complete disclosure of its future RISC releases and deliverable dates from manufacturing (one of which is also timed for 1992). Also add in the stipulation that IBM will allow third parties (Motorola being specifically, but not exclusively, named) to manufacture this line of products under a license agreement, thereby allowing IBM to make money via royalties. Such an agreement allows Apple to continue doing business with a loyal and capable manufacturing ally, Motorola (which has more experience in mass microprocessor production than IBM). And for the first time Apple will use a microprocessor that can be second-sourced—that is, manufactured by others—perhaps from the onset, thus ensuring that the price of the chips will be lower.

And as a result, people buying and using Macintosh technology will get access to better computers. It’s hard to gripe about that.

Will the Mac Go Away?
Does the pope wear white? Apple is planning to introduce a new Apple III! Why would it get rid of the Mac? Apple cannot afford to give up the Macintosh. There is enough work left for improving and evolving the Mac Operating System to keep Apple’s engineers working for several years. There will be a constant stream of smaller but powerful revisions of the operating system, and more major changes like 7.0. Apple can plot the next several hardware generations of the Macintosh, too. While it is not clear that the RISC-based computers will be called Macintosh, they will run the Mac Operating System and Macintosh applications.

The Mac will be with us for the remainder of the decade. Every so often, over that period, the oldest generation of Macintoshes will no longer run the latest version of the operating system with all its features. It won’t be practical to upgrade older Macs to run the latest hardware and software, and these machines will continue to be used into the late 1990s. But through the next several years, while the microprocessor architecture/hardware evolution progresses, software evolution will determine how we will use computers toward the end of the decade. And that is what the second part of the IBM-Apple deal is all about.

Sleeping with the Enemy
IBM will not obtain access to the Macintosh Operating System. Instead it will share access to Apple’s new op-

(continues)
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COMMENTARY

erating system based on object-oriented programming (OOP) techniques. The form of this sharing is to be a jointly established company that will deliver a new operating system to Apple, IBM, and other companies who want to license it.

My initial reaction to the announcement was wanting to ask the press-release writers to cut us some slack. Apple can’t form a software business (Claris) successfully, let alone go into a jointly operated business with IBM. And even if a company is formed, the concept is dumbfound. A group of senior software engineers from both companies will sit around and amicably discuss how to get product out? More likely, battles will begin from day one, and at best, the joint company might become two camps battling over niggling points of direction.

That minor point aside, the substance of the Apple-IBM agreement revolves around the theory that the industry needs common ground for an operating system so that computers, applications, and data can be shared across all computers. This discussion is driven by large businesses that influence people such as John Sculley. It was popularized by Bill Gates. When computer-company leaders succumb to this siren’s song, they inevitably begin mumbling about cross-platform compatibility. Businesses find it more profitable to work with older, stable, depreciated, but antiquated computer technology. So they use their financial clout to suggest that computer manufacturers should get together and solve problems by creating one unified approach to operating systems.

Those who propose this choose to ignore the experience of personal computer manufacturers in Japan with MSX, a unified operating system that was supposed to help businesses by allowing all applications to run across all platforms. The idea was that companies would compete based on their hardware. But the MSX effort failed, despite government support.

Proponents of a standard, cross-platform OS must believe that Unix, which after two decades of standardization is a worse mess than ever, is a flawed model too. (Perhaps they be- (continues)
Fax interruption
in progress.

Wouldn't you know it, just when you start to get some work done, the fax machine jerks you away from your Mac. And on most days, it happens time and time again.

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Software with a Silverlining.

Every La Cie drive includes a FREE copy of Silverlining, the #1-rated hard drive management utilities program. Silverlining drivers can get 30% more speed from a drive than the competition. It works with any true SCSI drive, internal or external. So one program can manage it all. Plus, Silverlining optimizes your data so it's consecutive on your drive, which makes your applications run faster.

And, Silverlining drivers are intelligent. They test the drives' functionality at startup to ensure that everything is working properly. If it's not, it protects you.

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MacUser...

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La Cie offers internal and external hard drives from 40MB to 1.2 Gigabytes. Choose from the award-winning Tsunami, Cirrus, ZFP family and external drives. Plus, La Cie now offers the Boater, a hard drive that attaches directly to the back of a Macintosh Plus or SE.

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Commentary

I believe the Unix experience can be avoided by good planning. Similarly the implementation of Motif, a common interface developed by a consortium of nearly two dozen computer companies, is a flawed model.

And finally the proponents will have to hope that IBM working with Apple—even if successful—will not be like IBM’s deal with Microsoft, in which IBM adopted Microsoft’s operating-system technology and was then led about for years by Bill Gates.

So What?
I agree with those who say that the metaphor of personal computing will change by decade’s end. I believe that there is likely to be another advance in technology, like the Mac, that is different from all that came before it.

And I agree, as a manager in a business, that stability in computing

I don’t think that the next great advances in computer operating systems will come from a consortium

would help my business to avoid unnecessary expenses in the near term.

But I don’t think that the next great advances in computer operating systems will come from a consortium. I don’t think that a socialistic approach to development (from each according to his programming ability, to each according to his hardware need) is how the computer industry is going to advance. Or we’d be buying computers from Moscow. And if I think like a standard business manager and push for cross-platform compatibility, I’ll lose my shirt to Japanese competitors in the next decade.

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LETTERS

Quitting Macintosh Motoring

In the late sixties and early seventies, British motorcycles dominated my life. When you got up in the morning, you never knew if they were going to start, but when they did, the ride was incredible.

Today, I spend my time kick-starting a Macintosh, and as with the British motorcycle, you never know when the plugs are going to foul and the Mac simply won't run. Rather than fix the problems with the Macintosh Operating System, Apple made a new one, with even more problems than the first. I have done just about everything but overhaul the motherboard, and the Mac still doesn't run smoothly.

I gave up on British motorcycles. System 7 has convinced me it is time to do the same with my Macintosh. This Mac is up for sale and I am walking away.

Robert Irwin
Lynden, Washington

Emphatically Not Yet

If our two-word review of System 7 is "emphatically yes" ("Confessions of a System 7 User," July 1991), but after reading the article, I don't see what the excitement is about. Anyone who uses the Macintosh daily doesn't need more crashes or a system that is ahead of the software that runs on it. This Macintosh user will wait until the thrill seekers have done the debugging and the developers have come up with software that recognizes System 7.

Richard Harrison
Portland, Oregon

Incompatible System 7 Review

I found your coverage of System 7 in the July 1991 issue to be quite inadequate. I expected some down-to-earth information from Jim Heid's how-to article, "Getting Started with System 7." I knew I was going to be disappointed when I read the words, "I discovered remarkably few incompatibilities."

My compatibility-check report found that three of my applications were compatible, five were mostly compatible, two of those had newer versions that were recommended, and ten applications I had to upgrade.

Lowell Erickson
Granada Hills, California

The Speed of Compact Pro

David Pogue states that StuffIt Deluxe 2.0 [Reviews, July 1991] is "even generally faster than Compact Pro." From testing various file types, I found that Stufflt Deluxe's Best Guess compression is usually within 1 percent of the file size of Compact Pro's compression scheme. For this equivalent compression, Compact Pro was, on average, more than twice as fast as StuffIt Deluxe.

Ken Hancock
Waltham, Massachusetts

Lite Desktop Publishing

I was quite dismayed to read Jerry Borrell's article [Commentary, July 1991]. Your readers don't need 90MB image files, gigabyte drives, or even a copy of Photoshop to produce quality color from the desktop. What they do need is an adequate level of training on color-printing technology and a good OPI [Open Prepress Interface] service bureau.

Jerry Jewel
Rancho Cordova, California

Corrections

The résumé software from Individual Software (Window Shopping, July 1991) is called ResumeMaker.

The Gravis MouseStick (Best Sellers Product Watch, August 1991) is made by Advanced Gravis Computer Technology.

The correct phone number for Nanao USA Corporation (Where to Buy, August 1991) is 213/325-5202.

The actual results for the Mobius Accelerator ("The Accelerated Course," July 1991) were faster than portrayed in the "Speed Tests." The Mobius should have been positioned among the MacProducts, Newlife, and Total Systems 25MHz accelerators in overall performance.

Borrell complained about the storage costs. You could get all the scans for an entire magazine on one $3 8mm tape. Why archive on expensive hard drives?

Jerry Jewel
Rancho Cordova, California

Information Slavery

Prior to reading "How the Good Guys Finally Won" [The Iconoclast, June 1991], I was only vaguely familiar with Lotus's reasoning for abandoning Marketplace. I am pleased (continues)
that this product was pulled because, "flawed [public] perception" or not, this type of product has abuse written all over it. What really amazes me is that Lotus and Equifax stood to make big bucks from this product while the people who supplied the information, namely us, would get nothing.

David Oliver
Springfield, Virginia

Information Monopoly

The people who won in the withdrawal of Lotus Marketplace were the reactionaries in a small segment of our society. This vocal group has helped those who already have access to this information keep a lock on it, thereby creating the likelihood that abuse of this privilege will happen in the future.

Being on a computer list and being a target market is part of our system. I choose to participate in our society, and I am glad others feel they have something to say to me.

Mark Cline
Birmingham, Alabama

How to Double Data Loss

A friend recently showed me a review [in Chicago Computing, September 1989] of a device called the DoubleDisk Converter.

The Converter is essentially a precision hole punch designed to produce the extra hole in the double-density floppy-disk case that allows the Macintosh to format and run the disk as a 1.4-megabyte high-density disk. The reviewer claims that all major disk manufacturers produce double-sided disks that meet the minimum ANSI coercivity standard of 600 oersteds for high-density drives. On this argument, a double-sided disk should function quite well as a high-density disk. What do you make of these claims?

Charles Rootbaum
Chicago, Illinois

According to Bay Area disk manufacturer Dysan, the coercivity spec for double-density (800K) disks is indeed 600 oersteds, but for high-density (1.4MB) disks, it is 720 oersteds. Reformating double-density disks and using them as high-density disks is like stuffing yourself into a too-tight pair of jeans: it can be done, but something may give way. See Quick Tips in this issue for more information.—Ed.

No Word on ROM Upgrades

Apple advertised and documented the Macintosh II, IIx, IIcx, and SE/30 as having the capability to address as much as 128MB of memory, an amount that should be sufficient for most users many years into the future. In addition, Apple has the foresight to manufacture their System ROMs [for these machines] on SIMMs, to allow these machines to easily upgrade their System ROMs.

The current System ROMs are not "32-bit clean." Users of these Macintosh machines are limited to 16MB, and even less after the addition of expansion cards.

We the users, owners, and administrators of these Mac computers would like...
to see Apple make a public statement regarding its plans to make a ROM upgrade available.

Adam Engst, Jim Gaynor, Tonya Joy Byard, Jeffry Hexter, John Lawson, followed by 567 signatures from all over the world

See MacBulletin, August 1991, for news on the available alternatives to ROM upgrades for 32-bit addressing.—Ed.

Hazards of Recycled Paper

Trees are a renewable resource; they do grow with sunshine and water. Paper is safer for the environment before it becomes a chemically hazardous sludge during the recycling process. The solvents used to remove the old inks and copier toner, plus the repulping (shredding), leave only about 20 percent of the recycled paper usable. The remaining [material] must be dumped as a hazard.

Lee Holmes
Sacramento, California

According to Jeff Rabuck of Earth Care Paper of Madison, Wisconsin, diffusing ink into the recycled paper product and bleaching without chlorine are methods that limit the release of petroleum-based inks into the environment as a by-product of recycling, and only 20 percent of the paper at most being recycled is wasted. Macworld is exploring with our printer the use of recycled paper and soy-based inks in the production of the magazine, but unfortunately the quality of the products does not allow us to change over at this time. On another front, Macworld is working on electronic publishing alternatives that may reduce our reliance on paper and ink.—Ed.

Subscription Sabotage?

Please note that the December 1990 Macworld arrived only this week [May 10, 1991]. I realize that there was a war in this area and that we had many days and nights of Scud attacks and air[craft] flying over on bombing raids of Iraq, most of which interrupted my sleep, reading Macworld, and computing, but it shouldn't have interrupted my subscription service.

I further request that you take into account the following points: 800 telephone numbers do not work from most overseas locations to the U.S. I suggest you require advertisers to add fax numbers to all ads. Foreign residents also encounter difficulty in obtaining updates to software. I've been trying to update software without success and am mad about poor dealer service [abroad].

Ward E. Whitley
Dhahran, Saudi Arabia

Steamed Subscriber

This spring I renewed my subscription to Macworld by returning one of the renewal cards I received in the mail. I recall having mailed this sometime in mid-April. By mid-May I had become a deadbeat. I was guilty of nonpayment of my renewed Macworld subscription. No simple invoice, but a letter stating my name was being placed in a bad-debt file and my account was being turned

How to get a date.

Of course, open communication is only one of many ways to bring people together. That's why WordPerfect Office 3.0 for the Macintosh also offers an integrated calendar and network scheduler to help you make appointments, coordinate meetings, schedule events and company resources as well as make to-do lists.

Along with WordPerfect Scheduler and Calendar, WordPerfect Office includes other useful desktop utilities such as Notebook, a flat-file database program; File Manager to help you organize your files; and Forms Maker to create custom forms for Mail, Notebook, and Calendar.

Want to know more about WordPerfect Office 3.0 for the Macintosh? That's easy, too. Just call us at (800) 526-2252. It could be the start of a very productive relationship.
over to a collection agency! The tone of the letter seemed to indicate that these actions would be taken regardless of whether or not I paid.

I protest this form of consumer abuse. Your credibility has been damaged. The next article concerning consumer rights or market fairness by you will be met with considerable suspicion.

Tom Schneider
Chicago, Illinois

According to our records, Tom Schneider mailed a renewal notice on February 19, 1991. Macworld mailed three bills over the next three months requesting payment. When we received no payment, a fourth bill, referred to in his letter, was mailed in late May. Like Time, Newsweek, and many other magazines, Macworld uses a collection agency for delinquent subscription payments. Unfortunately, we couldn't know that Mr. Schneider had not received his first three bills. Our apologies to him for any concern about his credit rating, which has not been damaged.

Finally, some readers seem confused about direct-mail solicitations that offer a free issue to new subscribers. If you accept the offer but then ignore the bill, we assume you want to subscribe but have postponed payment. You must write "cancel" across the bill and return it if you don't want to receive future issues or bills. To resolve subscription problems, call 800/228-6848 or 303/447-9330.—Ed.

Electronic Censorship

Electronic speech may be omnipresent, but how far is it protected? The U.S. Freedom of Information Act has failed to keep pace with the demands of new technology. The rules of access remain obscure. Fears have also arisen that commercial interests may soon be able to corner the market in data distribution, setting the price for information that should be available to everyone. How do we define electronic privacy when the FBI is unashamedly eavesdropping on electronic bulletin boards?

Senator Bob Packwood and legal scholar Laurence Tribe have both proposed constitutional amendments extending the Bill of Rights to electronic media. Organizations have been set up to explore the legal and moral boundaries of the computer world.

Until these questions are answered, cyberspace will remain, in the words of John Perry Barlow, "vast, unmapped, culturally and legally ambiguous, and up for grabs."

Philip Spender
Publisher,
Index on Censorship
London, England

Letters should be mailed to Letters, Macworld, 501 Second St., San Francisco, CA 94107, or sent electronically to CompuServe (70370,7022), MCI Mail (294-8078), America Online (Macworld), or AppleLink (Macworld). Include a return address and a daytime telephone number. We regret that, due to the high volume of mail received, we're unable to respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of Macworld.
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Truevision is well known in the broadcast industry for providing the highest quality video output. With VideoScript, you can make the most of the advanced features of the Truevision NuVista+. Improve the quality of your video output by using this powerful combination in your next production.

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ART BEAT

by Cathy Abes

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

Artist: Free-lance illustrator and designer Gordon Studer has done work for a number of publications, including Time, In Health, Publish, and the Los Angeles Times. Studer also does illustration part-time for the San Francisco Examiner. This is his first illustration for Macworld.

Tools: Mac IIx with 8MB of RAM; 80MB internal hard drive; RasterOps 24-bit color board; 13-inch Apple RGB color monitor; Microtek MSF-300ZS color scanner; Adobe Illustrator 3.0; Adobe Photoshop 1.0.7.

How It Was Done: For the illustration that opens this month’s “Insights on Adobe Illustrator,” Studer started by making a rough sketch in heavy black marker. Using Illustrator, he drew the basic geometric shapes and added colors, then began positioning each shape in relation to the others and experimenting with different colors.

Next he began filling in details for the rest of the drawing, including the glasses, the eyes, and the map. To create the shadow of the glasses, Studer selected and option-dragged them to create a duplicate just below the original. He painted the duplicate with a slightly darker shade of the skin color. Then, because duplicating an object always brings it to the front, he had to reselect the original white glasses and bring them in front of the shadow.

To create the magnifying effect of the left lens, Studer drew a separate circular object slightly larger than the lens. Because the line he used for the glasses was fairly thick, he didn’t need the accuracy of a mask to block out the edges of the shape. He merely pasted the glasses in front of the object.

The dashed line at the top of the illustration is actually two lines. The one in front is a 6-point dashed yellow line with a 20-point dash and 15-point spaces between the dashes; the one underneath it is a 6-point solid black line that shows through the spaces of the dashed yellow line.

The wrinkles on the face were done as blends. Studer created a crescent shape with two points, grouped it, and duplicated it using option-drag. Then he chose the skin color and a slightly darker shade of that color for the blend. Next he ungrouped the original and the duplicate, selected both points of each crescent, selected the blend tool, and clicked on one point of one crescent and the comparable point of the other. After specifying a 15-step blend from dark to light in the dialog box, he selected the blended object, grouped it, and option-dragged it to create a duplicate.

After drawing the black bars and white bars for the background of the map, Studer selected one of the shapes and option-dragged to make a duplicate off to the side. Then, on top of the duplicate, he began drawing the streets and entering the street names. Once the map was finished, he selected the duplicate shape and masked it. After ungrouping the mask and sending it to the back, Studer grouped the mask, the streets, and the street names so he could move them all—as one object—on top of the original shape.

From the start Studer planned to incorporate a photograph into the illustration, eventually settling on a black-and-white print of a pipe. Since he planned to convert the pipe into a color image, Studer scanned it as a 300-dot-per-inch color TIFF file. But even for images he plans to use in gray-scale mode, Studer finds that scanning in color provides better results. He ends up with a scanned image that has more detail than one scanned in black and white.

After importing the file into Photoshop, Studer began colorizing it. First he lassoed the bowl, made it reddish brown, and adjusted the color with the Color Balance slider. Then he gave the stem a dark-blue tint. (Because he had to mask the pipe once he brought it into Illustrator, there was no need to position the colors precisely.) Then he selected the whole image and adjusted the brightness and contrast. Next he scanned in a piece (continues)
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The basic geometric shapes were drawn and colors added in Illustrator.

Details such as the glasses, the dashed lines, and the panels of the map were added.

After the maps were drawn and a mask made for each map panel, the maps and masks were grouped and placed over the original panels.

The scanned-in pipe was colorized in Photoshop, then rotated, skewed, and masked in Illustrator.

The wrinkles were created as 15-step blends. The image on top is in Work mode, and the one on the bottom is in Preview mode.

of marble-textured wrapping paper—also scanned as a 300-dpi color TIFF file—and adjusted its color, brightness, and contrast in Photoshop.

To import the scanned images into Illustrator, he had to save them as EPS files. (When EPS files are imported into another file, they must always accom-

pany the finished file because they contain vital information that defines the image.) In the EPS Options dialog box, he chose 8 bits/pixel, Binary coding, Include Halftone Screens, and Include Transfer Functions.

In Illustrator, Studer skewed and rotated the pipe to position it correctly. He used the pen tool to draw a mask around the pipe and did the same for the wrapping paper (the blue background behind the map), drawing its mask in the shape of an arc. •
Paint Takes On A New Perspective.

Redefining the Paint Category
PixelPaint Pro defined the category of Professional Color Paint. Now, version 2.0 extends the Paint category into artistic image processing. Demanding designwork requiring image compositing, 8-bit masking, transparency and anti-aliasing or special effects such as embossing, patterning, tinting or controlled warping is dramatically simplified. Photographs can be turned into spectacular art with a few commands or brushstrokes. And precision controls and full color separations mean your designs come out looking the way you expect them to look.

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Buy PixelPaint Professional 2.0 now and receive a Cookbook tutorial ($19.95 value) free when you return your registration card. Call 1-800-334-3005 for more information about Pro 2.0.

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The new System 7

The original mail order source for Macintosh products. Since 1984. 1991 Macworld World Class Award Nominee for Best Customer Support Software.

No doubt you've read a lot about System 7. But what will it do for you? Recently, Macworld Contributing Editor Lon Poole—a very System 7-savvy kind of guy—visited the production studios of PCTV and helped us put together a video that makes the power of System 7 perfectly clear. It's free with any order over $100. Or you can buy one for just $9 (2244).

We also have Lon's book Macworld Guide to System 7 for sale, for $19 (2238).

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5618 ◊ 4D Write 1.0 or 4D Calc 1.0 ... 229.
6948 ◊ FileForce 1.1 ....... 249.
◊ Advanced Software ... 30 day MBG
5608 ◊ DocoComp 1.5 ....... 89.
◊ A Lasting Impression
◊ ResumeExpert or Cover Letters ea. 48.
◊ Ashton-Tate
1324 ◊ FullWrite Professional 1.0 special 39.
◊ Avery ... 60 day MBG
7446 ◊ MacLabel Pro 1.0 ........ 48.
◊ Baseline Publishing ... 30 day MBG
8811 ◊ Thunder 7 1.0.4 ....... 56.
◊ Chang Labs ... 30 day MBG
1611 ◊ C.A.T. 3.0 ........ 279.
◊ Checkfree Corp. ... 30 day MBG
6928 ◊ Checkfree Mac 1.5 var 19.
◊ CheckMark Software ... 60 day MBG
5862 ◊ Payroll 4.5 ....... 175.
5863 ◊ MultiLedger 2.0 ....... 235.
◊ Claris
1129 ◊ MacWrite II 1.1V1 ........ 139.
8216 ◊ FileMaker Pro 1.0V2 ...... 215.
1125 ◊ MacProject II 1.2V3 ....... 359.
◊ Deneba Software ... 30 day MBG
1768 ◊ Coach Professional 3.1 ....... 124.
◊ DeltaPoint ... 60 day MBG
8987 ◊ Taste 1.01 ........ 97.
1942 ◊ Market Analyzer Plus 2.0 ....... 225.
◊ ElseWare Corp ... 30 day MBG
1506 ◊ DataShaper 1.2 ....... 135.
◊ Fox Software
5572 ◊ FoxBASE + Mac 2.0 ....... 289.
7070 ◊ Language Master 2.0 ....... 45.
◊ Good Software
2527 ◊ REM's Property Manager ... 339.
Individual Software
6222 ◊ Resume Maker 1.3 ....... 29.
Informix
4956 ◊ Wingz 1.1A ....... 245.

DYNAPAGE

Portfolio Systems ... 30 day MBG
7992 ◊ DynPage 4.0—Prints any Mac file—double-sided—to organizer pages! $72.
6916 ◊ Dynode 2.0—Faster address manager. Print double-sided organizer pages, labels... $72.

◊ intuit ... 30 day MBG
2507 ◊ QuickDraw 3.0 (August 91) ....... 42.
◊ Kaetron Software ... 30 day MBG
8941 ◊ TopDown 3.0 ....... 219.
◊ Mainstay ... 30 day MBG
7716 ◊ MacFlow 3.54 ....... 169.
◊ MECA ... 60 day MBG
2796 ◊ Managing Your Money 4.0 ....... 99.
◊ Microlytics ... 60 day MBG
9730 ◊ Strunk & White's Elements of Style ... 34.
7506 ◊ Inside Information 1.0 ....... 68.
7820 ◊ Random House Encyclopedia 1.0 ....... 68.
◊ Microsoft ... 30 day MBG
2572 ◊ Schedule Plus 1.0 ....... 129.
2864 ◊ Works 2.0D ....... 184.
4959 ◊ Word 4.0 ....... 245.
9803 ◊ Excel 3.0 ....... 309.
2565 ◊ Project 1.1 ....... 449.
5454 ◊ The Microsoft Office 1.5 ....... 525.
1420 ◊ Excel 3.0 Companion Book ....... 20.
◊ Niles & Associates ... 30 day MBG
5048 ◊ EndLink 1.1.3 ....... 56.
4602 ◊ EndNote 1.3 ....... 85.
8010 ◊ EndNote Plus 1.0 ....... 145.
◊ Nolo Press ... 30 day MBG
4228 ◊ For the Record 2.0 ....... 30.
2981 ◊ WillMaker 4.0 (not valid in LA) ....... 35.
OCR Systems
9926 ◊ ReadRight 1.0 ....... 309.
◊ Odesta ... 30 day MBG
5621 ◊ Double Helix III 3.5 ....... 439.
6468 ◊ DataDesk 3.0 ....... 459.
Paragon Concepts
5683 ◊ Nius 3.06 ....... 245.
◊ Portfolio Systems ... 30 day MBG
7992 ◊ DynoPage 1.0 ....... 72.
6916 ◊ Dynodex 2.0 ....... 72.
◊ PowerUp ... 30 day MBG
7696 ◊ Calendar Creator 1.01 ....... 44.
7697 ◊ Letter Writer Plus 1.01 ....... 56.
7694 ◊ Address Book Plus 2.0 ....... 56.
7698 ◊ Fast Forms 2.0 ....... 112.
◊ Provue ... 60 day MBG
4582 ◊ Panorama II 2.0 (August 91) ....... 245.
◊ Que Corp. ... 30 day MBG
7482 ◊ RightWriter for the Mac 3.1 ....... 54.
◊ Reality Technologies ... 30 day MBG
6929 ◊ WealthBuilder 1.01 ....... 95.
is now on the scene.

Shana ... 30 day MBG
A comprehensive intuitive software solution for forms design, management, & data collection.
7692  Shana Designer 1.1.1  $159.
8810  Shana Manager 1.0.1  $99.
8201  Shana AutoForm 1.4  $75.

GRAPHICS & DESIGN
PUBLISHING, PRESENTATIONS

★ Abbott Systems ... 30 day MBG
8052  Abbott Cheshire 1.0  $62.
6957  Abbott Type Library (Vol. 1-230)  $41.
8794  Adobe Type On Call  $41.
5750  Adobe Type Manager 2.0  $59.
6053  Adobe Plus Pack  $118.
6098  TypeAlign for ATM 1.0.4  $62.
★ Adobe TypeSets for Business  $95.
6671  Adobe Type Set 1 or 6677 Type Set 2  $62.
7870  Adobe Type Set 3  $125.
8042  Adobe Type Sets 1-2-3 Bundle $239.
8171  Adobe Illustrator 3.0.2 (w/ATM)  $379.
6544  Adobe Photoshop 2.0 (July '91)  $549.
5001  Streamline 2.0  $122.
★ Smart Art I, II, III, or IV  $62.
8207  Adobe Gallery Effects 1.0  $44.
6674  Adobe Personal Press 1.0.1  $211.
3506  Altitus SuperPaint 3.0 (Aug. '91)  $144.
3980  Adobe Digital Darkroom 2.0  $279.
3507  Altitus Super 3D (Aug. '91)  $349.
7467  Adobe PrePrint 1.5  $349.
4751  Adobe Persuasion 2.0  $349.
1330  Adobe FreeHand 3.0  $419.
7088  Adobe PageMaker 4.01  $549.
8054  Altitus Design Team (includes PageMaker, FreeHand & PrePrint)  $899.

★ Ares Software ... 30 day MBG
8878  Ares FontMonger 1.0  $62.
7005  Ares ScreenMonger 1.0  $33.
7764  Color MacCheese  $56.
7928  Exposure Pro  $78.
9426  True Type Fonts 1 or 9429 Fonts 2 ea.  $98.
1591  True Type Fonts 3 or 1595 Fonts 4 ea.  $98.

Paragon Concepts
5683  Fish 3.06 - Boasts ten clipboards, unlimited undos, noncontiguous selection, and a lightning-fast search/replace that can even check unopened files. Plus: graphics and two macro levels for custom features  $245.

★ Baseline Publishing ... 30 day MBG
8055  Baseline Screenshot 3.1  $33.
7764  Color MacCheese  $56.
7928  Exposure Pro  $78.
9426  True Type Fonts 1 or 9429 Fonts 2 ea.  $98.
1591  True Type Fonts 3 or 1595 Fonts 4 ea.  $98.

Broderbund Software
9351  Kid Pix 1.1  $29.
1427  The Print Shop 1.3.2  $35.
6281  TypeStyler 1.5.2  $115.

★ Casady & Greene ... 60 day MBG
8879  Casady & Greene Font Library 1.0  $99.
1945  True Type Starter Set  $57.

Claris
1123  Claris MacPaint II 2.0  $89.
2518  Claris MacDraw Pro  $285.
8007  Claris CAD 2.0  $629.

1-800/334-4444
MacConnection®
14 Mill Street, Marlow, NH 03456  603/446-7711 FAX 603/446-7791
### Paracomp ... 30 day MBG

<table>
<thead>
<tr>
<th>Product</th>
<th>Duration</th>
<th>Price</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swivel D3 Professional 1.0</td>
<td>30 day MBG</td>
<td>$435.</td>
<td>One of the best selling 24-bit programs available.</td>
</tr>
<tr>
<td>FilmMaker 2.0</td>
<td>30 day MBG</td>
<td>$435.</td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
</tbody>
</table>

### Creative Software ... 30 day MBG

<table>
<thead>
<tr>
<th>Product</th>
<th>Duration</th>
<th>Price</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy Color Paint 2.0</td>
<td>30 day MBG</td>
<td>$45.</td>
<td>Custom Applications.</td>
</tr>
<tr>
<td>Freedom Press Light 3.0</td>
<td>30 day MBG</td>
<td>$55.</td>
<td>Easy-to-use design and layout tools.</td>
</tr>
<tr>
<td>Freedom of Press 3.0</td>
<td>30 day MBG</td>
<td>$55.</td>
<td>Features anti-aliasing and transparency for multimedia presentations.</td>
</tr>
</tbody>
</table>

### DeltaPoint ... 60 day MBG

<table>
<thead>
<tr>
<th>Product</th>
<th>Duration</th>
<th>Price</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeltaGraph 1.5</td>
<td>60 day MBG</td>
<td>$125.</td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
<tr>
<td>DeltaData Software</td>
<td>30 day MBG</td>
<td>$125.</td>
<td>Custom Applications.</td>
</tr>
<tr>
<td>UltraPoint 1.03</td>
<td>30 day MBG</td>
<td>$125.</td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
<tr>
<td>Canvas 2.1.1</td>
<td>30 day MBG</td>
<td>$189.</td>
<td>Free upgrade to 3.0.</td>
</tr>
</tbody>
</table>

### Dream Maker ... 30 day MBG

<table>
<thead>
<tr>
<th>Product</th>
<th>Duration</th>
<th>Price</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cliputures: Sports or Business ea. 88.</td>
<td>30 day MBG</td>
<td>$88.</td>
<td>Custom Applications.</td>
</tr>
<tr>
<td>Electronic Arts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Studio6: 2.0</td>
<td></td>
<td>$189.</td>
<td>Custom Applications.</td>
</tr>
<tr>
<td>Studio6: 3.1</td>
<td></td>
<td>$449.</td>
<td>Custom Applications.</td>
</tr>
<tr>
<td>Foundation Publishing</td>
<td>60 day MBG</td>
<td>$36.</td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
<tr>
<td>Comic Strip Factory 1.6</td>
<td>30 day MBG</td>
<td>$36.</td>
<td>Custom Applications.</td>
</tr>
<tr>
<td>Comic Strip/People &amp; Kid Stuff ... 71.</td>
<td>30 day MBG</td>
<td>$71.</td>
<td>Custom Applications.</td>
</tr>
<tr>
<td>IDD/Innovative Design Data</td>
<td>30 day MBG</td>
<td>$125.</td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
<tr>
<td>CurveDraw 2.1</td>
<td>30 day MBG</td>
<td>$279.</td>
<td>Custom Applications.</td>
</tr>
<tr>
<td>Press2 3.1</td>
<td>30 day MBG</td>
<td>$419.</td>
<td>Custom Applications.</td>
</tr>
</tbody>
</table>

### Letraset ... 30 day MBG

<table>
<thead>
<tr>
<th>Product</th>
<th>Duration</th>
<th>Price</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letterjoy Studio 1.7</td>
<td>30 day MBG</td>
<td>$139.</td>
<td>Custom Applications.</td>
</tr>
<tr>
<td>Letraset 2.0</td>
<td>30 day MBG</td>
<td>$139.</td>
<td>Custom Applications.</td>
</tr>
<tr>
<td>Ready Set Go! 4.5A</td>
<td>30 day MBG</td>
<td>$165.</td>
<td>Custom Applications.</td>
</tr>
<tr>
<td>ColorStudio 1.5</td>
<td>30 day MBG</td>
<td>$599.</td>
<td>Custom Applications.</td>
</tr>
</tbody>
</table>

### Linguist’s Software ... 60 day MBG

<table>
<thead>
<tr>
<th>Product</th>
<th>Duration</th>
<th>Price</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 100 language fonts</td>
<td>60 day MBG</td>
<td>$call.</td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
<tr>
<td>Mainstay 30 day MBG</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### MediaLab Tech ... 30 day MBG

<table>
<thead>
<tr>
<th>Product</th>
<th>Duration</th>
<th>Price</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PictureAccess (photo scanning)</td>
<td>30 day MBG</td>
<td>$189.</td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
<tr>
<td>PictureLink 1.1</td>
<td>30 day MBG</td>
<td>$215.</td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
</tbody>
</table>

### MicroFrontier ... 30 day MBG

<table>
<thead>
<tr>
<th>Product</th>
<th>Duration</th>
<th>Price</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENHANCE 2.0</td>
<td>30 day MBG</td>
<td>$235.</td>
<td>Custom Applications.</td>
</tr>
<tr>
<td>MicroMaps ... 30 day MBG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MapArt (Paint)</td>
<td></td>
<td>$41.</td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
<tr>
<td>MapArt (P/C)</td>
<td></td>
<td>$41.</td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
<tr>
<td>7555 (EPS) ea. 95.</td>
<td></td>
<td></td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
</tbody>
</table>

### Microsoft ... 30 day MBG

<table>
<thead>
<tr>
<th>Product</th>
<th>Duration</th>
<th>Price</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PowerPoint 2.01.D</td>
<td>30 day MBG</td>
<td>$245.</td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
<tr>
<td>MonoType Typography 30 day MBG</td>
<td></td>
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</tr>
<tr>
<td>Montage Impressions-TrueType ea. 22.</td>
<td></td>
<td></td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
<tr>
<td>Classic Fonts (full line available)</td>
<td></td>
<td></td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
<tr>
<td>Multi-Ad Services</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Multi-Ad Creator 2.5</td>
<td></td>
<td>$455.</td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
</tbody>
</table>

### Argosy Software ... 30 day MBG

<table>
<thead>
<tr>
<th>Product</th>
<th>Duration</th>
<th>Price</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Bridge/Mac 2.0</td>
<td>30 day MBG</td>
<td>$99.</td>
<td>Features full animation, anti-aliasing, and transparency for multimedia presentations.</td>
</tr>
<tr>
<td>8028</td>
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<tr>
<td>7728</td>
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<td></td>
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<td>2460</td>
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<td>2459</td>
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<td>2458</td>
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<td>2457</td>
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<tr>
<td>2463</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7441</td>
<td></td>
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</tr>
</tbody>
</table>

### Paracomp ... 30 day MBG

<table>
<thead>
<tr>
<th>Product</th>
<th>Duration</th>
<th>Price</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swivel D3 Professional 1.0</td>
<td>30 day MBG</td>
<td>$435.</td>
<td>Detailed 3D models to use in graphics and presentation applications.</td>
</tr>
<tr>
<td>FilmMaker 2.0</td>
<td>30 day MBG</td>
<td>$435.</td>
<td>Customized by illustrators and multimedia specialists (Map 1-Amercas, Map 2-Europe, Anatomy, Air &amp; Sea, and Cars). ea. $156.</td>
</tr>
</tbody>
</table>
what this will mean?

ON Technology ... 1 year MBG
9801 Meeting Maker (5 user) - Plan, schedule & confirm meetings via network. Schedule a time & date, select required guests & prepare agenda. Personal calendar to block out activities. $309.
9800 Meeting Maker (10 user) ... 549.

ON Technology ... 1 year MBG
1824 Calculator Construction Set 2.0 62.
1857 Bar Code Kit ... 135.
4875 FilePro/1.0 ... 25.
9801 Meeting Maker (5 user) ... 249.
9800 Meeting Maker (10 user) ... 398.

Dubl-Click Software
7974 ClickChange 1.05 $56.
1824 Calculator Construction Set 2.0 62.
*ElseWare Corp. ... 30 day MBG
1507 Bar Code Kit ... 135.
*Fifth Generation ... 30 day MBG
4875 FilePro/1.0 ... 25.
3655 Suitecase II 1.2.10 ... 49.
8266 SuperLaserSprint 2.0 ... 93.
5120 FastBack II 2.5 ... 118.
5725 DiskLock 2.01 ... 118.
*FWB, Inc. ... 30 day MBG
2317 Hard Disk Partition ... 57.
2319 Hard Disk DeadBolt ... 57.
*Gio Technology ... 30 day MBG
1488 Hot Keys Universal (word process.) 36.
6171 MacPrint 1.23 ... 93.
*JAM Software USA ... 30 day MBG
6089 Smart Alarms w/App. Diary 3.07 63.
*Kensington ... 30 day MBG
9901 PassProof (right) or 9900 (left) ea. 65.
*Kent Marsh Ltd. ... 30 day MBG
5457 QuickLock 2.0 ... 34.
9519 FolderBolt 1.01 ... 73.
2591 The NightWatch 1.03 ... 84.
6134 MacSafe II 2.0 ... 106.
*Kiwit Software ... 60 day MBG
6267 FileEnveloped 3.1.1 ... 32.
*Loop Software ... 30 day MBG
5442 PictureBook 3.2A ... 39.
*Magic Software ... 30 day MBG
7267 AutoSave II 2.0 ... 26.
7270 BackTrack 2.0 ... 50.
*Microcom ... 30 day MBG
8562 Complete Utilities 1.1 ... 48.
4803 Virex 3.2 ... 57.
8561 911 Utilities ... 69.
2462 Citadel with Shredder ... 89.
*Microseeds Pub. ... 60 day MBG
7068 NITPickr 2.02 ... 34.
2591 RedJuX 1.63 49. 7168 Rival 1.1 69.
*Microsoft ... 30 day MBG
4471 QuickBasic 1.0 ... 64.
*Multi-Ad Services
8850 Multi-Ad Search 1.0 ... 115.
*Nine to Five Software ... 30 day MBG
9767 Reports 2.0 ... 94.
*Now Software ... 30 day MBG
6925 Now Utilities 3.0 (September '91). 64.
*ON Technology ... 1 year MBG
6385 On Location 1.02 ... 75.
9801 Meeting Maker (5 user) 309. 9800 (10 user) 549.
2570 Instant Update (2) 309. 2571 (5 user) 619.
*Palomar Software ... 30 day MBG
8210 PLOTTERgeist 2.0 ... 249.
*Galileo Software ... 30 day MBG
7404 DiskDoubler 3.7 ... 49.
*Softstream ... 30 day MBG
5440 HyperHit 3.0 119. 1568 (network) 389.
*Solutions, Inc. ... 60 day MBG
3448 SmartScrap & The Clipper 2.1 ... 56.
*SuperMac Tech. ... 60 day MBG
3377 DiskFit 2.0 ... 58.

Kent Marsh Ltd. ... 30 day MBG
5176 Symantec AntiVirus for Mac (SAM) 66.
5724 Symantec Utilities for Mac (SUM II) 99.
6748 Norton Utilities for the Mac 1.1 ... 87.
3421 THINK Pascal or 3420 THINK C 165.
9957 THINK Reference 1.0 ... 69.
*Synex ... 30 day MBG
7147 MacEnvelope 5.02 ... 57.
*Tactic Software ... 30 day MBG
8964 MasterFinder 1.2 ... 49.
*Teletypeparking ... 30 day MBG
8058 TScript 1.4 ... 91.
6667 Prograph 2.5 (September '91) ... 309.
*Walfram Research ... 30 day MBG
8273 Mathematica Enhanced 2.0 (Aug.) 799.
*Zedcor ... 60 day MBG
3985 ZBasic 5.0 ... 99.

Palomar Software ... 30 day MBG
8210 PLOTTERgeist 2.0 - System 7-savvy Chooser-level driver connects plotters to your Mac. First to provide presentation-quality word process. Also features back­ground plotting and easy-to-use interface $249.

ON Technology ... 1 year MBG
2570 Instant Update 1.0 (User) - Create live documents that groups produce and work on together. Changes to the document from network users are saved with a click of a button. $309.
2571 Instant Update 1.0 (User) ... 619.
To help you find out

VIDEO & SOUND
MUSIC, MIDI, ANIMATION

* Ars Nova ... 30 day MBG  
1215 @PracticA Musica 2.2. ... $66.

Articulate Systems  
2034 Voice Impact ... 82.
2232 Voice Impact Pro. ... 179.
9975 Voice Navigator II ... 549.

* Bogas Productions ... 60 day MBG  
9279 Studio Session MIDI Utility 1.0 ... 59.
6135 Super Studio Session w/Music Library 99.

Coda Music Systems  
8188 @MusicProse 2.1. ... 299.
5604 @Finale 2.6.1 ... 549.

Computer Friends  
8271 @ColorSnap 32 + 1.1 ... 649.

Electronic Arts  
1846 Deluxe Music Construction Set 2.5 ... 84.

* Farallon Computing ... 30 day MBG  
6770 MacRecorder Voice Digitizer 2.0.3 ... 104.
2199 MacRecorder Sound System 2.0.3 ... 174.
6766 Media Tracks 1.0 ... 205.

Apple Computer/Claris

1094 @ System 7—Balloon help, File sharing. Publish & Subscribe, Alasing, TrueType, Virtual memory. 32-bit addressing. Buy now & get a free PCTV video (limit 1 per customer) with less than 200 free PCTV video_explaining all these new features $99.

Full Logic Studios  
1183 Mac-Sound (241 sound effects) ... 79.

* MacroMind ... 30 day MBG  
9353 @MediaMaker 1.0 ... 489.
6159 @MacroMind Accelerator 2.01 ... 125.
5087 @MacroMind Director 3.0 (Aug. 91) ... 699.
2246 @MacroMind Three-D 1.0 ... 1029.

Mass Microsystems  
2592 QuickImage 24 ... 579.

* Paracom ... 30 day MBG  
7839 @FilmMaker 2.0.1 ... 435.

Passport Designs  
8253 TRAX 2.0.1 ... 57.
3117 @ Master Tracks PRO 4.4.5 (Aug.) ... 315.
8250 @Encore 2.0 ... 379.
3115 @ MIDI Interface ... 79.

PCTV  
2244 System 7 Video (VHS) ... 9.
2445 System 7 Video with Lon's Book ... 25.

Pixar  
1596 MacRecorderManShowPlace Bundle ... 649.
RasterOps  
Full line available. Partial listing. ... 499.

CD-ROM

Adobe Systems  
6794 Adobe Type 1 Call CD/ATM ... 47.
9443 Adobe TOC & Porta Drive Bundle ... 659.

CD Technology  
2321 CD-ROM Cardy ... 11. ... 2533.
8057 Porta Drive CD-ROM ... 649.
7686 Porta Drive II & MS Office CD-ROM ... 999.

* Discovery Systems ... 60 day MBG  
9968 Birds of North America (CD-ROM) ... 26.
9965 Sherlock Holmes on Disc (CD-ROM) ... 26.
9966 Shakespeare on Disc (CD-ROM) ... 26.
9967 Nautilus (subscription kit, CD-ROM) ... 20.
1874 Mammals of N. America (CD-ROM) ... 52.
2484 The Family Doctor (CD-ROM) ... 125.

Dubl-Click  
9944 The WinSet CD (CD-ROM) ... 218.
1875 Metro CD CD-ROM Drive ... 649.

* Everex ... 30 day MBG  
7771 @ Webster's Dictionary (CD-ROM) ... 159.

Toshiba  

* HyperGlot ... 30 day MBG  
9778 @Learn to Speak English, French, or Spanish Spanish (CD-ROM) ... ea. 64.
2615 Lingua ROM II (3-CD Set) ... 649.

Microsoft ... 30 day MBG  
6383 @ The Microsoft Office (CD-ROM) ... 599.

* Monotype Typography ... 30 day MBG  
Classic Font Library on CD-ROM ... call NEC.

6135 ClipArt 3D (2500 full-color images) ... 246.
6636 Image Gallery (2800 line art) ... 246.
6959 Type Gallery PS (Adobe fonts) ... 246.
9441 CDR36 CD-ROM Portable Drive ... 399.
2478 General Reference CD-ROM Bundle (includes CDR36 kit & 3 titles) ... 529.

* Panton Overseas ... 30 day MBG  
2511 Vocabulary in Spanish 1.1 CD ... 59.
2810 Vocabulary in French 1.1 CD ... 59.

* Somak ... 30 day MBG  
LaserArt 1 or II (CD-ROM) ... ea. 62.

* Tactic Software ... 30 day MBG  
2519 Tactic MultiMedia CD ... 149.
6749 XM 3201 CD-ROM Drive ... 659.

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* Abracadata, Ltd. ... 30 day MBG  
9995 @Instant Decorator ... 29.
9990 @Design Your Home - Architecture, 9992 Interiors or 9994 Landscape ea. 63.

Libraries available. ... call 

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1423 Hard Ball II ... 31.
8220 Jack Nicklaus GOLF ... 34.

* Aldus ... 30 day MBG  
3503 Dark Castle or 3552 Beyond DC ea. 36.

* Baseline Publishing ... 30 day MBG  
7785 @ Talking Moose ... 23.

* Beacon Technology ... 30 day MBG  
HyperBible 2.03 (K or NI) ... ea. 125.

Broderbund Software  
4314 @Typel 1.0 ... 18.
6516 The Playroom 1.1 (CP) ... 29.
Carmen Sandiego Series (CP) ... ea. 29.
6384 @PlayMaker Football 1.1.1 ... 29.
9804 RoboSport or 8195 @ BannerMania 35.
8266 SimEarth 1.0 ... 40.
4966 SimCity 1.2 (CP) ... 47.
5871 SimCity Supreme 1.2 ... 47.

* Carina Software ... 30 day MBG  
5726 Voyager 1.2 ... 87.

* Casady & Greene ... 60 day MBG  
2268 @Crystal Quest 2.2x, 7455 @ Mission Starlight or 7498 @ Sky Shadow ea. 29.

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8525 @Casino Master 3.24 (BW) ... 41.
8524 @Casino Master 4.1 (Color) ... 45.

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7492 @RightWriter for the Mac 3.1—Instantly improve your writing. RightWriter for the Mac makes it simple. With a few clicks of the mouse, RightWriter checks your grammar, style, word usage and punctuation ... 54.

Que Corp. ... 30 day MBG  
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what it's all about

Davidson & Associates
6128 Math Blaster Mystery 1.0 (CP) ... $29.
8050 EARTHQUEST 2.0 ................. 48.
Electronic Arts
6716 Pipe Dreams 1.2 .................. 17.
8643 Harpoon ................................ 39.
1907 PGA Golf (August '91) .......... 39.
FTL Software Heaven
1555 OIDS .................................. 25.
★ Great Wave ... 30 day MBG
4334 NumberMaze 26. 8527 (Color) 36.
8044 O NM Decimals & Fractions (Color) 36.
1517 ReadingMaze. 26. 1513 (Color) 36.
★ HyperGlot Software ... 30 day MBG
WordTorture 4.0-Beginner to Advanced (Span., Fren., Ger., Ita., Rus.) ea. 35.
★ Pronunciation Tutor - Beginner (Span., Fren.,) ea. 35, (Germ., Chin.) 39.
★ Verb Tutor - Intermediate (Spanish, French, German) ... ea. 39.
★ Survival Manuals (var. langs.) . ea. 39.
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8257 Preschool Pack - Color 1.0—Teaches children their A, B, C's and 1, 2, 3's in a light and enthusiastic manner using color animation, graphics and sound. Six different modules on 3 disks ......... $35.

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★ Personal Training Sys. ... 60 day MBG
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Sierra On-line
9733 Hoyle's Book of Games II ........ 23.
7367 Space Quest III (color reqs. 2 MB) ... 35.
Str-Tech Software
8229 Bane of the Cosmic Forge ........ 35.
8228 WizardryII: Knight of Diamonds (CP) 28.
Software Toolworks
4619 Mavis Beacon Typing 1.3 (CP) ...... 32.

Prometheus ... 30 day MBG
2590 ProModem 2400 Mini Plus—V42bis/MNP5 data compression and error correction added to a 2400 bps mini modem at no additional cost. Includes MACKNOWLEDGE communications software, and cable ........... $124.

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MODEMS, MAIL, NETWORKS
★ Abaton ... 30 day MBG
6266 InterFax 24/96 Modem .......................... 299.
8363 DataLink/Mac Portable .............. 209.
8362 Quadrant.Link 1.1.1 .............. 205.
★ Beagle Bros. ... 30 day MBG
7691 Flash 1.2 ................................. 125.
★ CE Software ... 60 day MBG
5174 QuickMail 2.5 (5) 249, 5173 (10) 375.
★ CompuServe ... 60 day MBG
1676 Macintosh Membership Kit 1.03 ... 22.
1673 CompuServe Navigator 3.04 ... 49.
1674 Membership Kit/Navigator Bundle 68.
★ DataViz ... 60 day MBG
1823 MacLink Plus/PC 5.0 ................... 129.
4842 MacLink Plus/Translators 5.0 ... 109.
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Dayna ... 60 day MBG
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9346 Hayes... 399.
EveryWare
8077 AllShare 1.4... 139.

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9866 Hayes... 399.
7807 Hayes... 399.
9901 Hayes... 399.
6273 Hayes... 399.
4889 Hayes... 399.
6687 Hayes... 399.
3001 Hayes... 399.

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9456 Hayes... 399.

Hayes
2300 Hayes... 399.
8614 Hayes... 399.
7391 Hayes... 399.

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1296 Hayes... 399.
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7557 Hayes... 399.
7058 Hayes... 399.
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4087 Hayes... 399.

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6420 Hayes... 399.

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7588 Hayes... 399.

Microcom ... 30 day MBG
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1556 Hayes... 399.
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9894 Hayes... 399.
7934 Hayes... 399.
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7838 Hayes... 399.
8990 Hayes... 399.

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4443 Hayes... 399.
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**Solutions, Inc. ... 30 day MBG**
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2300 Hayes... 399.
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As a Macworld Contributing Editor, author of The Macworld Guide to System 7, and all-around operating system aficionado, Lon Poole has been writing a lot about System 7 lately. But the best way to get a writer to really start making sense is to take his hands off the keyboard and put his face in front of the camera. So that's what we're doing—a video of Lon Poole explaining all about System 7 produced at the studios of PCTV®.

somewhere in the wilderness near Marlow, NH.

If you've been trying to figure out what System 7 can do for you, this is a great way to find out. And it's free to anyone who places an order over $100. (Limit one per customer.) Or you can buy a copy for $9.

By the way, Lon's publisher and accountant asked us to remind you that we'll also sell you his book on System 7 for just $19. Or buy the book and video for $25. You'll be System 7 savvy in no time.

MacConnection

1-800/334-4444

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- Disk Labels 3 1/2" Laser (Oly. 630) $29.
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- The Organizer $199.
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- Mac Classic/Plus/SE Case $24.
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- Apple SE/20 Monitor Polarizing Filter $90.
- Apple SE Monitor Polarizing Filter $95.
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- MacTilt II (high resolution) $75.
- Goldstein & Blair 30 day MBG
- The Mac Bible Guide to System 7 $10.
- IDG Books $25.
- I/O Design 30 day MBG
- Available in black (listed) or blue.

**2238 Macworld Guide to System 7 $19.
- 1913 The Mac Bible Guide to System 7 $10.
- 8374 The Macintosh Bible (with disks) $25.
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- 9979 MacTilt II (high resolution) $75.
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- 6129 Ultimate SE/Ext. Carrying Case $79.
- 1941 Ultimate LC Carrying Case $95.
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- 3 1/2" DS Disks Color (10) 12.
- 3 1/2" HD Disks Color (10) 19.
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- 9728 (10) 699.
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- 94 MB Card Case $74.
- 9728 (10) 699.
- Sony 60 day MBG
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- 2520 DOD90M (DDS 4mm, certified 2GB) $28.

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<thead>
<tr>
<th>Product Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>MouseMan</td>
<td>$77.</td>
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<tr>
<td>TrackMan</td>
<td>$89.</td>
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<tr>
<td>ScanMan Model 32 G-Scan E Scanner</td>
<td>$299.</td>
</tr>
<tr>
<td>PowerKey 1.01</td>
<td>$64.</td>
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<tr>
<td>PowerKey Remote</td>
<td>$32.</td>
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<tr>
<td>LightningScan 400</td>
<td>$385.</td>
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<tr>
<td>MacTRAC A/B (for SE &amp; II family)</td>
<td>$75.</td>
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<tr>
<td>Microtek 2.0</td>
<td>$95.</td>
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<tr>
<td>MS-II OCR Scanner</td>
<td>$129.</td>
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<tr>
<td>Scannaker 600GS</td>
<td>$159.</td>
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<td>Scannaker 6002S</td>
<td>$159.</td>
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<td>Scannaker 1500S</td>
<td>$229.</td>
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<tr>
<td>MacSpeakrs (two, stereo)</td>
<td>$175.</td>
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<tr>
<td>Mouse Systems</td>
<td>$75.</td>
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<tr>
<td>Trackball ADB</td>
<td>$68.</td>
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<td>Little Mouse or Little Mouse Plus</td>
<td>ea. 74.</td>
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<td>A3 Mouse</td>
<td>$85.</td>
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<td>Nutmeg Systems</td>
<td>$95.</td>
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<tr>
<td>19&quot; for SE, SE30, II, III</td>
<td>ea. 99.5</td>
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<td>20&quot; for Gray-Scan SE30, II, III</td>
<td>ea. 129.5</td>
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<td>20&quot; Color System SE/30, II, III</td>
<td>ea. 259.5</td>
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<tr>
<td>Orange Micro</td>
<td>$30.</td>
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<tr>
<td>30&quot; ADB</td>
<td>$92.</td>
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<tr>
<td>9&quot; ADB</td>
<td>$134.</td>
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<tr>
<td>Datadesk</td>
<td>$68.</td>
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<tr>
<td>9630 MAC/680 Keyboard—Latest version featuring function keys, click-dick tactile sensation, six separate screen control keys, a numeric keypad and isolated Esc and Reset keys</td>
<td>$129.</td>
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<tr>
<td>2858 MAC/680 Keyboard with Quicksilver</td>
<td>$149.</td>
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<tr>
<td>Pacific Data</td>
<td>$88.</td>
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<td>Pacific Page (PE)</td>
<td>$529.</td>
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<td>1473 (XL) 979</td>
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<td>Sophisticated Circuits</td>
<td>$64.</td>
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<td>Power-Key 1.01</td>
<td>$32.</td>
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<td>Power-Key Remote</td>
<td>$32.</td>
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<tr>
<td>The Complete PCI</td>
<td>$289.</td>
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<td>Thunderware</td>
<td>$699.</td>
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<td>LightningScan 400</td>
<td>$35.</td>
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**UPGRADES & DRIVES**

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<th>Product Description</th>
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<tr>
<td>SIMMs</td>
<td>$49.</td>
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<td>1 MB SIMMs (80ns)</td>
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<td>8316 1 MB SIMMs (80ns, set of 2)</td>
<td>$95.</td>
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<tr>
<td>4937 2 MB SIMMs for II or LC</td>
<td>$129.</td>
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<td>Applied Engineering</td>
<td>$139.</td>
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<td>FastMath LC</td>
<td>$229.</td>
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<tr>
<td>1, 1.44 MB High Density Drive</td>
<td>$309.</td>
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<tr>
<td>QuickSilver (256k cache card)</td>
<td>$309.</td>
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<tr>
<td>MacRam Classic with 0, 1, or 3 MB.</td>
<td>call</td>
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<th>Product Description</th>
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<tr>
<td>Ram PowerCard</td>
<td>$749.</td>
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<tr>
<td>SCSI PowerCard</td>
<td>$1095.</td>
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<tr>
<td>Fifth Generation</td>
<td>$155.</td>
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<td>Jukebox Five</td>
<td>$999.</td>
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<td>Fast Back Tape</td>
<td>$759.</td>
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<td>Pocket-lammar50</td>
<td>$599.</td>
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<td>Pocket-lammar100</td>
<td>$899.</td>
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<td>Pocket-lammar200</td>
<td>$1349.</td>
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<td>HammerSoft (internal)</td>
<td>$469.</td>
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<td>Hammer100s (external)</td>
<td>$699.</td>
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<td>Hammer200s (internal)</td>
<td>$1199.</td>
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<td>Omega</td>
<td>$30 Day MBG</td>
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<tr>
<td>44 MB Transportable (reqs. kit)</td>
<td>$299.</td>
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<tr>
<td>90 MB Transportable (reqs. kit)</td>
<td>$799.</td>
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<td>DataPak</td>
<td>$699.</td>
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<td>DataPak 88 Classic</td>
<td>call</td>
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<td>Micron</td>
<td>$30 Day MBG</td>
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<tr>
<td>Xceed Ici-128K Cache Card</td>
<td>$239.</td>
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<tr>
<td>Xceed Color 30 Card</td>
<td>$279.</td>
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<tr>
<td>Xceed MacroColor II Card</td>
<td>$469.</td>
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**Mass Microsystems**

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<tr>
<th>Product Description</th>
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<tr>
<td>2605 DataPak 45 MB Removable Cartridge Drive</td>
<td>$699.</td>
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**Cutting Edge**

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<th>Product Description</th>
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<tr>
<td>600K External Disk Drive special</td>
<td>$119.</td>
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<tr>
<td>44 MB Removable Drive</td>
<td>$599.</td>
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<tr>
<td>30 + MB Hard Drive</td>
<td>$398.</td>
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<td>45 + MB Hard Drive</td>
<td>$398.</td>
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<td>60 + MB Hard Drive</td>
<td>$398.</td>
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<td>80 + MB Hard Drive</td>
<td>$398.</td>
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<td>52 MB Hard Drive</td>
<td>$398.</td>
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<tr>
<td>105 MB Hard Drive (Quantum)</td>
<td>$649.</td>
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<td>165 MB Hard Drive</td>
<td>$699.</td>
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<td>601 MB Hard Drive</td>
<td>$2229.</td>
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**Daynix**

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<tr>
<td>Daynix II 300k Drive</td>
<td>$449.</td>
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<tr>
<td>Daynix II 1.2 5/4&quot; Drive</td>
<td>$449.</td>
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<tr>
<td>Daynix II Dual 360k &amp; 1.44 MB</td>
<td>$739.</td>
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**DayStar Digital**

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<tr>
<th>Product Description</th>
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<tr>
<td>Listed items do not include coprocessor LT200 Connection (PC) 189 (MC) 299.</td>
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<tr>
<td>FastCache for Mac Ici</td>
<td>$279.</td>
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<tr>
<td>50 MHz PowerCache 030</td>
<td>$1699.</td>
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**Sigma Designs**

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<th>Product Description</th>
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<td>DoubleUp</td>
<td>$319.</td>
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<td>Quick SCSI Card</td>
<td>$469.</td>
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**Peripheral Land, Inc. (PLI)**

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<th>Product Description</th>
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<td>PLI TurboFloppy 1.4</td>
<td>$309.</td>
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<tr>
<td>PLI Sony 40 Turbo Ext Drive</td>
<td>$419.</td>
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<tr>
<td>PLI SuperFloppy</td>
<td>$449.</td>
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<tr>
<td>PLI Infinity 40 Turbo</td>
<td>$699.</td>
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<td>PLI Infinity 88 Turbo</td>
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<td>PLI Infinity 16x80</td>
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<td>PLI 105 MB Ext Drive</td>
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<td>PLI 200 MB Ext Drive</td>
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<td>PLI 2GB DAT Drive</td>
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<td>Quick SCSI Card</td>
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**Sigma Designs**

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<td>DoubleUp</td>
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**Stop Systems**

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<td>High Speed SCSI for Mercury 16+</td>
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<td>16 MHz Mercury 030 (for Mac SE)</td>
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<td>16 MHz Mercury 030 (for Mac Plus)</td>
<td>$499.</td>
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<tr>
<td>20 MHz Gemini 030</td>
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<td>25 MHz Gemini 030</td>
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<td>33 MHz Gemini II 030</td>
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<tr>
<td>40 MHz Gemini II 030</td>
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<tr>
<td>20-40 MHz Gemini Classic</td>
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<td>68828 Math Coprocessors</td>
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**Logitech**

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<td>MouseMan</td>
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<td>TrackMan</td>
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<td>ScanMan Model 32 G-Scan E Scanner</td>
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<td>PowerKey 1.01</td>
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<td>Power-Key Remote</td>
<td>$129.</td>
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<td>The Complete PCI</td>
<td>$139.</td>
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<td>FastMath LC</td>
<td>$229.</td>
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<td>1, 1.44 MB High Density Drive</td>
<td>$309.</td>
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<tr>
<td>QuickSilver (256k cache card)</td>
<td>$309.</td>
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<tr>
<td>MacRam Classic with 0, 1, or 3 MB.</td>
<td>call</td>
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IT MAKES CENTS. Take the magazine you’re reading. To fill a single 8mm tape, you could backup every issue of MACWORLD for the next two years. A single issue costs just about 33 cents to store. Consider that you're spending less time backing up more data, and you're no longer dealing with small change.

Using our high speed, high capacity 8mm tape drives will save you time and money in manhours, media, storage, and shipping costs. In fact, our drives give you the lowest cost per megabyte on the market. On lightweight, reliable media. That is fast becoming an industry standard.

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Compatible with all Macintosh models including systems running A/UX, our drives give you between 2.5GB and 25GB of storage per tape. Features like a liquid crystal display, data compression, data encryption, and high speed search capability give our drives the flexibility to adapt to your changing needs. We can meet any site requirements with rack mounting options, hard disk configurations, and a variety of cable lengths. And we back every product in our line with a 12-month warranty and technical support.

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Funny kind of world we live in. Every time you feel you’ve seen its worst, that you’ve shielded yourself from its slings and arrows, that you’ve observed the low points in human behavior and understand perfectly that the average person lacks the morals of a zebra mollusk, something wallops you upside the head and tells you things are much, much worse than you suspected. Welcome to Chinatown, Jake. And you realize that despite your hard-won cynicism, you are but a rube without a clue, a widowed grandmother waiting outside the bank for the nice man who said he was a cop to return the life savings he borrowed in order to catch a crook.

That was the way I felt when I read about the ongoing negotiations and recent agreement between Apple Computer and International Business Machines to work together.

Rainbow and Blue
Hey, I should have known better. It’s not like Apple Computer of late has been a model of the idealistic New Age company that its founders promised back when they were still within psychic shouting distance of the garage where it all began. Apple Computer is a serious business, raking in a billion bucks every quarter. You would have to be a tree stump to believe that the leadership of Apple doesn’t participate in the short-term greed-ridden mentality so pervasive in American business. The company is awash in meaningless reorganizations, energy-draining lawsuits, and cushy executive payouts, all while its technological leadership drip-drip-drips away.

It’s also common knowledge that as Apple gets bigger, older, and richer, it more and more resembles Big Blue, the faceless, white-shirted mob that dominates the industry from its headquarters in New York. Apple hires executives who worked at IBM, and it cultivates a sheen of blandness to court corporate minions who kneel and jerk their buying decisions in the direction of Armonk.

This tendency on Apple’s part has always been disturbing because IBM still stands as a symbol of the days when computers lived in air-conditioned fortresses and not on people’s desktops. IBM believed that computers should be handled only by a high priesthood that Knows More Than You Do. It kept the productivity, not to mention the joy, of computing away from those who could mightily benefit from it. If IBM had its way, we’d still be handing stacks of punched cards to pocket-pencil geeks.

IBM may tempt us with a good product or two (for its time, the IBM PC was quite a nice piece of machinery), but ultimately it shows its true loathsome face with something like the PC Junior or the hideous Presentation Manager, thus revealing that IBM never got it in the way Apple did so effortlessly. Computers are all about transcending limitations, and IBM is all about limiting computers (continues)
for its own dark corporate purposes. If it were in the company's own interests, IBM would bend our heads, spindle our best efforts, mutilate our hopes.

We know what IBM stands for. And just in case we forgot, IBM's chairman, John F. Akers, recently sent out a missive reminding his wing-tipped warriors, exactly what Big Blue is and has always been about. According to several newspaper accounts, Akers wrote:

"IBM exists to provide a return to its shareholders . . . These facts of business life are as plain now as they were more than 45 years ago when Thomas J. Watson Sr. reminded people of them, saying, 'It becomes increasingly apparent in my small sphere of observation, and I conclude the company as a whole, that the average IBM'er has lost sight of the reasons for its company's existence. IBM exists to provide a return on invested capital to the stockholders.'"

No wide-eyed rap about technology empowering people. No politically correct, technologically hip college teacher pep-talking students about a new Industrial Revolution with a chicken in every pot and a mouse on every desk. No promise to deliver cool product. We're IBM, baby, and the bottom line is the bottom line.

The Mission

Apple Computer, of course, is a profit-making enterprise, too, and I wouldn't have it any other way. But from the first, it seemed to hold a promise that this was capitalism with a human face—that little smiley guy who tells you, "Welcome to Macintosh." Apple was a company with vision, a company with a mission. It was going to make life better. It was going to make computers for the rest of us.

What did they mean by "the rest of us"? The people who hate IBM.

As Apple gets bigger, older, and richer, it more and more resembles Big Blue, the faceless, white-shirted mob that dominates the industry.
Faster SCSI

Improve your Mac's SCSI performance by up to 400%.

Eliminate the SCSI bottleneck. QuickSCSI allows data transfer rates up to 4.4MB/sec. and beyond. That's more than twice as fast as the Mac's built-in SCSI, because QuickSCSI uses a wider data path. And because QuickSCSI doesn't disable the built-in SCSI, you can have up to 14 SCSI devices online at a time.

Set-up is easy, because QuickSCSI is compatible with most popular disk drives, including internals.

And you can install it in any NuBus Macintosh. Get all the performance your fast drives can give, use QuickSCSI.

*$699 suggested retail, $399 when purchased with a PLI drive.

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QuickSCSI provides automatic, continuous backups.

Everything you write to the main drive will be written to a second drive at the same time. If one drive crashes, you can bring the second drive online in seconds.

You never have to Re-create data or waste time restoring.

Mirroring is by far the safest, most-reliable way to maintain current backups of your important data. And QuickSCSI uses a fast-burst, disk mirroring technique which is so fast and easy, you may never do a traditional backup again.

Mirroring is useful to everybody.

It's ideal for network administrators, desktop publishers, computer artists or anyone who hates to make backups.

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upon and nothing more. They wanted to change the world.

Not everyone at Apple bought the mission whole hog. But enough Apple workers did to make the company something special, not only to its workers but also to its customers. To those of us who believed in the mission, Apple Computer meant something. We paid a price for it.

The czars at Apple, from Jobs to Sculley, knew the blindness of our devotion and milked it for all it was worth. They tested our patience. They charged too much for their products, they hoarded their sometimes questionably begotten software licenses, they acted in too many ways like the very companies they said they were different from. But we hung on, through overpriced computers, faulty power supplies, hubris-laden boardrooms, and nonexistent notebook computers. We continued to keep the faith, even when Apple's leaders didn't. We were buckled in for the whole ride.

Our continuing loyalty was based on two factors, intertwined like the bushes on the graves of Tristram and Isolde: Apple's products, by and large, were great. And no matter what else was wrong with the company, Apple Computer was not IBM.

Although often distracted by executive misdirection, Apple never really forgot that besides making money, there was a mission at stake. You could see this in its products, which more often than not displayed a useful amiability, and you could see this in the spirit of its employees, most of whom realized that the best part of working at Apple was participating in the mission.

Apple knew that not being IBM was one of its prize assets, and the company sang that song from the rooftops. Apple ran commercials showing IBM customers walking off cliffs in their three-piece suits. Lemmings, I believe Apple called those Blueheads. Then it ran commercials of people frustrated with their IBM PCs and bashing the things, in one case even taking a chain saw to the beast. At Macworld Expo, stockholder meetings, and random pep rallies, wherever Apple screened these promos, people stood up and cheered.

For one sales meeting, Apple even hired the guy who sang "Ghostbusters" to redo the song, only this time the who-you-gonna-call were the "Bluebusters."

No matter how bad things got—with Apple suing just about everyone in sight for allegedly appropriating its interface, and with System 7 late, a Portable that sucked fish, the whole Macintosh development team in exile, and the corporate staff at Apple looking like an outtake from a Leni Riefenstahl movie—we still had one important thing to fall back on. It wasn't IBM. Envisioned geographically, there was the continent of Apple and the continent of IBM, and between them a gulf that would never be crossed.

(continues)
Flips, somersaults and handscans.

NEW!

Now there are three LightningScan models. So everyone can perform great feats of graphics. LightningScan 400 is the top-rated scanner for all Macs. And now we've introduced the Compact for Mac Classic, SE/30, SE with SuperDrive® and Portable. And the Pro 256 for any Mac II or LC.

They're fun, easy-to-use and feature the exclusive SnapGuide® system for straight scanning. And ThunderWorks®. The award-winning software that lets you alter images with a troupe of handy tools.

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For starters, LightningScan 400 and LightningScan Compact are ideal for adding graphics to newsletters, reports, flyers and announcements. And despite its impressive features, the Compact has a street price under $300.

For professional results, the Pro 256 is the world's most powerful hand-held scanner. It's great for layouts and comps. And with 256 shades of true gray, it's even better for creating high-quality halftones. For speed, control and creative expression, the Pro 256 scans alone.

Do flips, rotations and special effects with ThunderWorks software.

Whether you're looking for low-cost graphics, or a powerful imaging tool, you can't beat LightningScan. To get your hands on one, see your Mac retailer or call us today for our demonstration video.

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ThunderWorks is System 7 compatible. LightningScan 400 runs on all Macs. LightningScan Compact runs on Macintosh Classic, SE/30, SE with SuperDrive, and Portable. LightningScan Pro 256 requires a Macintosh II, LC, or SE/30; 4 MB suggested. LightningScan, SnapGuide, ThunderWorks, Thunderware and its logo are registered trademarks of Thunderware, Inc. Macintosh and SuperDrive are trademarks of Apple Computer, Inc. © 1991, Thunderware, Inc. All rights reserved.

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The Betrayal

That's all over now. The Bluebuster T-shirts apparently have been stuffed into garbage bags and shuttled off to Goodwill. John Sculley and his whitebread lieutenants have huddled with the former forces of evil and emerged with an agreement that spells the end of an era.

Read it and weep, those of you who believed the dream: Apple and IBM are forming a joint venture to create the next generation of operating system, successor to the Macintosh. They may even sell each other's products. This is something that Nostradamus might have predicted as a sign of the apocalypse, the lion lying down with the lamb and all. But there it is.

Apple Computer can no longer lay claim to its aura of specialness—that quality was left in some conference room in Armonk, destined to spend eternity in the lost-and-found of good intentions. Bill Gates got it right when he said, "What's left? Apple has sold off its birthright... and that's sad."

Gates, of course, is the odd man out in this alliance, which was presumably motivated in part to fight Microsoft's increasing power in the personal computer industry. But he speaks the truth. The agreement is not only the biggest betrayal of its loyal customers in all Apple history, but also a signal that one of the pillars, if not the major pillar, of Apple's mission is hereby toppled. Apple can no longer say that it's not like IBM. Because in an essential way, it now is IBM.

Some industry analysts are applauding the agreement, saying that the strategic alliance will work for both companies. Others are warning that Apple may be lured into making a deal that ultimately will not serve its interests. Anyone with brains is wondering how the two company cultures will mesh. But at this point, I don't care about whether the deal works or doesn't work—the soul of Apple is no more.

What will Apple stand for if its products become interchangeable with those of IBM? What were the lords of Apple thinking to even consider this? Don't they understand that Apple, despite its inclusion in the fraternity of corporate giants, still retains some of its sheen precisely because it stands as an alternative to the mind-numbing dominance of IBM? And that entering into a partnership with IBM on such critical matters is no less than a blood betrayal of the faithful? Down through the years, Apple's mission has eroded, but this is different—it means that there's no mission at all. It's Chinatown, Jake—let's get out of here.

Orwell Redux

Remember Apple's great commercial introducing the Macintosh (another IBM-hashing spot, by the way), where the agents of repression were de-

Apple led a revolution—

a big glorious gob

of spit in IBM's face...

A partnership with

IBM is a blood betrayal

of the faithful.

stroayed by superior interfaces and we were promised that '1984 won't be like 1984'? If you reread the book that made that annus so notorious, you will find that the fictional world therein has three large nationalities, each of which is always at war with one and allied with another. The opposing nation is always referred to as a demonic, horrible, subhuman force that deserves no less than total destruction. But then, with no warning or explanation, that war is called off, and a new war initiated with the third entity. This new opponent is referred to with the same dehumanizing cant. And the country that for years had been considered a satanic blight on humanity? Suddenly, our ally!

And that is why 1991 looks like 1984. Apple, please—say it ain't so!

Macworld columnist Steven Levy is writing a book on artificial life.
When it comes to selecting the right scanner, be forewarned. There is a difference you can see in black and white. And color. Just look at this comparison between the La Cie Silverscanner and the Microtek Scan 3002S. Both images were scanned at default settings with no corrections. This entire ad was then created and separated using Adobe Photoshop, Quark XPress 3.0 and a Linotronic 330.

As you can see, Silverscanner produced a better-looking image than the Microtek scan. Silverscanner lets you scan color, gray-scale, halftone and line art with dazzling clarity. La Cie gives you more with OCR compatibility, faster color previews, versatile scanning controls and up to 1200 dpi.

FREE Software. Silverscanner comes with two FREE bonuses: Adobe Photoshop (full version) and La Cie’s exclusive Silverscan plug-in modules for Photoshop, ColorStudio, Digital Darkroom, Enhance 2.0, ImageStudio and Ragtime.

A Company You Can Count On. La Cie is a Plus Development Company, backed by $400 million in assets. That means you can trust La Cie to provide a constant source of high-quality Macintosh peripherals. Plus dependable service and support. Silverscanner is the color scanner you’ve been looking for. See for yourself. Order yours today.

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La Cie Silverscanner: 16 million colors; 256 smooth shades of gray, production quality line art; up to 1200 dpi—all in a single pass.
The Macintosh of the future is

Introducing the System 7 Personal Upgrade Kit.

You've read and heard a lot about System 7, the new system software for Apple Macintosh computers. And if you already know what it will do for your Macintosh, perhaps the only other thing you need to know is this: Your System 7 Personal Upgrade Kit is ready.

You can order it right from the next page, or from your authorized Apple reseller. Just proceed to the phone number above the coupon. But if you'd like a reminder of what System 7 is all about, please read on.

More powerful capabilities.
More ease of use.

That's what System 7 brings to your Macintosh. As soon as you install it, you'll enjoy an array of new capabilities, and be ready for a new generation of software. And since System 7 runs virtually all current applications, you'll enjoy its benefits without giving up a thing.

What's on the Apple menu? You decide, by dragging any document or application into the Apple Menu Items folder. To open it, just click. And for a quick way to see what's inside a folder, click the triangle next to it.

With enhanced multitasking, you can keep several applications open at once, and continue to work while you print, search for, copy, or share files. Thanks to virtual memory, multitasking capability isn't limited by the amount of RAM.

Introducing Balloon Help. Point to anything—a menu item, icon, or tool—and a balloon appears, telling you what it is and what it does. Balloon Help is available in the Apple Finder and in a new generation of applications.

With TrueType, even the largest letters display perfectly on the screen, with no jaggy, "staircase" edges. You also get terrific printed output with almost any kind of printer. And System 7 is compatible with the fonts you already have.

©1991 Apple Computer, Inc. Apple, the Apple logo, Macintosh, and "The power to be your best" are registered trademarks of Apple Computer, Inc. Balloon Help, Finder, and TrueType are trademarks of Apple Computer, Inc. Computers with both a 68020 microprocessor and a 68051 PMMU. "A System 7 Group Upgrade Kit, designed for managers of large Macintosh installations, is available from Apple resellers only. (Suggested retail price.
the Macintosh on your desk.

We've also made Macintosh easier to use. For instance, take a look at Apple Balloon Help, our new on-line help feature. Point to an item on the screen, and a balloon pops up next to it, telling you what it's for. So applications are quicker to learn, and easier to make the most of.

Everything gets smoother and simpler.

With System 7, there's a big improvement in big type. Thanks to Apple's TrueType font technology, you get perfectly smooth letters on the screen, no matter what their size, along with more professional-looking output. And you don't need the Font/DA Mover. To install TrueType fonts, just drag their icons into the System Folder. (Ditto for desk accessories.)

Open an application. Work. Save. Quit. Open another application. Until now, that's how you've probably moved from, say a word processing program to a spreadsheet. With improved multitasking, you can keep several applications open at once, and choose between them with a mouse click. So you don't have to stop what you're doing to print, search for files, duplicate files, or share data.

Using applications simultaneously can demand lots of memory, but with System 7 you aren't likely to see a not-enough-memory message. Because there's virtual memory. When you need extra memory, just tell System 7 to use the spare room on your hard disk. Your Macintosh will work without interruption, and so will you.

See what's developing.

System 7 gives developers a far-reaching new set of tools, enabling them to offer applications that do new things for you. For example, to the fame and success of cut and paste, we've added publish and subscribe. Change something in one document, and it can change automatically—in every document where it appears. Even if the documents are in different applications or on different computers across a network.

System 7 also enables any Macintosh on a network to share documents and applications with any other.

We could go on. But the main point is really this:

System 7 is ready for your Macintosh.

To run System 7, all you need is 2 megabytes of memory and a hard disk. (If you don't have enough memory, you can purchase it from your authorized Apple reseller.)

System 7 sets new standards in personal computing, and so does the way Apple brings it to you. To make installation simple and sure, your System 7 Personal Upgrade Kit comes with everything you need—disks, manuals, and 90 days of telephone upgrade assistance. Yet your System 7 Personal Upgrade Kit costs only $99 (plus shipping and handling).
When it comes to performance, DayStar is the upgrade company. We deliver 100% compatible performance upgrades for your Mac.

Whether you need 25, 40, or 50 MHz performance with our new PowerCache®, or an economical boost with the FastCache®... we have an upgrade to fit your budget. You can work up to three times faster!

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Or, with our LT200 Connection, you can even connect PCs to your AppleTalk™ network!

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CONSPICUOUS CONSUMER

Electromagnetic Update
THE CONTROVERSY—AND RESEARCH—CONTINUES

BY DEBORAH BRANSCUM

While the computer industry has moved fairly quickly to respond to consumer concerns about low-level electromagnetic fields (see "Seeking ELF Relief," this issue), there's still more controversy than consensus in the scientific debate about whether such fields are harmful. Three recent studies fail to settle the debate, and add more questions.

Conducted by the University of Southern California, a soon-to-be-published epidemiological study of 232 childhood leukemia cases and 232 controls shows a link between leukemia and household-wiring configurations. That link confirms the observations of two earlier studies done in Colorado. But unlike the earlier work, USC's study, overseen by Dr. John Peters, also measured electric and magnetic fields in various areas inside and outside each home, and measured magnetic fields for at least 24 hours in each child's sleeping area.

Wiring configurations—which refer to the relationship between the number, capacity, and distance of power lines to houses—had been thought to represent electromagnetic field strengths within particular homes. If that were true, researchers who found a relationship between wiring configurations and leukemia risk should find a correlation between actual household measurements of electromagnetic fields and leukemia risk as well. But according to a summary of the USC study, the research data "offer no support for a relationship between measured electric field exposure and leukemia risk, little support for a relationship between measured magnetic field exposure and leukemia risk, some support for a relationship between wiring configuration and leukemia risk, and considerable support for a relationship between children's electrical appliance use and leukemia risk."

(The electrical appliance risk referred to involved the use of hair dryers and black-and-white TVs among a small number of children. No one knows if the short-term, very high exposure of children to the fields from these appliances is actually responsible for the observed risk.)

There is no one explanation for the puzzling results of the USC study. The Palo Alto, California-based Electric Power Research Institute (EPRI) is a power-utility-sponsored research organization that is spending some $9 million this year on studies in this area, including USC's. Dr. Stanley Sussman of EPRI suggests several possible explanations for the study's findings: (1) that the field measurements weren't taken over a long enough period to be meaningful; (2) that the critical element linking electromagnetic fields and leukemia risk wasn't registered by the measurements; (3) that wiring configurations don't represent electromagnetic fields but some other element such as traffic patterns or housing density that somehow contribute to an increased risk for leukemia; or (4) that a design flaw in the study suggests a false as (continues)
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EDWARD BERLAND

EDWARD BERLAND OF SANTA ROSA, CALIFORNIA, writes that when he had problems with his Microtek 300Z scanner, the company "made every effort to correct those problems over the telephone," walking him through diagnostics. When that failed, Berland returned the scanner for repair, twice. When it became apparent the scanner was still faulty, Microtek sent Berland a new scanner at no charge—even though the unit was out of warranty. Berland writes that he remains loyal to Microtek because the company "made a bad experience into a good one."

Dr. Schnorr, who suggested that researchers concerned about ELF exposures might want to look at other populations. At least one such study is under way.

Differing Views

Not everyone agrees that more research into the potential health effects of electromagnetic fields is good or necessary. In a paper published this year in Physical Review A, Yale physicist Dr. Robert Adair is blunt: "There are very good reasons to believe that weak ELF fields can have no significant biological effect at the cell level—and no strong reason to believe otherwise." Adair and others argue that the electromagnetic fields emitted by personal computers, power lines, and other devices are so much weaker than electric and magnetic fields created in the body itself that significant health effects are impossible.

The Food and Drug Administration (FDA), which is responsible for regulating devices that generate both ionizing and nonionizing radiation, such as ELF fields, responds mildly by pointing out that "there's no real agreement within the physical science community."

"Others in physics say you are ignoring the fact that the biological system may be able to receive this (continues)
How to Master 20 Popular Macintosh Programs Without Ever Reading The Manuals

Macintosh Programs Can Be Learned in a Few Hours With the Right Training

Over the past four years I've been associated with over 50,000 people attempting to learn the Macintosh computer. I've watched as each person wages their own personal, private battle to master the computer and the most popular Macintosh programs.

I've seen their frustration, have empathized with their confusion, and understood their computer fears. I've talked to workers who have had new computers and new programs simply dropped on their desk with the directive to, "learn this." I've listened to people who have struggled night after night trying to read and understand a computer manual. Can you imagine trying to understand and master 4th Dimension from the manual?

You would be surprised at the number of people who have confided with me the fact that they've given up trying to learn some of the programs. They put the box on the shelf and write the expenditure off as a bad investment.

Hard Earned Money Wasted

Can you imagine how much money has been wasted on programs and computers that are sitting abandoned? Right now think of the people working on Macs in your office. Do they really understand the computer? Do they know what to do when it goes down? How many programs are each of your people using? Have they really mastered the programs they're using? Do they know the short-cuts and valuable techniques that will save you time, money, and increase your professionalism?

An Excellent, Low Cost Training Answer

Four years ago I founded MacAcademy. My purpose was to create a training organization that provided training similar in nature to the Macintosh itself - simple, easy to use, and effective.

Now, four years later the concept has proven to be a great success. Right now people are benefiting from MacAcademy training in over 100 cities in the U.S., in Canada, Great Britain, Australia, Japan, Hong Kong, and 22 additional countries throughout the world.

MacAcademy training is successful for one reason - it works!

The Video Answer

Two years ago we introduced the MacAcademy Video Training Library. This library now includes over 45 different titles. Each video is 2 hours long and offers clear, concise, effective training for the Macintosh and over 20 popular programs. In many cases you can purchase up to 6 hours of training for one program.

MacAcademy has resisted the temptation to follow competitive training programs who have recently implemented large price increases. Our videos started out at $49 each and are still only $49. The best training in the business for less than $50. This low cost training alternative has proven to be the Macintosh training choice of over 10,000 companies.

Guaranteed Results

The MacAcademy reputation is excellent. Our guarantee is simple: If you're not happy we'll give your money back. No hassles or problems.

To Order

Here is a current list of MacAcademy Video training tapes now available. To order, simply send check, credit card information, or purchase order to MacAcademy Videos Dept. MW1091 477 S. Nova Rd. Ormond Beach, FL 32174 or call the numbers listed below. Now is the time to start training. Thank you for allowing MacAcademy to help you in that effort.
That's why we invented Magic. With Magic, add sound, and use responsive buttons to dull becomes dynamic. Tediou s becomes one, you feel worse. Or create new ones from scratch. Magic is a better way of presenting. With Magic it is easy to animate text and graphics, add sound, and use responsive buttons to bring you to any point in your presentation. Now you can add pizzazz to static presentations that you may have already created. Or create new ones from scratch.

Is what? How about a boring presentation. The excessive perspiration, the public ridicule, losing your audience, or an important sale. There's nothing quite like it. If you're sitting through one, you feel awful. If you're giving one, you feel worse. That's why we invented Magic. With Magic, dull becomes dynamic. Tediou s becomes terrific. Magic is a better way of presenting. With Magic it is easy to animate text and graphics, add sound, and use responsive buttons to bring you to any point in your presentation. Now you can add pizzazz to static presentations that you may have already created. Or create new ones from scratch.

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Now there is an easy way to create presentations, reports, kiosks, training materials, storyboards, and the like, with all of the punch of multimedia. Let Magic unlock the presentation power of your Macintosh and put it in your hands.

It's not just what you say, it's how you say it. For more information on Paracompany's animation and 3D product line, call 1-800-877-7749.

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Until now, you've probably been paying big bucks for your typesetting service... while you sweat out your deadlines waiting for your copy to be returned. LaserMaster has another answer: two personal typesetters that make all your publishing jobs a breeze and take the heat out of your production budgets. With the LaserMaster 1200 or 1000 Personal Typesetters, you can keep more money in your pockets and still have it all:

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Macintosh information: (612) 944-8726
PC product information: (612) 944-9330

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Conspicuous Consumer

study program "which can inform development of design and usage standards for a wide range of exposure conditions." Apple offered to provide financial assistance and other types of support. The academy approved the proposal but added a hook: "The governing board wanted the study to be done without appearance of conflict of interest or bias," said Dr. Charles Edington, director of the Board on Radiation Effects Research of the National Academy of Sciences. "Normally, 50 percent or more of the funds come from government; 49 percent or less from private funds. This time, no private funds will be accepted." The result has been no study. "We have been unable to obtain funds from the federal government," said Dr. Edington. "We can't move without funding."

What to Do?
In the absence of scientific agreement on the issue, many wonder how to respond to the potential threat of health hazards from low-frequency electromagnetic fields. An Office of Technology Assessment report suggests taking a "prudent avoidance" strategy to minimize any potential risk. For computer users, such measures include sitting at arm's length from a monitor and moving away from the back and sides of coworkers' machines. The EEPA calls prudent avoidance an abandonment of science, but it's an approach several companies, including CBS News and the Boston Globe, are taking.

It will be many years before the question of whether electromagnetic fields are harmful is answered. If you want to help speed the process, lobby government officials to fund needed research. In the meantime, sit back from your computer, but don't become obsessed by it. Stress isn't a healthy response.

(Research assistance by Carolyn Bickford.)

Send nominees for sainthood to Service Heroes, Macworld, 501 Second St., San Francisco, CA 94107, or via AppleLink (Macworld) or America Online (Branscum). Conversely, drop Conspicuous Consumer a line if a company is ignoring you.
Introducing the Xeba™
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with throughput to 9600 bps

Finally, Xeba brings the aggressive pricing of the DOS market to Macintosh users.

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<thead>
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<th>Speed</th>
<th>Feature</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>2400  bps</td>
<td>V.22 bis</td>
<td>$109</td>
</tr>
<tr>
<td>2400  bps</td>
<td>V.22 bis/V.42 bis w/ MNP-5</td>
<td>$149</td>
</tr>
<tr>
<td>9600  bps</td>
<td>Send/Receive Data/Fax</td>
<td>$179</td>
</tr>
<tr>
<td>9600  bps</td>
<td>V.32/V.42 bis w/ MNP-5</td>
<td>$449</td>
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Introductory price: $168

Plus $6 shipping and handling. Xeba’s list price is $299, so order today. MasterCard or VISA. California residents add 7.25% sales tax.

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- Allegra PageMaker 4.01 goes beyond the paste-board metaphor that made the original a smash hit. New features include a blindingly fast Story Editor, extended support for color, ability to rotate text, built-in dictionary, checker, plus much more. #03223

- Adobe Systems
  - 03850 Type On Call CD-ROM ................. 59
  - 02371 Font 46 Futura ......................... 177
  - 02398 Font 42 Century Condensed ........... 239
  - 02334 Font 9 ITC Garamond ................. 119
  - 02352 Font 37 Univers ....................... 239
  - 02363 Adobe Collectors Ed #2 P&T .......... 139
  - 02348 Font 39 Futura Light ................. 177
  - 02347 Font 123 Tekton ....................... 119
  - Agfa
    - 00381 AgfaType Toshiba CD-ROM .......... 689
    - 00326 Agfa Type On CD ROM ............... 61
  - Bitstream
    - 00396 Font Pack I ........................................ 58
    - 00397 Font Pack II ........................................ 58
    - 04010 Font Pack III ...................................... 98
    - 04011 Font PackIV ....................................... 98
  - Casady and Greene
    - 00315 Fluent Laser Fonts Libr-special ..... 79
  - Design Science
    - 03559 Design Science Math Type ........... 99

- Adobe Systems
  - 03558 Adobe Illustrator 3.0 W/ Atm ...... 348
  - 03971 Streamline 2.0 ......................... 118
  - Aldus Corp.
    - 03947 Aldus Freehand 3.0 ................. 398
  - Aldus PageMaker 4.0 ......................... 498
  - Individual Software
    - 03978 Publish It Easy 2.0 ................. 143
  - Letraset Graphic Design
    - 03798 Quark Xpress 3.0 ...................... 518
  - Quark Inc.
    - 04121 Aldus Gallery Effects .............. 129
  - Broderbund
    - 03932 Typetyper 1.5 ............................ 114
  - Deneba
    - 00303 Canvas 3.0 ................................. 299
  - Dynaware
    - 03751 Dyna Perspective 2.0 ............... 599
  - Letraset Graphic Design
    - 03216 ColorStudio ................................ 598
    - 03217 DesignStudio ................................ 488
  - Pantone Color Book
    - 03445 Pantone Matching Grid ............... 44
  - Pantone Color System Guide ................. 44
  - Strata
    - 04001 Strattrusion 3D ....................... 348

- Canvas 3.0 ................................. 299
- ColorStudio .................................... 598
- DesignStudio .................................... 488
- Pantone Color Book ......................... 44
- Pantone Color System Guide ................. 44
- Strata .............................................. 348

**TABLETS**

- Kurta
  - 03012 Cordless 4 Button Cursor ........... 64
  - 03009 8.5X11 Tablet w/Pen & Cur ........... 318
  - 03010 12X12 Tablet w/Pen & Cur ........... 384
  - 03011 12X17 Tablet w/Pen & Cur ........... 624
- Wacom
  - 03942 4 Button Cursor SD 510C .............. 120
  - 03946 SD-510C 6x9 tablet .................... 560
  - 03948 SP-310 Stylus (Soft) ................. 99
  - 03963 SD-311E 12x18 Elec Stat ............... 1325
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The MacZone Announces

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*InfoZone* is a new service from the MacZone that offers you product information via your fax machine.

You may receive detailed information on products by simply calling our *InfoZone* fax number and following the computer's voice instructions. Product information available through *InfoZone* will be denoted by a "Z" next to the product number for each available product. A listing of these products are also offered through the *InfoZone* system.

*InfoZone* product information can be obtained anytime, day or night, just call 206-861-6601.

Lotus 1-2-3 for Macintosh delivers innovative spreadsheet capabilities that provide users simple access to commonly used functions, the ability to customize the desktop to their work styles, and direct manipulation of text, graphs and objects for intuitive operations. It also provides full file, formatting, macro and keystroke compatibility with all versions of 1-2-3 using the 1-2-3 Classic features, the familiar 1-2-3 menu invoked by hitting the "7" key. It will also fully support Apple's new System 7 operating system.

**Product Highlights**

- Tear-off menus to position anywhere on the desktop
- Customize your menus for formats, styles and macros
- Console and status bars designed as movable windows
- Directly manipulate text, graphs and drawn objects
- Graphs and drawn objects reside on top of the worksheet
- File, formatting and macro compatibility with other 1-2-3 versions
- The only Mac spreadsheet to offer true 3-D workbooks
- Query remote databases directly from 1-2-3
- Supports key System 7 features

"It's bound to be an important program..."  
John Sculley, Chairman & CEO Apple Computer

"...a first rate job of making a powerful product easy to use."  
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Lotus 1-2-3 for Macintosh

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**QuickKeys V2.0**

QuickKeys 2 lets you make shortcuts for your Mac. Use keys to automatically back up work, print envelopes, change fonts, select a printer and many other functions. #0371

**QuickMail V2.5**

QuickMail is a flexible, extendable LocalTalk-based electronic mail system. It does everything E-mail should do and has gateways to the outside world of MCI Mail, Telex, and dial-up services. #0313

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I/O Designs

- Ult Ext SE: Black, Navy .............. 78
- Ult Classic Std: Black, Blue ....... 68
- Ult SE: Neon Pink, Yellow, Green ... 88
- Ult Mac LC w/12" Mon: Blk, Blue ..... 94
- Mac Lug Classic: SE: Black, Blue .. 64
- 03794 Mac Luggage SE Ext: Black ... 74
- Mac Lug II/IX/Cr/St: Black, Blue ... 84
- 03876 Mac Luggage SE 30/Ext: Blue .. 74
- Mac Lug II/IX: Black, Blue ......... 98

Linebacker/MackPack Bag

- 01352 Mac/Se Xkb Navy ............... 69
- 00498 Plus/Se Reg: Navy .......... 55
- 02639 Mac/Se Xkb Grey ............. 69
- 00493 Plus/Se Reg: Wine ............ 55

Targus

- 02545 Mac/Se Reg: Black ........... 54
- 02545 Mac/Se Xkb Black .......... 74
- 02630 Mac/Se Xkb Grey .......... 74
- 02629 Mac/Se Xkb Wine .......... 74
- 03476 Cv/Cr: Black ............... 74

**ENTERTAINMENT BEST SELLERS**

FTL Games

- 00240 Toids .................................. 29

Broderbund

- 03800 Sim Earth Planet Simulator ... 39
- 00145 Robosport ......................... 37
- 02947 Sim City Color .................... 46
- 02165 Where In the World C armen ? ... 28
- 02488 Where In the U.S.A. Is Carmen ? 28
- 03808 Veatle .............................. 32
- 01980 Tetris (B&W And Color) ....... 22
- 01608 F alcon 2.2 ......................... 29
- 02651 Chessmaster 2100 .............. 30

Visionary

- 03112 Synchronicity ................... 38

Inline Designs

- 03934 Tesseract .......................... 31
- 03944 Darwin's Dilemma .............. 31

Casady And Greene

- 03462 Sky Shadow ....................... 28

Centron

- 02470 Casino Master Deluxe Color ... 44

**Computer Peripherals**

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ViVa offers the latest modem technology capable of meeting today's communication standards. With data compression, error control, leased line support and automatic functions, it provides reliable performance under the most demanding conditions.

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- 9642E (9600 Fax/Modem) ...... $479

**Global Village**

**TelePort Fax**

- 24/96 ........................................ 184

TelePort plugs into your ADB connector (like your mouse) eliminating a power adaptor, freeing your serial ports and enhancing portability. This 2400 baud Hayes compatible modem incorporates MNP5 data compression/error corrections. #0035

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  - 04071 Cache-in 50 Mhz .................1,599
- **Macintosh LC**
  - 04120 Fast Math LC .................. 139
- **Macintosh II**
  - 00831 QuickSilver IIsi Cache Card ........ 269

**Daystar Digital**
- 02877 Fast Cache IICl (64K) ............... 278
- new Fast Cache IIsi (64K) ............. 309

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**Sigma**
- 00215 Sigma Double-Up Board .............. 167

**Total Systems**
- Mac Plus + 512, 128
- 00036 Mercury 030 16Mhz .............. 499
- 00034 Mercury 030 16Mhz w/Fpu .......... 549
- 00048 Mercury SCSI Module .............. 899
- 02902 Gemini 030 20Mhz ................ 849
- 03633 Gemini 030 20Mhz w/Fpu .......... 995
- 02903 Gemini 030 25Mhz ................ 995
- 03634 Gemini 030 25Mhz w/Fpu .......... 1,275
- 00043 Gemini II 30 Mhz ................ 1,299
- 03635 Gemini II 30 Mhz w/Fpu .......... 1,599
- 00047 Gemini II 40Mhz .................. 1,499
- 03752 Gemini II 40Mhz w/Fpu ........... 1,899
- 02899 Gemkit (Us Version) .............. 125

**Total Systems Gemini 030 20 MHZ with FPU**
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- 00041 Mercury 030 16Mhz w/FPU ....... 428
- 00049 Mercury Ram Module .............. 245

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<table>
<thead>
<tr>
<th>CD Technologies</th>
<th>Porta Drive CD-ROM</th>
<th>648</th>
</tr>
</thead>
<tbody>
<tr>
<td>Datalcel</td>
<td>00405 52 Mb Qlps External</td>
<td>399</td>
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<td></td>
<td>04002 52 Mb Qlps Internal (Classic)</td>
<td>299</td>
</tr>
<tr>
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<td>04693 52 Mb Qlps Internal (NuBus)</td>
<td>299</td>
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<tr>
<td></td>
<td>03883 105 Mb Q External</td>
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</tr>
<tr>
<td></td>
<td>03985 170 Mb Q External</td>
<td>928</td>
</tr>
<tr>
<td></td>
<td>new 210 Mb Q External</td>
<td>1049</td>
</tr>
<tr>
<td>Everex Systems</td>
<td>03831 EMAC 20mb Impact</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>02161 EMAC 150 Tape Backup Drive</td>
<td>715</td>
</tr>
<tr>
<td></td>
<td>02047 EMAC 60T Tape Backup Drive</td>
<td>649</td>
</tr>
<tr>
<td>IDS Livingstone Tech</td>
<td>00144 20Mb Clipper</td>
<td>369</td>
</tr>
<tr>
<td></td>
<td>00387 40 Mb Pro Drive</td>
<td>349</td>
</tr>
<tr>
<td></td>
<td>01166 80 Mb ProDrive</td>
<td>459</td>
</tr>
<tr>
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<td>00170 50Mb Wip Drive</td>
<td>439</td>
</tr>
<tr>
<td></td>
<td>00171 100Mb Qlps Wip Drive</td>
<td>649</td>
</tr>
<tr>
<td></td>
<td>00802 45 Mb Syquest Removable</td>
<td>589</td>
</tr>
</tbody>
</table>

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If you have one computer

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- Daystar Digita
- C2215 LT200 MC LocalTalk Board
- C2214 LT 200 PC LocalTalk Board
- FGM, Inc.
- 00809 Picture This
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Dayna
- Maclink Translators
- Soft PC Classic
- Soft PC 1.3
- Soft PC Classic
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Orange Micro
- 00000 xxx...

Silka/Tops
- 01677 Tops Flashcard (Dos)
- 03384 Tops 3.0 Network Dos 5.25"
- 03383 Tops 3.0 Network Dos 5.25"

Traveling Software
- 03975 Laplink Mac III 3.2
- Walker, Richer, Quinn

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Hyperglot

03749 Japanese Kanji Master ............... 98
03737 Spanish Word Torture ................ 34
03750 Japanese Easy Kana ................... 128
03741 French Word Torture .................... 34
03745 German Word Torture ................... 34
03740 Spanish Pronunciation ................... 34
03739 Spanish Tense Tutor ..................... 41
03738 Spanish Verb Tutor ....................... 38
03742 French Pronunciation ................... 34
03893 Learn Spanish CD Rom ................. 60
03892 Learn French CD Rom ..................... 60
03743 French Verb Tutor ....................... 38
03744 French Tense Tutor ....................... 41
03747 German Verb Tutor ....................... 38
03746 German Pronunciation ................... 34
03732 Russian Word Torture .................. 34
03733 Intro To Russian ........................... 28
03734 Russian Verbal Aspect .................. 41
03891 Learn Italian CD Rom ............... 60
03748 Italian Word Torture ...................... 34
03735 Russian Noun Tutor ....................... 58
03734 Russian Russian English Dicti. ......... 41

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02238 Microsoft Word 4.0 ................... 244
OCR Systems, Inc

00461 ReadRight For Macintosh ........... 329
Paragon Courseware

03479 Nexus 3.05 ......................... 244
01473 Qued-M ................................. 85
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Logitech
02561 Scanman 32w/Digital Darkrm.... 298

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03231 Half-Page Scanner .................294

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Abaton Technology Corp
01507 Pro Point ADB (SE & II) .............79

Altra
02935 Felix ........................................ 116

Daladask
03780 Switchboard Switch Track Ball .........97

Kensington
01292 Trackball ..................................107

Microspeed
03306 Mactrac Trackball 512/Plus...........60

03305 Mactrac Trackball ADB ..............74

Micro Touch Systems
03412 Unmouse ...............................159

Mouse Systems Technologies
03629 Little Mouse A+ (512/Plus) ..........74

03550 Little Mouse For ADB .........74

Advanced Gravis
02740 Mouseslick Joystick 512 & Plus ....64

Kraft
00941 Joystick Quickstick 512 & Plus .......39

01900 Joystick (Premium III) ADB ........49
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<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>V.</th>
<th>REQ.</th>
<th>$</th>
<th>S</th>
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<tbody>
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<td>CHECKWRITER II</td>
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**PRODUCTS**

- **$** = cost of update to registered owners.
- **S** = cost of update to registered owners.
- **V.** = version #.
- **Req.** = min. RAM and system software required.
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(continues)
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Technical Notes on the Production
The page layout was designed in Aldus PageMaker 4.0 with graphics imported from Freehand and Adobe Photoshop. Photo imposition was shown in the Mac files with Zedcor Desk Draw. Microsoft Excel helped us keep track of what went where (which we could count on changing every day). Adobe Illustrator, Photoshop, Quark XPress and Aldus Freehand helped us manipulate furnished files and scans.

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HP Adds Color to DeskWriter

Hoping to please desktop publishers who'd like to add a little color to their work, Hewlett-Packard has introduced a version of its popular DeskWriter ink-jet printer that can produce monochrome, gray-scale, or three-color output. Not intended as a full-time color printer, the Hewlett-Packard DeskWriter C comes with a black-only ink cartridge and with a three-ink cartridge that can combine cyan, magenta, and yellow to produce millions of colors. The user manually swaps the cartridges when switching between black text and color graphics.

The 300-dpi QuickDraw printer produces a black-only page in about 20 seconds, while a full-color page takes around 4 minutes. HP includes a new printer driver that supports spooling, matches printer colors to monitor colors, and offers a choice of dithering patterns for creating different textures. The DeskWriter C comes with Times, Symbol, Courier, and Helvetica (the same four scalable fonts that the previous DeskWriter has) and supports Adobe Type Manager and TrueType. The printer works with System 6.X and 7.

The DeskWriter C accepts legal- or letter-size paper and can print labels, envelopes, and transparencies (HP recommends using HP's LX Jet-Series transparency film for the latter).

The printer includes an AppleTalk connector and an RS422 interface. It will begin shipping on September 1 at a list price of $1095. Owners of the DeskWriter can upgrade to the DeskWriter C at a list price of $450.

HP also reduced the price of its PaintWriter color ink-jet printer to $995 to remain competitive with other color printers from HP. For more information, contact Hewlett-Packard at 800/752-0900.—T.M.

Alias's New World

Sketch is a drawing package under development at Alias Research that seems a bit like Adobe Illustrator or Aldus FreeHand—except that it draws in a three-dimensional world. You create Sketch designs in a single 3-D window instead of the top, front, and side views common to most 3-D software; instead of creating single objects that you later combine in a scene, Sketch's window is the scene where you model, assemble, and assign rendering attributes to everything.

In addition to a few 3-D primitives and standard extruding and lathing, Sketch has some striking features. For example, you can draw a curved line, extrude it with a tug to make a wavy surface—and then draw right on it. You can deform an object in three dimensions by grabbing and yanking on it; Sketch senses the mouse location and creates a spline for you to reshape. Any object you design can serve as a snapping guide so that other objects will conform to its shape and location. You can import a scanned photo and incorporate its perspective in a 3-D model, or import text and apply all of Sketch's 3-D tools to it.

Unlike many 3-D packages, Sketch doesn't venture into animation, but it does store a history of every step in creating a design that you can replay; you can also roll back to a point and branch off in a different direction. (continues)
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Sketch has full-featured rendering tools, including Phong and Gouraud shading, texture mapping, bump mapping, and ray tracing. It comes with a RenderMan-like library of surfaces, and Alias plans to publish a spec for developers to create more (it doesn't support RenderMan shaders). Sketch will list for about $2000.

Alias's first Macintosh product, Upfront, shares Sketch's one-view, direct-manipulation metaphor, but its tools create walls and solid objects rather than Sketch's lines, planes, and curved surfaces (Upfront models can be incorporated into Sketch designs and rendered). A new version of Upfront will add simulated texture maps and the ability to fly through a model by following an invisible wall. Version 2 has not been priced, but the first version listed for $895. Alias Research is in Toronto, at 416/362-9181. —D.L.

**MicroPhone Front-Ends Global E-Mail**

They don't call it telecommunications for no reason: Pacific Bell Telephone is diversifying into public electronic mail. The phone company's PB Connection has an X.400 interface that can send messages to most places on the globe and also connects to AT&T Mail and SprintMail.

Flexible fish: using Alias Sketch is almost like drawing in the air with a sparkler that doesn't burn out.

Using the forthcoming version 4 of MicroPhone II, Software Ventures is creating a Macintosh front end for PB Connection that hides the E-mail system's command-line interface behind buttons and icons and allows you to perform all mail functions offline.

The MicroPhone interface to PB Connection supports sending to multiple addresses; can batch-search for addresses from a list of names and save them in its address book; and can send and receive mail unattended. PB Connection supports one binary enclosure per message.

The PB Connection front end will not be modifiable, even with a copy of MicroPhone. PB Connection costs about 15 or 20 cents for a letter-size message (X.400 access adds 20 cents per 1000 characters), and there are other charges for the front-end software and a mailbox. For more information, call Pacific Bell at 800/989-9005 (or 800/675-9005 in California).

MicroPhone II version 4 will include Dialoger Pro, a utility that simplifies designing a script's interface and wiring up its buttons and other features. Version 4's System 7 features can call other programs, such as Disinfectant and StuffIt, to operate on downloaded files, or pass downloaded information to other applications, such as Excel. It adds support for the Comm Toolbox's Connection Manager and has VT220 and VT320 emulation, though it can open only one session at a time. The new script editor is nonmodal, so you can open multiple scripts and copy and paste their contents; it may have a much improved debugger as well, but at press time Software Ventures wasn't sure that feature would be included. For experienced scripters, the old-style script editor is still available. Version 4 will list for $295. Software Ventures is in Berkeley, California, at 415/644-3232. —D.L.

**Iomega Doubles Bernoulli Capacity**

Offering twice the capacity of its existing 45MB Bernoulli drive, Iomega Corporation has introduced the Bernoulli 90, a removable-cartridge drive that stores up to 90MB. The introduction came a few months after rival SyQuest Technology introduced an 88MB version of its 44MB removable drive, which has been the most common removable-cartridge device for the Macintosh. Iomega has long dominated the market for removable-cartridge drives on the IBM PC side and has priced the new drive aggressively to gain share in the Mac market.

Iomega offers the device in two Mac-compatible configurations: the Bernoulli 90 Portable, a single-drive subsystem, and the Bernoulli 90 Dual, which contains two of the drives in one case for easier disk copying and backing up. The Bernoulli 90 has a better average access time (19ms) and higher maximum data-transfer rate (2.5M per second) than the previous Iomega removable.

All the Iomega drives use the Bernoulli effect (from the air flow pro-
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duced by the spinning of the disk) to bring the flexible disk and the read/write head closer to each other during operation. If shock or a dust particle interrupts the air flow, the disk and head move apart, making a head crash extremely unlikely. Once the shock or particle is past, the disk and head move back and operation resumes. As a result of this design feature, Iomega says, the drives have very high reliability.

Iomega is currently shipping both the Bernoulli 90 Transportable and the Bernoulli 90 Dual. The Transportable carries a suggested retail price of $1149; Dual goes for $2249. For more information, call Iomega Corporation in Roy, Utah, at 801/778-1000 or 800/456-5522.—T.M.

Exploring Data

Exploratory data analysis (EDA) is a tool for making sense of numbers by looking at them displayed as interactive graphics. The field continues to generate news on the Mac.

Data Desk's new publisher, Data Description, says the next version of its EDA package will take advantage of System 7 to access numbers stored in databases and spreadsheets and to communicate with other applications such as GeoQuery. Although Data Desk and GeoQuery have each left Odesta's nest for separate companies, System 7 lets the two applications pass data and analyses back and forth. At press time, no price or shipping date for the Data Desk upgrade was set. The current version, Data Desk 3.0, lists for $595.

D² Software has turned the marketing of its EDA pioneer, MacSpin, over to Abacus Concepts, the developer of StatView. The greatly expanded MacSpin 3.0 provides, besides MacSpin's trademark rotating 3-D scatterplots, a variety of interactive 2-D charts with data-masking and dataslicing, and support for changing variables and scale on the fly. Abacus Concepts claims that interapplication communication means users will find several smaller applications like MacSpin and Abacus's own StatView more effective than a big all-in-one program. MacSpin 3.0 lists for $295.

Other important EDA vendors are sticking with the large-function-set approach. The SAS Institute's new System 7-ready version 2.0 of JMP is almost twice as big as the original release. The first version of JMP depended mainly on exploratory data graphics, while the new version responds to users' requests for additional standard tests, including nonparametric tests; normality tests; statistical power and sample size calculations; and correspondence analysis. Version 2.0 also has more chart types, including real-time Shewhart control charts for quality analysis, Pareto charts, profile plots, and overlay plots. JMP's strength in quality control takes advantage of System 7: JMP can now monitor manufacturing-inspection processes in real time, summarizing and charting results. JMP 2.0 is shipping now and lists for $695.

Data Description is in Ithaca, New York, at 607/257-1000; Abacus Concepts is in Berkeley, California, at 415/540-1949; SAS is in Cary, North Carolina, at 919/677-8000.—Charles Seiter

Software Brains

California Scientific Software claims its BrainMaker neural-network software is so smart it can design its own brain. All you do is feed it lots of data about a problem and give it some examples of correct answers, and BrainMaker performs something like a massive regression analysis to figure out how to make the jump from the data to a right answer.

Neural-network software is a mysterious technology. In standard procedural programming, the programmer knows every step that the software takes to compute a solution. A neural network, by contrast, gets no math and no rules to follow. It passes data into an inscrutable hidden layer, where dozens or hundreds of interconnected neurons—the neurons can be chips or simulated in memory—add, multiply, and otherwise combine their signals until an answer pops out the other side. While training itself, the system compares the result to the answer it is trying to match and then repeats the process until it homes in on the target. When it gets pretty ac—

(continues)
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curate, the network is ready for use on live data with no preset answers.

At the Decision Support Group in Oakland, California, Bryan Dieter feeds hospital databases—medical records, patient billing, test results—to BrainMaker to help doctors identify optimal treatment for a wide range of medical conditions. "There are hundreds of variables," Dieter says. "One of the nice things about BrainMaker is that . . . it will figure out which ones make a difference and which don’t."

Dieter’s background is in health care, not computers, but he says BrainMaker is easy to use. "The hard part is getting the data into a [format] that BrainMaker can read . . . . Hospitals have not done a good job of generating information."

BrainMaker is shipping now at a list price of $195. For further information, contact California Scientific Software in Grass Valley, California, at 916/477-7481.—D.L.

High-Speed Hard Drive Stores 1.3GB

Aiming at applications that require very high speed and massive storage capacity, Storage Dimensions has introduced a line of 1.3GB hard drives that work with two Data Cannon boards that hook directly into the NuBus or into the IIfx’s PDS slot instead of through the Mac’s SCSI port. Called the MacInStor Series 1300, the drives come individually or with two drives or four drives combined in one case.

The Series 1300 has an average seek time of 11.5ms and comes with a SCSI-2 interface for faster transfers. However, the drive really takes off when used with one of the Data Cannon boards. Both boards contain high-speed SCSI interface chips that mediate between the Series 1300 and the Mac’s NuBus. The sustained transfer rate of the Data Cannon NuBus is up to 5MB per second, while the Data Cannon PDS for the Macintosh IIfx can reach a sustained data rate of 10MB per second.

The Series 1300 list prices start at $8849 for one drive, and range up to $32,599 for the four-drive configuration. All the drive configurations began shipping in June. The Data Cannon PDS and Data Cannon NuBus both list for $859 and are currently shipping. For further information, contact Storage Dimensions in San Jose, California, at 408/879-0300.—T.M.

E-Machines Shows 16-Inch Color Monitor, Upgradable Adapters

E-Machines recently introduced a low-cost 16-inch color monitor and a pair of user-upgradable accelerated graphics-adapter boards for NuBus Macs. The monitor, called the ColorPage E16, lists for $1595. It can display at 640 by 480, 852 by 624, or 1027 by 768 pixels, and works with E-Machines’ NuBus boards or with the built-in video on the Mac LC, IIfs, or Iicis.

The two new boards are the XL8, an accelerated 8-bit graphics adapter, and the Futura/24, an accelerated 24-bit board. Both boards offer panning (in hardware), 200-percent zooming, and virtual screens, and both can also produce PAL and NTSC video output. The XL8 starts out supporting 640 by 480 resolution on 16-inch monitors, but the user can upgrade the board to 24-bit color at 832 by 642 resolution. The XL8 is also compatible with 12- and 13-inch monitors.

The Futura/24 begins at 24 bits, supporting only 12- or 13-inch monitors. With the user upgrade, it can drive a 16-inch monitor at 832 by 642 resolution.

The E-Machines XL8 board lists for $995, and its 24-bit upgrade is $500. The Futura/24 board also has a list price of $995, and its upgrade is also $500. For more information, contact E-Machines in Beaverton, Oregon, at 503/646-6699.—T.M.

The ColorPage E16 monitor works with NuBus display adapters or the built-in display controllers on the LC, IIfs, or Iicis.

Synthetic Motion

George Lucas won’t be the only one directing the digital actors of the future. Life Forms, a new software package from Kinetic Effects, already enables Mac animators to create 3-D characters that can walk, dance, play sports, and move like real people.

Life Forms includes a body-shape editor that allows you to position a human figure on the screen, a timeline editor that takes care of tweening (moving between user-defined positions), and a stage for playing back animations. Early advocates of the package include the renowned choreographer Merce Cunningham, who used Life Forms to choreograph his recent work Trackers.

Life Forms models are fairly simple, like sleek modern mannequins (continues).
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Circle 218 on reader service card
and MIDI sequences. Future versions of Life Forms, which will include inertia and the ability for models to detect collisions with other models, are being developed for both machines.

Life Forms requires a Mac with 2MB of RAM and a 13-inch color monitor, but does not require a math chip. Kinetic Effects distributed a prerelease version of Life Forms for $1200, but a final price was not set at press time. Kinetic Effects is in Seattle at 206/283-6961. —Ann Garrison

**Down at the Works**

There are two ways to design integrated software: the RagTime way and the Microsoft Works way. The RagTime way has spreadsheets, word processing, graphics, and database windows living side by side in frames on the same page. The Microsoft Works way keeps each kind of data in a separate document, almost as if the package were several different applications.

A while back, TML Systems announced but never shipped a Works-killer, code-named Zebra, that was clearly based on the Microsoft model. Symantec recently acquired the company and renamed Zebra as GreatWorks. GreatWorks outdoes its rival by several steps, with eight modules that include a word processor, database, spreadsheet, charting, outliner, draw, paint, and telecom (Works has neither outliner nor paint).

The modules share many tools. For example, the text tools you use in the word processor are available in the spreadsheet and database, including the dictionary and spelling checker, and the spreadsheet’s functions are also available in the database (the spreadsheet module implements the same formulas and functions as Excel, but it has no macros or array capability). The outliner is more like Acta than More, but you can set text styles for each level. The word processor supports snapping columns and headers and footers, and provides a list of fields from a database to create mail merges, but lacks true style sheets. The draw window is color, but the paint window is black and white. There is no hot-linking between modules, so changes in one won’t be automatically reflected in another.

Other integrated packages are coming to the Macintosh (look for one from Claris to be frame-based); maybe some competition will get Microsoft to rework Works. Symantec plans to ship GreatWorks before this issue goes to press. It lists for $299. For further information, contact Symantec in Cupertino, California, at 408/253-9600. —D.L.

(continues)
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Online Services: How Scary Are They?

| How readers* rated the ease-of-use of their most frequently used online service |
|-----------------------------|-----------------------------|
| Extremely easy              | 15%                         |
| Very easy                   | 46%                         |
| Somewhat easy               | 29%                         |
| Not very easy               | 7%                          |
| Not at all easy             | 1%                          |
| Don’t know                  | 2%                          |
| Question refused            | 2%                          |

*Responding readers who are currently registered customers of one or more online services

Our survey indicates that the majority of responding readers are not intimidated by online services, with 61 percent rating them either extremely easy to use or very easy to use.

Articulate Systems
Unveils Sound Recorders

To provide advanced sound capabilities from within standard application software, Articulate Systems has upgraded its Voice Record sound-editing software and bundled it with two new sound recorders, the Voice Impact and the Voice Impact Pro. Voice Record version 2.0 has an improved, one-window interface that works as a DA or can be used to record and edit sounds from inside most applications that are compatible with Articulate Systems’ Sound Manager or the Apple Sound Manager.

The software also works with the built-in sound capability of the Macintosh LC and the IIsi, or with Parallon’s MacRecorder sound recorder. Some of the compatible applications are Excel 3.0, Microsoft Mail 3.0, QuickMail 2.2.3 and later versions, FullWrite Professional, Mathematica, and WordPerfect Office. Users can edit sounds and change the compression ratio at which the sounds are stored. Voice Record is bundled with SoundWave, a $69 stand-alone application that creates multiple editing windows, and mixes, filters, and adds effects to sounds.

The Voice Impact sound recorder includes a microphone, some other electronics that provide automatic gain control, and the Voice Record 2.0 software, but without the SoundWave application. Slated to begin shipping in early August, the Voice Impact lists for $119 and is available at a discount in packs of five and ten units. The Voice Impact Pro adds a digital signal processor for advanced features, including on-board compression. The DSP allows the Voice Impact Pro to record or compress without tying up the Mac’s CPU. Also scheduled for August shipping, it lists for $249, including Voice Record 2.0 and SoundWave. For more information, contact Articulate Systems in Woburn, Massachusetts, at 617/935-5656.—T.M.

Reader Survey: Online Services

This month’s survey takes us into the realm of online services, with 41 percent of responding readers saying they are currently registered users of at least one online service. CompuServe was the most frequently mentioned service, cited by 50 percent of registered customers. AppleLink was next at 31 percent, with America Online following at 28 percent, local bulletin boards at 25 percent, Prodigy at 24 percent, and GEnie with 20 percent of registered customers saying they used it. Other services mentioned include Connect at 8 percent, MCI Mail at 7 percent, Usenet at 3 percent, The WELL at 2 percent, and BIX and Delphi at 0.8 percent each. Figures add up to more than 100 percent because this question allowed for multiple answers.

Apparently the difficulty of using an online service has been overstated, since 15 percent of Macworld readers who are registered users say that the service they use most is extremely easy to use, 46 percent say it is very easy, and 29 percent say it is somewhat easy to use. Only 7 percent of those readers said their online service was not very easy to use, and a mere 1 percent said the service was not at all easy to use.

Responding readers who are registered users said the features they accessed were general information (80 percent), electronic mail (59 percent), technical support (59 percent), research (55 percent), special-interest groups (46 percent), instant communication with others online (39 percent), shopping (23 percent), games or entertainment (20 percent), and other (13 percent).

Most readers who subscribe to online services said they have a 2400-bps modem (60 percent), while 9600-bps and 1200-bps modems are each owned by 13 percent. Of those readers, 7 percent said they connected less than an hour a month, 48 percent said 1 hour to less than 5 hours, 20 percent said 5 hours to less than 10 hours, 11 percent said 10 hours to less than 15 hours, and a small percentage responded in each of five higher-use categories.—T.M.
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The chart explains exactly what you need to achieve the desired level of performance.

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

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

To upgrade an 8-socket Mac II, III, IV, or SE to this amount of memory.

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

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 x $59 ea.).

WHAT YOU NEED TO KNOW

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

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

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

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BUS0168 CalendarMaster 3.0 ... 291
Cegep
BUS0073 Calendar Creator ... 35
Cisco Software
BUS0118 DESK 3.03 ... 209
Connectix
BUS0174 FastLabel 3.0 ... 41
Zedcor
BUS0119 DESK 3.03 ... 209
EDUCORP
COM0063 Arts Graphics Library ... 239
Microsoft
BUS0139 Lingua-ROM ... 399
Quantum Leap
BUS0205 RealMac, MacLibrary ... 103
Wagzta Technology
EDU1904 The World Wide Web ... 74

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Caravelle Networks Corporation
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G10020 2nd Annual Pack ... 124
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ComputServe
G100101 Membership Kit For The Macintosh ... 27
G100400 Navigator 3.0 ... 49
Datacom
G100103 MultiMail Plus / CC 5.0 ... 129
G100202 MacMail Plus / Transfers ... 109
Dayna Communications, Inc.
UII 1116 005 Mounter 2.0 ... 53
NET0125 Paragon's Computing ... 285
Paragon
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NET0107 DataClub Single ... 109
NET0106 DataClub - Pack ... 169
NET0101 DataClub - Pack ... 539
NET0108 DataClub - Pack ... 539
NET0109 DataClub - Pack ... 539
NET0071 PhoneNET Studio 2.0 ... 135
NET0072 PhoneNET Studio 2.0 ... 135
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COLOR MONITOR MIRAGE

by Charles Seiter

Since the last time we reviewed 8-bit color monitor systems ("Color Monitors Put to the Test," Macworld, July 1990), video boards have dropped in price, a dozen vendors have introduced new big-screen monitors, and Apple, in its own often contrary fashion, has brought out a monitor that's smaller than anyone else's. Most items in this market are headed toward commodity status—you can buy generic 8-bit color boards from one vendor to drive generic 19-inch monitors that are from another, for example. And while the Big Three Macintosh monitor vendors (Radius, RasterOps, and SuperMac Technology) are still leaders in terms of sales and development effort, they now face competition from nearly a dozen other companies.

Sources for monitors have also expanded. In addition to Sony, the dominant supplier of color monitors, Ikeyami, Hitachi, Seiko, and Toshiba also sell monitors. This profusion of sources brings up at least one strategic question: Should you pay more than $5000 at your friendly local dealer for a system from one of the Big Three vendors, or are you better off buying an under-$3000 monitor from a vendor that sells direct or from a mail-order firm?

Two more basic questions you should consider before purchasing a color monitor system are: How much brightly lighted real estate do your eyes really need—can 16 or even 14 inches take care of you as well as a bigger monitor can? And do you need more than 8 bits of color? We'll look at these questions and others as we survey monitor options.

Spec Specifics

In order to fully understand the Macworld Lab test results, you need to review two mildly technical subjects: first, the way a color monitor puts a signal on the screen; second, how the Mac sends a signal through a video board to the monitor.

The traditional RGB (red-green-blue) cathode-ray tube (CRT) has three separate electron guns, which fire beams of electrons at sets of color phosphor dots on a monitor's screen, generating spots of light. On the way to the screen, the beams from the guns pass through a shadow mask—a metal plate with precisely spaced tiny holes. The shadow mask ensures that only nice thin beams hit the screen and that the beams strike only the correct phosphor dots. Since this precision can be upset if heat generated by the monitor expands the metal shadow mask even slightly, the best monitors (in this review set, those that use the Hitachi CRTs) use shadow masks of Invar, a special alloy with minimal thermal expansion.

Unlike the Hitachi CRT, the Trinitron CRT developed by Sony uses a single electron gun, a screen painted with narrow color-phosphor stripes, and a grid of fine vertical slots in place of a shadow mask. This design offers three potential advantages: it gives better vertical resolution than the traditional design does (see "Two Kinds of Screens: Close Up"); it lets more energy through to the phosphor, creating more screen brightness (the grid blocks the
With rich colors and sharp text, the RasterOps Business Color System is an in-house favorite.
electro-magnetic field can produce slight misalignment of the final beam position. If the electron beams are knocked too far out of alignment, you see misalignment—that is, the screen looks out-of-focus and you start to see fringes of color around black-and-white text. For the sake of uniformity, whenever making convergence adjustments, monitor makers position the monitor to face east.

Measureable changes in convergence can occur when magnets are present (in nearby monitors, for example) or someone bumps into a monitor. Fortunately, some monitors—such as the Sony Trinitrons—have easily accessible controls for adjusting convergence. These controls make monitors, especially big ones, more pleasant to use. Macworld Lab does not adjust convergence on monitors before taking objective readings. If you buy a monitor and are not happy with the convergence, you can adjust it yourself if the controls are accessible, or you can have the dealer adjust it for you.

Sending a Signal
The Mac is a digital device while the typical monitor is analog. How does the Mac translate its set of numbers that characterize each pixel on a screen into a usable signal, like that for a color TV? The Mac sends a digital signal to a video display circuit, which is located either on its own main logic board (as in the LC, IIsi, and IIC) or on a display board. Three high-speed digital-to-analog converters then translate the signal into red, green, and blue levels. Now the monitor is ready to produce any conceivable color—the 256-color limit implied by the designation 8-bit is due to a limit in the display circuit. The circuit allows you to save 256 index values—each value represents a particular combination of red, green, and blue levels. The set of possible combinations gives you access to more than 16 million colors, but the catch is that the 8-bit circuitry (which costs about one-third as much as 24-bit color) only lets you use 256 colors at one time.

For most applications, 256 colors is plenty. You need more if you want to view scanned images and expect them to look like color photographs. Some vendors, anticipating that you might eventually want this capability, offer trade-ins (E-Machines, SuperMac, MegaGraphix) or upgrades (Radius, Sigma, RasterOps) from an 8-bit to a 24-bit board. The 8-bit version of a scanned image looks slightly grainy compared to a 24-bit version, because the software is forced to pick a best fit from a set of colors that aren’t an exact match—this means that boundaries can show the color equivalent of black-and-white jaggies.

The Differences in Video Boards and Monitors
Having reviewed a bit of electron-gun dynamics and color-generation theory, are you ready to pick a moni-
In 1989 you paid $6000 for a good 19-inch monitor; now you can get one that meets the same specs for less than $3000

or not this screening process allows a vendor to ship a higher percentage of "perfect" monitors.

We compared two monitor types driven by the same board—the MegaGraphics 19-inch Ikekami CT/20 and the MegaGraphics 19-inch Sony Trinitron, both driven by the MegaGraphics 2008 high-resolution video board. In every area except brightness, the Sony posts slightly better scores than the Ikekami in Macworld Lab tests. The results are not unique to MegaGraphics products—in general, the 19-inch Sony Trinitron posts better scores than the 19-inch Ikekami.

Ikekami monitors, however, are generally cheaper than Sony monitors. Thus, the hard question to answer is if you can get an Ikekami-based monitor system such as the Mirror Technologies ProView/8 for $2897 and take care of minor tracking deficiencies with software gamma correction, is it worth about $1500 more to get a Sony-based system from another vendor? Judging subjectively between the two MegaGraphics products, Macworld found that the Sony unit shows clearer text, especially if the user adjusts convergence with the two convenient knobs right up front on the monitor. If you typically work with text or with line drawings, the improved sharpness is worth the extra money.

What about Variation?

There's variation in every measurable quantity. If you buy ten cheap plastic 1-foot rulers and line up their 1-inch marks, you may be startled to find considerable length variations out at the 12-inch marks. How much variation occurs in a set of monitors from the same manufacturer (say Sony) using the same display board? Macworld Lab compared a set consisting of Ikekami monitors from Cutting Edge, Ehman, and MegaGraphics. The video boards shipped with these monitors are from the same source. Comparing these systems suggests the amount of variation you can expect in products the vendors try to make as identical as possible. The monitors show some differences in convergence and distortion, the most delicate variables in the objective evaluation, but strong similarities in tracking, contrast, and brightness. This means, among other things, that vendors can't accomplish much by prescreening the monitors they send Macworld Lab for evaluation. Translating these differences into a buying decision requires that you keep in mind that your vision may not be as acute as professional test equipment at registering small variations. Thus, if one monitor only edges out another in a test, you won't see any real-life differences in quality and should opt for the less expensive or better-supported product.

Buyer's Guide

These observations lead to some general-purpose monitor-buying advice. First, visit the nearest dealer and try out the software you work with every day to see how much difference screen size makes to you. If a 14- or...
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</tr>
</tbody>
</table>

* The DirectColor/8 can be upgraded to 24 bits. A nonupgradable 8-bit board, the PrecisionColor 8 is available for $785. * A 72-dpi version of the DirectColor/8 is available for $1295. * System with Sony monitor available for $5198. * System with Hitachi monitor available for $5298. * Can also use Spectrum/8 24 PPA board ($1399), which includes QuickDraw acceleration.
### Color Monitor Tests

**Longer bars are better**

### Convergence

<table>
<thead>
<tr>
<th>Monitor Model</th>
<th>Convergence</th>
</tr>
</thead>
<tbody>
<tr>
<td>AppleColor High-Resolution RGB Monitor</td>
<td>0.85</td>
</tr>
<tr>
<td>Apple Macintosh 12&quot; RGB Display</td>
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<tr>
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<td>MacProducts USA MagicView (Seiko)</td>
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</tr>
<tr>
<td>MegaGraphics 2008/16&quot; Color Display System (hi-res)</td>
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<td>Radius Color Display/21</td>
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<td>Radius Color Pivot</td>
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<td>RasterOps BLC System</td>
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<tr>
<td>RasterOps Business Color System</td>
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<td>SuperMac Technology 19&quot; Dual Mode Trinitron Display</td>
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<tr>
<td>SuperMac Technology 21&quot; SuperMatch Two-Page Color Display</td>
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</tr>
</tbody>
</table>

*This system is being replaced by the BXL.*

Convergence denotes how closely red, green, and blue electrons meet on the same spot on a screen. The better a monitor’s convergence, the more accurately the monitor renders color. The SuperMac 16" Trinitron Display had the best convergence and thus received an index rating of 1.00. On average, red, green, and blue were out of alignment by only .15 millimeters. The Cutting Edge 20" Trinitron had the worst convergence—its guns were out of alignment by .56 millimeters. We used a Klein convergence meter to measure convergence.

### Distortion

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<td>SuperMac Technology 21&quot; SuperMatch Two-Page Color Display</td>
<td>1.00</td>
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A monitor’s level of distortion determines how geometrically correct an object appears on screen. None of the monitors had highly noticeable distortion. We measured (in units of 64ths of an inch) the total amount of distortion displayed in 9 squares at various locations on the screen and totaled the measurements. The RasterOps BL System had the least distortion at 6.5 and thus received an index rating of 1.00. The Cutting Edge 20" Trinitron had the worst distortion at 61.5—nearly an inch total.

16-inch screen is sufficient, spare yourself the expense and physical nuisance of dealing with a giant two-page display. If you’re upgrading from an SE or Classic to a color system, even 14 inches will seem expansive. Second, if absolute sharpness on very small text or fine lines is critical to you, ask to see the actual monitor you will be buying demonstrated—different units, even those from the same vendor, have enough variation that in the most rigorous resolution tests some are just better than others.

Finally, quality-control standards on all these products are high enough that none we tested was actually bad in any sense—a lower ranking here may mean that a monitor is very slightly less sharp or somewhat less bright, but every one of them was sharp enough and bright enough to be acceptable for day-to-day use. The chances of getting a lemon have been
Gray linearity indicates how accurate colors stay as they lose luminance. To test gray linearity, we used Apple's Color Picker to reduce the luminance of red, green, and blue in increments of 10 percent. We used a Minolta color analyzer to measure the luminance coming from the screen at each percentage drop. The RasterOps BLC System had the best linearity and received an index rating of 1.00; the SuperMac 16" Trinitron Display had the worst linearity.

In our subjective tests, we found that most people prefer a brighter monitor. For our objective test, we turned the brightness up as high as it could go without showing scan lines on the monitor. We then used a Minolta luminance meter to measure brightness. The brightest monitor was the MegaGraphics 2008/19" Display (Ikemari) at 60.68 footlamberts—it received an index rating of 1.00. The dimmest monitor was the MegaGraphics 2008/16" Color Display (Hi-res) at 19.11 footlamberts.

The better a monitor's contrast is, the better you can see details in light or dark areas of an image. To test contrast, we placed several white squares on a black background and then used a Minolta luminance meter to calculate the ratio between the luminance in each of the white squares and the luminance in the black background. We averaged the ratios. The Radius Color Display had the best contrast ratio at 16:1 and thus received an index rating of 1.00; the MegaGraphics 2008/16" Color Display had the worst contrast ratio at 6:1.

whittled to a very low level indeed by diligent engineers at Sony, Ikemari, and Hitachi. You may want to call customer support at a company a few times to see how fast your call gets answered, but if you're a hardy soul who doesn't need reassurance or dealer hand-holding for setup there's no objective reason to pass up the savings you get by ordering a less expensive system from a price-competitive company or a mail-order firm.

A Colorful World
All the monitors we tested are of good quality, but we still have favorites. Here are some picks in specific categories.

Small but Effective The 13-inch AppleColor High-Resolution RGB Monitor is still a quality monitor, but you can get an excellent bargain by purchasing a less expensive, 14-inch multisync monitor, a popular type of
monitor in the MS-DOS world (see "Sync or Swim—Low-Cost Monitors"). For instance, we tested the iDS ColorVue 14" Color Monitor from iDS Systems with Apple’s Macintosh Display Card 4*8 to see how multisync monitors fared. At $399, the ColorVue is a great bargain. It has sharp text and bright colors. If you don’t need more screen than this, get an iDS monitor and buy yourself a CD ROM player with the rest of your funds.

A Monitor with a Twist

The Radius Color Pivot is an amazing device. If the Monitor Fairy wants to reward us for all our painstaking lab measurements, she should leave a Color Pivot on our desktop. The objective mea-

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**How a Monitor Works**

A cathode (A) starts the chain of events that leads to an image being displayed on a monitor’s screen. When heated, the cathode produces a cloud of electrons (B). A control grid (C) determines the number of electrons that can pass—the more electrons that pass, the brighter the image on the screen will be. An anode (D) then accelerates the electrons, sending them into an electrode (E) that focuses them into a beam (F) that is the same width as a pixel on the monitor’s screen. All of these elements—from the cathode to the electrode—are housed in a monitor gun. A monochrome monitor has only one gun; a color monitor has three—one for red, one for blue, and one for green. Once the beams are focused in the guns, deflection coils (G) generate a magnetic field that forces the beams to zig-zag back and forth across the screen at a rate of over 60 times per second (this is called the monitor’s refresh rate). When the electron beams collide with the screen, the phosphor coating glows and produces a visible image.

---

**Two Kinds of Screens: Close Up**

All monitor screens have an internal phosphor coating backed by a fine metal grid. The grid determines how the monitor’s screen appears on close inspection. The Sony Trinitron guns shoot red, green, and blue beams (left). A striped metal grid (called an aperture grill) separates the colors. Each gap in the grill is large enough to let a red, green, and blue beam pass. This setup gives Sony Trinitrons sharp resolution, but also—upon close inspection—noticeable vertical lines. Other monitors use a metal grid of staggered round holes (called a shadow mask). Each hole lets a red, green, and blue beam pass. The vertical resolution of these monitors is not as sharp, but you don’t see any lines.
measurements were not outstanding, and the screen does not really give you much more area than a 14-inch monitor, but the colors on the Pivot are particularly vivid, and the ability to change this monitor's orientation from landscape to portrait and back again makes the Color Pivot more flexible than a standard 14-inch monitor.

Sweet Sixteen We processed all the objective tests through SYSTAT 5.1, looking for correlations between quality factors. One result that emerged was that in-store Sony products offer more-precise red-green-blue gun tracking on a 16-inch screen than on a 19-inch one. And the star among the Sony 16-inch monitors is the E-Machines ColorPage T16. If you work with line art or CAD drawings or just big spreadsheets with color highlights, the ColorPage T16 is the best monitor you can choose. All these monitors look good displaying color fish tanks; the ColorPage T16 is the best monitor you can choose. These monitors look good displaying color fish tanks; the ColorPage T16 looks good even when displaying green numbers in 9-point Times way off in the upper-right corner.

Big and Beautiful In the largest monitors, RasterOps has something for everyone: the Sony-based RasterOps 8L System won the greatest number of objective tests, and the Business Color System (a Hitachi-based package listed for $2500 less) was an in-house favorite for its richness of color and sharp text. Of the two monitors, we would opt for the Business Color System.

Real Deals If you need a big monitor and have budget constraints, you should go with the Mirror ProView/8 or the MacProducts Magic View. Within the specifications of Ikegami quality control, these systems are identical. The ProView/8 comes with some handy software utilities, although many similar utilities for large screens can be obtained as shareware. At the time this was written, these two firms were trading places as the "best buy" during a series of small price cuts; you should be able to get a 20-inch Ikegami-based 8-bit color system from one of these vendors or their competitors for around $2500 before the end of the year. In objective tests, Ikegami monitors performed somewhat worse as a group than Sony monitors at convergence and tracking, and in subjective tests a bit worse than big-screen Hitachi monitors in color richness. But you would be hard put to justify several thousand dollars' difference in price between these units and their competitors—looking at a discounted, mail-order Ikegami on your desk without other monitors around for detailed comparison, your opinion is going to be "Wow, what a great monitor!"

Reality Check Bigger things cost more. Better bigger things cost more still. Apart from these observations, which were probably true for spear tips in the late Pleistocene, we can give you some new information. A vertical refresh rate over 65Hz means the screen doesn't flicker. It helps greatly to have horizontal and vertical static convergence knobs on the front of a monitor. Almost all the sources for 8-bit video boards seem equally competent. The quality control within given manufacturers' lines appears tighter than it was two years ago, especially for larger monitors. The new wave of monitors from Ikegami and Hitachi will force down prices, even on Sony systems.

When Macworld reviewed color monitors in August 1989 you had to pay $6000 for a good 19-inch monitor; now you can get one that meets the same specs for less than $3000. You can, of course, save lots of money if you can live with a smaller screen, and it helps to look at several types of monitors close up before you buy. But 8-bit color monitors, at least, unlike software or networks or giant hard drives, have become an area in which it is hard to make a serious buying mistake.

See Where to Buy for contact information.

Macworld contributing editor Charles Seiter works on problems in color-image analysis and compression for a San Francisco electronics firm.
To computer users who worry about the possible health dangers of exposure to the low-level magnetic fields emanating from their monitors, the issue seems clear: manufacturers should get rid of the offending emissions.

But monitor makers see shades of gray when it comes to emissions. Most say that they want to address public concern over the possible dangers of extremely-low-frequency (ELF) magnetic emissions. Indeed, some see reducing emissions as a way for their product to stand out in a crowded and competitive marketplace—and as the only way to succeed in the booming European market, where consumers and labor unions may demand reduced-ELF products. Vendors complain, however, that because there is no scientific consensus on what level of magnetic emissions—if any—affects health in humans, they can’t know just how far to go in reducing the emissions. “We don’t know how low is low,” says Stu Roberson, a product manager at Radius.

As long as monitors use cathode-ray tubes (CRTs), manufacturers can’t easily eliminate all magnetic emissions—at least, not without making the devices far too costly. A CRT works by deflecting a beam of electrons with precise magnetic fields generated by wire coils wrapped like a yoke around the neck of the tube. Without sufficiently strong magnetic fields to move the electron beam, it would simply shoot straight ahead, never sweeping across the screen to draw the image you see.

Nonetheless, many leading monitor vendors are delivering, or say they are designing, new monitors with sharply reduced ELF magnetic emissions, using one or two well-understood techniques. Which engineering method is required, says Brian Berkeley, manager of display technology for Apple, “depends on the size of the screen and whether it is monochrome or color.” Larger screens require higher current peaks to operate, and tend to generate more intense magnetic fields—thus requiring more stringent reduction techniques.

**Coils Affect Emissions**

ELF magnetic emissions can be reduced by changing the kind of wire coil used on the CRT yoke. Coils are often wound in a *saddle-toroidal* pattern, in which one coil surrounds a ferrite band that covers another central coil and directs the magnetic fields generated by the coils. Switching to a *saddle-saddle* method of winding the yoke coil—in which all the windings are inside a ferrite band—can reduce ELF emissions significantly, says Roberson (see “New Monitor Designs to Reduce Electromagnetic Emissions”). “On displays that have a saddle-saddle yoke, the ELF emissions are quite low,” he says.

Macworld Lab tests of 32 color monitors confirmed that those with a saddle-saddle design uniformly emitted weaker ELF magnetic fields than monitors using a saddle-toroidal design (see “ELF Magnetic Emissions”).
Monitors from several vendors showed dramatic improvements over monitors from the same companies tested by Macworld Lab last year. And in all but three cases (monitors with saddle-toroidal coils) emissions drop off to below 1 milligauss (\( \frac{1}{10000} \) of a gauss, a unit of magnetic-field strength) at 28 inches from the front of the monitor. Users can reduce their exposure to ELF magnetic fields by simply staying this far away from the screen (and slightly farther from the sides and back of the monitor) whenever possible (see “The Magnetic-Field Menace,” Macworld, July 1990).

Some monitor makers have avoided saddle-saddle coils out of concern that they don’t deliver as crisp an image as the standard, saddle-toroidal coils, according to Carlo Girvin, director of engineering for MegaGraphics. The 4-inch-long wings are electrically connected to the yoke coil, and also require some changes to the deflection circuit board that controls the electron beam. Girvin claims that this design reduces the magnetic fields to “pretty far below” levels recommended in the influential MPR-2 guidelines issued by the Swedish National Board for Measurement and Testing, without adversely affecting image quality.

But Girvin says that adding canceling coils to monitor designs is not easy. If the canceling coils are not placed precisely in the correct spot, the canceling fields they generate will not properly oppose the fields of the yoke. The result: magnetic emissions that are weaker at some points, but even stronger than those from an unmodified monitor at others.

“Some of these countervailing fields cancel the emissions at the operator’s location, but [can] create larger fields at other points,” says Louis Slesin, editor of VDT News, a newsletter specializing in electromagnetic emissions issues (for subscriptions, write to P.O. Box 1799, Grand Central Station, New York, NY 10163; or call 212/517-2802). The canceling coils must also be placed so that they reduce the magnetic field enough to meet the Swedish guidelines without adversely affecting the magnetic fields that push the electron beam around.

And like the saddle-saddle method, canceling coils are not cheap. MegaGraphics CEO Diane Scott estimates that adding canceling coils will increase the company’s production costs per monitor on its monochrome Rival line by 10 to 15 percent (although the added expense may not affect retail pricing). For some manufacturers, adding canceling coils to older designs isn’t worth it. “We looked at it, and it was an expensive aftermarket fix,” says Roberston of Radius.

Smaller monitors, such as the one in the Macintosh Classic, do not re-
New Monitor Designs to Reduce Electromagnetic Emissions

Variations in the design of monitor components significantly affect electromagnetic emissions. Images on a computer screen are created by an electron beam that sweeps from top to bottom and from left to right. That sweeping motion is controlled by magnetic fields generated by deflection coils within an assembly that looks like a yoke around the neck of the cathode-ray tube (A). Electromagnetic fields generated by the coils also emanate from the monitor.

There are two methods for winding deflection coils: saddle-toroidal and saddle-saddle. Both methods begin with an inner coil, shown in green (B), which controls the horizontal movement of the electron beam. In the saddle-toroidal method (left), a second coil, shown in gold (C), which controls the beam’s vertical movement, is wound directly around a gray ferrite band (D) that encircles the central coil and helps concentrate the magnetic fields. In the saddle-saddle method (right), the second coil, shown in gold (E), is placed on top of, and rotated at 90 degrees in relation to, the inner coil. A ferrite band (shown in a ghosted image at F) wraps over the middle section of the coil assembly.

Macworld Lab tests indicated the saddle-saddle method to be clearly superior, showing lower ELF-magnetic emissions than the saddle-toroidal method. To reduce electromagnetic emissions, some manufacturers are using or intend to use canceling coils whose electromagnetic fields operate in opposition to the fields of the main coils. MegaGraphics is working on canceling coils (shown in red at G) positioned above and below the main coils of its monitors that use the saddle-toroidal method. SuperMac has used a canceling coil (shown in red at H) that wraps around the largest section of the saddle-saddle coils. The SuperMac machine showed a lower level of ELF emissions than any other monitor tested.

Quality Control

While reduced-emissions monitors can certainly be produced, there is some doubt about whether they can be manufactured reliably, without significant variation from one unit or factory to the next. In one study, several identical models of an IBM monitor were found to vary in ELF emissions by as much as a factor of three, according to Slesin. Vendors agree they must impose stringent design and production standards to ensure that all units meet performance guidelines. In the absence of U.S. standards, most monitor vendors look to the Swedish MPR-2 recommendations. While claiming that their products meet or improve upon the Swedish limits, monitor makers are reluctant to release specific ELF figures to consumers. Radius and most other vendors want to treat the MPR-2 specifications much like an Underwriters Laboratories sticker—a statement to consumers that the product passed the test. Some companies pointedly say that without proof that a certain

THE EVOLVING SWEDISH GUIDELINES

The first Swedish guidelines governing electromagnetic emissions from CRTs, known as MPR-1, were released in 1986 and covered electrostatic emissions, x-radiation, and VLF magnetic emissions (defined as the frequencies between 2kHz and 400kHz, in cycles per second). In response to new research and concern voiced by consumers, workers, and labor unions, updated guidelines were released in 1990. The new guidelines, MPR-2, include added coverage of alternating electric fields and ELF magnetic fields. MPR-2 restricts ELF magnetic fields (5Hz to 2kHz) to an intensity of no more than 2.5mG at half a meter from the monitor. The Swedish National Board for Measurement and Testing, which established these guidelines, can be reached at 011 46 33-16 65 50 (phone) or 011 46 33-10 13 92 (fax).—Charles Filler
level of emissions is harmful, they don't want a specific level of emissions to influence buying decisions.

Companies fear that with five kinds of emissions generated by every monitor—very-low-frequency (VLF) and ELF electric and magnetic fields, plus an electrostatic field—specific numbers will confuse consumers. (Some vendors add to consumer confusion, however, by advertising products as having "reduced electromagnetic emissions," without clearly specifying that VLF, but not ELF, emissions have been reduced.) ELF magnetic fields have generated more concern than the other fields because they are more difficult to control and have been more directly linked to biological effects in research studies. Although light fixtures, laser printers, hair dryers, coffee makers, and even the electrical wiring in walls all produce ELF magnetic fields, CRT monitors have caused the most concern for two reasons: tens of millions of people sit directly in front of their monitors many hours every day; and researchers have linked biological effects in animals more closely to the pulsed waveform produced by CRTs than to the ELF magnetic waveform produced by other devices (see "The

### ELF Magnetic Emissions

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<thead>
<tr>
<th>Manufacturer Key: F = FIMI (CRT supplied by another manufacturer, whose name Apple would not disclose); G = GoldStar 1450 Plus; H1 = Hitachi CM2086AUX; H2 = Hitachi CM2186 A30Y; H3 = Hitachi HM-4320-D; H4 = Hitachi STD 5762 (SuperMac custom); I = Iriegami CT-29V/A; M = Mitsubishi (Apple custom); N = NEC; S1 = Sony GDM-1602; S2 = Sony STD 9750 (SuperMac custom); S3 = Sony GDM-1950 (Trinitron); S4 = Sony M0401 (Apple custom); S5 = Sony STD 9751 (SuperMac custom); S6 = Sony (Trinitron); SE = Seiko CM 1445; T = Toshiba E2906B22.</th>
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<td>5.2</td>
<td>4.8</td>
<td>13.2</td>
<td>13.3</td>
</tr>
<tr>
<td>MedProducts USA MagicView (S5)</td>
<td>ST</td>
<td>21.5</td>
<td>32.0</td>
<td>15.3</td>
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<td>8.2</td>
<td>3.3</td>
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<td>5.2</td>
<td>9.1</td>
<td>8.4</td>
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Manufacturer Key: F = FIMI (CRT supplied by another manufacturer, whose name Apple would not disclose); G = GoldStar 1450 Plus; H1 = Hitachi CM2086AUX; H2 = Hitachi CM2186 A30Y; H3 = Hitachi HM-4320-D; H4 = Hitachi STD 5762 (SuperMac custom); I = Iriegami CT-29V/A; M = Mitsubishi (Apple custom); N = NEC; S1 = Sony GDM-1602; S2 = Sony STD 9750 (SuperMac custom); S3 = Sony GDM-1950 (Trinitron); S4 = Sony M0401 (Apple custom); S5 = Sony STD 9751 (SuperMac custom); S6 = Sony (Trinitron); SE = Seiko CM 1445; T = Toshiba E2906B22. |

Testing Procedures

The difficulty of accurately measuring ELF emissions makes numerical comparisons difficult, argues John Chubb, low-emission manager at Apple and a leading expert on electromagnetic emissions. If background noise, or ambient emissions—ELF magnetic fields produced by electrical wiring, light fixtures, and the like—are too high, he notes, an accurate reading of monitor emissions can’t be made. “A lot of people are using the [MPR-2 guidelines] document and [measuring] equipment without the proper training,” says Chubb. Apple is building a special emissions-measurement room with low-voltage DC lighting and specially routed electrical cables.

The Swedish guidelines—which require 48 separate measurements on each monitor—are too costly for manufacturers to employ, Chubb says. Apple favors a new set of guidelines being developed by the Institute of Electrical and Electronics Engineers (IEEE). The IEEE guidelines, says Chubb, will specify the same levels of ELF magnetic emissions as the MPR-2 guidelines but will require only half as many measurements.

Both the MPR-2 and IEEE guidelines recommend that testing points be made in a circular pattern around each monitor in three planes, corresponding to the top, middle, and bottom of the screen, with all measurements taken from a distance of half a meter (about 20 inches). These configurations are well suited to an automated testing process. Macworld Lab used 23 measurements, but at varying distances from the monitor, including 4 inches and 12 inches. These points were determined without regard to engineering for mass-production testing, but they reflect a realistic range of distances at which users are exposed to ELF fields.

The IEEE guidelines, like MPR-2, will not be legally binding. Without government-mandated standards, manufacturers must decide whether to reduce emissions in their entire product line (as Radius says it will do by the end of the year), thereby raising their expenses, or to offer some less-expensive, unmodified monitors to compete with companies whose products cost less.

“Getting to be a vicious market,” says MegaGraphics’ Scott. Her company will continue to sell older, less-expensive monochrome designs that do not reduce ELF magnetic fields, along with its lower-emissions color and monochrome models. “I am not totally convinced there is a problem with the [emissions]. But I don’t want to stay awake nights wondering if I’m causing anyone harm.”

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Rory J. O’Connor is computing editor of the San Jose Mercury News in California.
Some of the most powerful typographic tools in existence are available on the Mac. But ask a professional typesetter about the Macintosh and desktop publishing, and you'll hear at least as much criticism as praise.

Having tools and knowing how to apply them are two different things. Fine saws don't make a fine cabinetmaker, nor can cutting-edge font technology make you a skilled typographer. Even professional designers are turning out substandard type that would never make it past the proofreaders at a fine type house. For that matter, most typographic flaws found in desktop publications are ones typesetters learn to avoid in their first week on the job.

What sets fine typography apart from ordinary typesetting is the extra care given to the appearance of every line. Beautiful type has an even color across the page: the spacing between characters, words, and lines is consistent and judiciously used—never too much, never too little. Lines end at logical stopping points, such as after commas and periods. The spacing of headlines and other large type is meticulously adjusted, each character coming within a hair's width of its neighbors.
To a fine typographer, every word, every line, and every paragraph is a design element unto itself. A typesetting house is the domain of specialists who adjust the spacing of characters and words with an interior decorator’s eye.

But desktop publishing replaces the typographer with a Get Text or Place command. More and more, type is being set by designers and production artists who may lack a typographer’s degree of training, or who don’t have the hawk eyes of a proofreader, or who simply don’t have the time or inclination to sweat the details that go into finely crafted type. “It’s not reasonable to expect to find in one body a typographer, a designer, and a production person,” says Betty Handly, a veteran typographer and president of Type Gallery, a Seattle-based type house. Kenneth Sahs, president of Shore Typographers in Chicago, agrees: “The bulk of our clients have good designers, good creatives, and good thinkers,” he says, “but they don’t have typographers.”

**Typography 101**

The first dead giveaway of desktop publishing is bad punctuation style. Most people learn to type on typewriters, and unnecessarily bring those typographic restraints to the Macintosh (see “Punctuation Primer”).

One of the most basic typographic decisions involves establishing the proper relationship between point size, line length, and leading (see “An Illustrated Glossary of Typography” for definitions of typographic terms; for definitions of character elements, see “Type Renaissance,” *Macworld*, July 1991). When you read, your eyes establish a pattern of movement, recognizing groups of three or four words at a time. If too many words are on each line, the eyes tire more quickly and get distracted by adjacent lines. If too few words are on each line, the flow of the text is disrupted as the eyes are forced to jump from right to left every few words. Short line lengths are especially troublesome with justified text, and lead to excessive hyphenation and wide spaces between words.

As with most things typographic, there is no cast-in-stone law of line length. But there are rules of thumb. One states that a line should be wide enough to accommodate two and a half lowercase alphabets in the desired type size and style. Another says you should strive for an average of 8 to 11 words per line. Both yield similar results.

As far leading, most publishing programs and word processors provide an auto-leading option that adds 20 percent of the type size—10-point text, for example, has 12-point leading. That works for _body text_ (text in sizes between 8-point and 12-point) in average line lengths, but not with _display type_, such as in headlines, and unusual line lengths. Headlines look better with no extra leading (for example, 18-point type with 18-point leading) or even with some negative line spacing (such as 16-point leading with 18-point type), provided one line doesn’t touch the next. And longer line lengths need more leading than shorter ones. More leading in long line measures helps keep the eyes on track and away from adjacent lines.

**Space: The Vital Frontier**

One way to differentiate between a good typographer and a bad one is to compare the spacing of their type. A good typographer adjusts the spacing between pairs of characters—not only of classic _kerning_ pairs such as T/A and Yo, but of every pair whose spacing needs tweaking in certain sizes. Every typeface has these subtle kerning candidates, but only the best typographers deal with them. The result is more-legible type because the eyes tend to recognize words by their overall shape, not by picking out individual characters. (This phenomenon also explains why you should avoid using all-uppercase text, whose overall uniform shape makes the reader work harder to recognize words.)

Generally, larger type sizes need more extensive kerning than body text does. Early phototypesetting equipment couldn’t set text larger than 18-point or 24-point, so typographers hand-set headlines using photographic equipment whose fonts were strips or disks of film. Some display type is still set this way, but thanks to digital output devices and their ability to set virtually any size, headlines are usually typeset along with body text, and most typographers electronically adjust headline spacing.

You can, too, by using a publishing program’s manual-kerning features. Start by tightening up a headline’s overall spacing using a _tracking_ command, and then individually kern characters...
as needed to obtain consistent spacing. But be forewarned: it’s hard work. “To do good kerning across the board on a Mac is a time-consuming, tough job,” says Shore Typographers’ Kenneth Sahs. Print out tests after each tweaking session; the Mac’s screen isn’t accurate enough to display fine adjustments. For frequent headline work, consider a display-type program such as Letraset’s LetraStudio or Broderbund’s TypeStyle, both of which electronically emulate the headline machines of yore and allow you to position individual characters by dragging them.

Regardless of your tools, follow the headline typographer’s general rule: characters should be tight, but not touching. Remember to tighten up the space between words, too. And be consistent: if you tighten up a certain character pair in one headline, do it in all the headlines.

As for automatic kerning, TrueType and PostScript fonts contain kerning tables that specify common kerning pairs. Desktop publishing programs’ automatic kerning features use a font’s kerning table to determine how to kern those pairs. You can fine-tune the kerning tables to yield the most attractive results. If you send documents to a service bureau for imagesetting, you may need to supply a copy of the edited font too. (QuarkXPress users can supply the XPress Data file.)

**Justified** body text presents its own spacing challenges, especially in narrow columns. To justify text, or align it with both margins, a publishing program adjusts the space between words. The narrower the column, the greater the likelihood of distracting vertical rivers of white space. Rivers are undesirable areas of white space that appear to run vertically or diagonally through justified text. You can keep rivers at bay by telling the program to add space between letters, too, but only to a degree. Excessive letterspacing makes it more difficult to discern one word from the next, and that’s at least as bad as wide word spacing. Because inconsistent spacing is an inherent part of justified text, many designers avoid justification in favor of a **ragged-right margin**—a variable right margin.

But rags have their own requirements. You can simply let a publishing program determine line endings based on what will and won’t fit, but when quality counts, you should take the helm and end some lines yourself by using the return key. For body text, you get a more attractive rag if the text tends to alternate between long lines and shorter ones. This gentle zigzagging of line endings emphasizes the uneven look of the ragged-right margin, and some say it reduces reader fatigue.

When you’re looking for sensible places to break lines, look for pauses in the prose—commas, periods, dashes, and so on. The reader’s

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**Punctuation Primer**

Here is a quick summary of things you can do to make documents look more professionally typeset.

- Don't put two spaces after a period that ends a sentence; one will do.
- Don't use the straight-up-and-down typewriter quotes—those whose key is to the left of the return key. Use curly (or smart) quotes by pressing the open bracket (') and close bracket ('') keys along with the shift and option keys in various finger-tangling combinations. If your word processor has a smart-quotes option, use it.

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**Incorrect**

"He said, 'You're kidding. A 36" goldfish?'"

**Correct**

"He said, ‘You’re kidding. A 36" goldfish?’"
mind pauses at these junctures, making them ideal places to end lines. Similar concepts apply to headlines. If you have a three-line headline, don’t rely on a publishing program’s word wrap feature to determine line breaks. Divide the headline into logical phrases, and break lines after each one. This is called breaking for sense.

Watch Your Weight: Small Capitals and Fractions
The Mac’s ability to scale PostScript and TrueType fonts to virtually any size makes it easy to create small caps from a regular font—just choose a publishing program’s small-caps option. Ditto for fractions—create small top and bottom characters, and sandwich a slash between them.

AN ILLUSTRATED GLOSSARY OF TYPOGRAPHY

Date Nut Bread

The flavor of this favorite nut bread is enhanced by soaking the dates in boiling water and using the water in the batter. Loaves keep well if stored in airtight containers. For a variation, use pecans instead of walnuts.

INGREDIENTS

4 1/2 cups brown sugar 1 TBSP. soda
2 TBSP. shortening 1 pound chopped dates
4 1/2 TBSP. vanilla 3 cups boiling water
4 eggs 2 cups chopped walnuts
4 cups flour

PREPARATION

Preheat oven to 350°. Mix brown sugar, shortening, vanilla, and eggs—beats well. Add flour and soda. Soak dates in boiling water. Add flour and soda mixture to sugar mixture alternately with water from dates, using only enough water to produce a thick batter. Mix well. Add dates and nuts.

Pour in greased loaf pan and bake 60-70 minutes. Allow to cool for 10 minutes before removing from pan.

Makes 3 loaves.
QuarkXPress even includes a feature that makes the fractions for you.

But is the quality of these elements up to the highest standards? No. The problem is subtle: when you enlarge or reduce characters, you change the width, or weight, of their stems, causing a mismatch with adjacent text. Thus, the stem weights of the small caps that publishing programs create don't match those of the large capitals they appear next to. In program-created fractions, the tiny numerals have such light stem weights that they often don't print well.

The answer? True-cut characters—characters specially designed to be used as small caps, fractions, and the like. More and more font developers are offering fonts containing small caps and fractions whose stem weights are designed to match the rest of the typeface. Several Adobe fonts, for example, have optional Expert Collections that include true-cut small caps, a variety of ready-made fractions, and separate numerals that were born to be numerators or denominators. Monotype offers similar ciphers under the Expert Set moniker. These collections often include other mainstays of fine typography, such as old-style numerals (those with descenders and ascenders) and ligatures (connected character pairs, such as fi and fl). They aren't cheap (Adobe's Expert Collections range from $185 to $275), but they're an essential part of a desktop typographer's toolbox.

If you commit to buying true-cut small caps, don't delegate them to headlines or special applications. Use them in body text where appropriate: for the chronological designations A.M., P.M., B.C., and A.D., and in other instances where large capitals would overwhelm surrounding lowercase text.

One more word about fractions: if you can't justify buying a fraction font, do create derived fractions instead of using full-size figures (as in 1-1/2). A derived fraction is better than no fraction at all.

Truth in Italics and Bolds

Another subtle point to be aware of is the difference between true italic text and derived italics, or oblique, text. In most typefaces, especially serif faces, italics are specially drawn to have their own scriptlike characteristics and to complement the stroke width of the upright, or roman, version (see "Type Renaissance," July 1991). The Mac, however, can electronically slant the roman version of a font to create a kind of pseudoitalic. To see an example, type some text in a font such as Geneva, Chicago, or New York, and then choose the italic style. Illustration programs such as Aldus FreeHand and Adobe Illustrator also let you create oblique text by slanting a block of roman text to an angle you specify.
At Shore Typographers in Chicago, Mark Hnatow uses a phototypo­positor machine to hand-space each letter in display type.

Oblique text can be a useful design element for headlines and other special purposes, but for body text you should generally use the font designer’s true italics. In most cases, that’s easy—simply install the italic versions of the typeface’s screen and printer fonts. But some font packages don’t include true italics. Adobe’s ITC Benguiat package, for example, includes only roman and bold versions, even though Benguiat has beautiful italics. In this case, the solution is to buy the font package from Bitstream, which sells a complete version of the typeface.

The Bigger Picture
Clearly, setting top-notch type on the Macintosh requires a great deal of effort and skill, not to mention a watchful eye. Is the process as arduous on dedicated typesetting systems? Generally, the answer is no.

Dedicated systems have more extensive features for controlling spacing between words and letters. Although Mac page-layout programs allow you to manually kern with great precision, they don’t provide on-screen codes that show just how much kerning you’ve applied between characters. With a dedicated system, if the type­setter wants to tighten a letter pair by two-thirds of a point, he or she can specify that amount, and a code reflecting it appears on the screen. This makes it easier to apply the same degree of kerning elsewhere. Hanging punctuation is also much easier on dedicated systems, thanks to their ability to zero-set characters—essentially to print one character (such as a quote) over another (such as a period or comma).

Dedicated systems are also better suited to producing lengthy, structured documents such as books and manuals. On a dedicated system, typesetters can create elaborate formatting macros that change margins, type styles, and sizes, and insert repetitive text with a single keystroke. The style-sheet features that Mac page-layout programs offer don’t go far enough in automating repetitive formatting tasks. Programs such as Interleaf Publisher and Frame Technology’s FrameMaker provide better support for long documents, but their kerning and other character-finessing features don’t match those of Aldus PageMaker, QuarkXPress, or Letraset’s DesignStudio. The Mac makes you choose between quality and quantity.

And no typographer I know of would choose a Macintosh over a dedicated system for creating the elaborately formatted tables that appear in financial statements and annual reports. Adjusting column widths, straddling headings over columns, creating the rules that appear above totals and subtotals, and hanging parentheses into the gutter between columns are common chores in setting what veteran typesetters call tabular matter. The tab features in Mac publishing programs are adequate for simple tables but are taxed by complex ones.

The International Mac
The Mac does have a significant edge when it comes to combining text and graphics, of course, and it’s the preferred platform for certain types of foreign-language work, particularly for Cyrillic, Arabic, kanji, and other non-Latin writing systems. Dedicated typesetting systems are designed for Western languages and their relatively simple, left-to-right, top-to-bottom text flow, and are stumped by languages such as Hebrew and Arabic, which operate by different rules, and ones such as Japanese and Chinese, which use thousands of characters.

The Mac isn’t as parochial. A portion of its system software, the Script Manager, allows the
Mac to be easily adapted to other languages and script systems. Apple’s KanjiTalk system is opening doors to new typographic and desktop publishing applications in Japan, and the company’s forthcoming release of a Russian version of the Mac’s system software was one of the hottest topics of discussion at a USSR developers’ conference sponsored by Macworld and Apple last year.

But one of the many problems with supporting complex script systems involves accommodating the thousands of characters these languages require. The current standard for representing characters, ASCII (short for American Standard Code for Information Interchange), provides “slots” for just 256 characters—the maximum number that can be represented by one byte. ASCII is woefully inadequate for representing languages such as Japanese, Chinese, and Korean, and it complicates file exchange between systems that use various Western languages, since one language’s computers may place accents and other characters at different positions than another language’s computers.

The answer may be in a new character-encoding standard called Unicode, currently being developed by a consortium of major computer manufacturers and software houses. Unicode uses two bytes to represent characters, not one, allowing for up to 65,536 character positions—enough to represent every language in the world, along with a multitude of symbols and punctuation characters. Alas, the Unicode standard isn’t finalized yet, nor has Apple announced when the Mac will support it. But TrueType and PostScript Level 2 can support multibyte character encoding schemes, so they’re ready for Unicode when it arrives. “Font Futures” describes some additional type technology on the horizon.

In the meantime, most of us are more concerned with English-language text and the blood and guts of typography—putting words on paper and ensuring that they are spelled and hyphenated properly and spaced attractively. The techniques I’ve described here can help in that noble task. And even if you don’t apply every one of them to your work, just knowing they exist is likely to give you a new respect for type—and for professional typographers, those meticulous directors of the most powerful cast of characters ever assembled.

See Where to Buy for contact information.

Contributing editor Jim Heid is a former typesetter and former member of the International Typographers Union. He is the author of Macworld Complete Mac Handbook, an updated and expanded collection of his Getting Started columns.

1991 has been an important year for Macintosh typography. TrueType, announced by Apple, and Multiple Master from Adobe, promise to change the possibilities of digital typography. The most remarkable features have yet to be realized, and the most talked about of these is nonlinear scaling.

When metal typefaces were cut by hand, each point size was designed independently, with subtle changes in the proportions and shapes of the letters.

The new digital type technologies promise a way to reproduce this attention to design detail through nonlinear scaling. With nonlinear scaling, the proportions of a character’s outline change under various conditions. For example, in large point sizes, serifs may be more pronounced, or if the type reverses out of a dark background the letter may be scaled at a heavier weight. TrueType, and now PostScript—through its Multiple Master technology—promise such intelligent scaling in the near future.

But nonlinear scaling creates difficulties for typesetting applications, which have always relied on fixed and reliable character widths. These programs fit type into a line by counting the cumulative widths of the characters on that line—widths that are obtained by tables of character metrics located within the font itself. If type is to be scaled nonlinearly, though, character widths have to be calculated on a case-by-case basis, not just copied out of a standard width table.

The only way to make character-width calculations consistent across applications is to do it at the system level. This will be one of the jobs of Apple’s Line Layout Manager, a system utility planned for a future release of system software (it isn’t in System 7.0).

Another difficulty with nonlinear scaling is that it must be based on subjective visual criteria, not just precise mathematical formulas. How type in small sizes, small capitals, and condensed type should be correctly proportioned cannot be predicted algorithmically. For the best visual results, each typeface must be handled as a distinct case, and no one is yet willing to suggest just how that will be done.

Another capability dependent on the arrival of Line Layout Manager is character ductility—the ability to distort letter shapes to accommodate certain linguistic or typographic situations. This isn’t a big issue in Western typography—except in some script and italic faces—but in Arabic, for instance, certain letters change shape according to the letters that appear around them. If those characters could change their shape contextually, keyboarding Arabic manuscripts would be greatly simplified. Similar situations exist in ideogram-based languages, such as Chinese. Again, Line Layout Manager is the key to making this prospective change practical.—James Felici
New options mean better, more-affordable four-color publishing

A diagram of the process most desktop publishers follow to produce color pages used to look like a complex board game complete with meandering detours to various vendors and dangerous squares with legends reading "Design change, go back to separator, pay $1000" or "Stripping mistake, lose one day, miss deadline."

But the publishing game doesn't have to be played that way anymore. New techniques are enabling a growing number of publishers in businesses ranging from small design studios to *Fortune* magazine to straighten the crooked path that leads from design to four-color film. After years of inching toward the goal, these publishers are finally saving time, cutting costs, and even improving their products by building complete color mechanicals on the desktop.

Because these electronic documents incorporate all text and graphic elements on a page—including high-quality color photographs—they go directly from design to separation without pasteup or stripping. The process typically requires only one vendor. Highly accurate color mock-ups are a simple printout away at any point. And late changes are comparatively easy and inexpensive to incorporate.

**Ask Me How**

Two paths to complete color design are open to today's publishing pioneers. The high road involves translating Mac pages into a format that can be read by high-end prepress workstations (known in the trade as CEPS, or color electronic prepress systems). Once the files are on the CEPS stations, they can be merged with high-quality scans and output on high-end film plotters. This method marries the benefits of desktop design with a proven standard for color quality, but it isn't cheap.

The low road is more familiar to Mac publishers, relying as it does on PostScript imagesetters for output. What may be unfamiliar to many, however, is the quantum leap in quality that service bureaus using PostScript imagesetters have been able to achieve during the past year.

How good can imageset color get? All the photos and color elements in this article were placed in PageMaker and output on an Agfa SelectSet 5000 PostScript imagesetter.

Which of the paths to fully integrated color publishing is right for you depends on factors such as...
Fortune magazine now does all its editorial design and production on Macs and then outputs the final film through a Crescent prepress system. Designer Frances Fifield (right) and art director Margery Peters (left) produced the recent Fortune Global 500 cover.
as the type of publications you produce and how much extra work you're willing to take on. Before you start down one or the other road, you need to know a few things about how the two processes work, where you will and won't save money, and how the switch to full-page publishing will affect your production cycle. You will also want some information on how to get the best quality you can, whichever path you follow.

You Take the High Road

While software and hardware combinations that link Mac page-layout files to proprietary CEPS workstations have existed for several years, until this year they have mostly been adopted by larger and more sophisticated Mac publishers, such as catalog houses and magazines. One reason is that the CEPS companies that created the linking systems have no experience marketing to end users, so few desktop publishers are aware of these prepress solutions.

These schemes for bringing Mac files into the proprietary formats imposed high costs and many restrictions. For example, Scitex America and Crosfield have both offered proprietary turnkey systems costing $30,000 to $50,000 depending on the hardware selected—a steep investment for a proprietary solution to a new, unsettled application area. And Crosfield's initial effort at an off-the-shelf link resulted in one that could accept files from just one of the three then-popular page-layout programs. Predictably, the majority of desktop publishers were turned off by these approaches.

In response, CEPS vendors began shifting their focus to systems that could accept files from any standard Mac graphics or publishing program. The Du Pont Imaging StudioLink system was the first, late in 1988, followed closely by Scitex's VIP image processor, Hell's ScriptMaster system and Screen USA's OMEGA RIP processor both came out last year.

Initially, these products were a problem to use, for reasons that had as much to do with the culture of color-prepress service bureaus as with the technology. After years of either ignoring or maligning desktop publishing, CEPS operators suddenly found themselves working with desktop publishing documents filled with fonts and file formats about which they knew practically nothing. The links themselves tended to be slow, unable to process certain kinds of files, and rife with limitations that made them unacceptable to many publishers—an inability to accept Adobe's popular Type 1 fonts, for instance. Today, although prepress-links systems are still nowhere near perfect, most of the shortcomings affect prepress operators more than they do publishers.

CEPS Steps

The exact steps a publisher and CEPS operator take to produce a given page vary considerably, depending on the prepress-links system being used and the elements on the page. In fact, different shops with the same linking system may well follow very different routines. On a generic, idealized level, however, all the prepress-links systems subscribe to the same basic work-flow model.

All the linking systems start with the premise that most Macs lack the processing power to work with full-resolution versions of scanned photographs, which can easily run to tens of megabytes. So CEPS service bureaus make two sets of scans: low-resolution scans for the designer to position during layout; and high-resolution scans, which the service bureau substitutes into a layout be-

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**PREPRESS PRIMER**

Prepress involves the same basic tasks whether done traditionally or electronically.

- For type and black-and-white line art, creating a negative.
- For noncolor photographs, creating halftone negatives (made up of dot patterns to simulate grays).
- For color elements, making four color separations (one film negative for each of the four standard printer's inks, called process colors).
- Making color proofs (also called match prints) so you can see how faithful the separated image is to the original.
- Doing color correction on these separations to account for peculiarities in the printing press used or in the colors of the original image, as well as retouching to fine-tune the image.
- Trapping color elements that abut, such as a blue border around a red circle, so that the colors will print without gaps between them in case the printing press is slightly out of register. The interior element's outside border is printed slightly larger than actual size (spreading), and the exterior element's inside border is printed slightly larger than actual size (choking) so there is enough overlap to prevent gaps.
- Creating silhouettes (also called masks), commonly used to isolate a subject from its background.
- Assembling all the pieces of film by stripping individual negatives onto the master negative, called a flat, which contains multiple pages and is sent to the printer when completed.

In the electronic approach, you no longer worry about multiple pieces of film, since the negatives are not created until you have merged all your elements in the layout and finalized it. This reduces errors and makes it easier to make changes and corrections.

Because electronic color prepress is relatively new, you may not find one vendor with the expertise or equipment to handle all the tasks. Just as traditional publishers often rely on one vendor for color separations and another for stripping, many midrange desktop publishers use one vendor for scanning and retouching and another for output. With the growth in service bureaus experienced in both electronic color prepress and film output, however, the one-stop shop is increasingly easier to find.
fore outputting the final film. The service bureau retains responsibility for color correction and any required retouching.

The designer positions the low-resolution scan on a page, crops it, and even—within limits—rotates and/or resizes it. (The limit for enlarging a scan is usually about 20 to 50 percent.) When it's time to output pages, the CEPS system's file-serving software recognizes the position scans by their file names, automatically swaps in their high-resolution cousins, and outputs the pages with the photographs in position and with scaling, sizing, and cropping instructions applied.

To understand prepress-link technology, it's important to know that film output devices can't interpret PostScript. To print Mac pages on a film plotter, it's necessary first to run the file through a RIP (raster image processor), which translates PostScript's page descriptions to the proprietary language of the CEPS system.

This translation process can be a source of problems, but bringing Mac files into the domain of the proprietary CEPS workstations for retouching and stripping does have some clear advantages. Because proprietary formats describe a page in a less complex way than PostScript, even complicated pages print more quickly. Also, when you send files to the CEPS shop, it handles the job of trapping tint areas, color type, and PostScript illustrations—a difficult job given the limited capabilities of the Mac's trapping tools.

I'll Take the Low

From the end user's point of view, the low-road, PostScript-output path to Mac color pages isn't that different from the high-road method. The PostScript service bureau makes two sets of scans, keeps the high-resolution versions, returns the low-resolution position scans, and then merges the full-scale scans into the final layout during output. The main difference between the two processes is that the PostScript service bureau uses a PostScript imagesetter to output the pages; no translation is required from the layout program's PostScript files to another format.

Until very recently the all-PostScript path to color publishing was unacceptable for publications requiring high-quality output. Colors in photographs tended to be murky and inconsistent. Moiré patterns and the milder form of patterning called "prominent rosettes" cropped up regularly in both tints and photographic work. Imagesetters often got bogged down when outputting large or complex color files.

During the past year, three developments converged to dramatically improve PostScript color. One, the better PostScript service bureaus now use color scanners that are as good as high-end devices (in some cases they are high-end devices). Two, instead of printing color separations on what are essentially typesetting machines, PostScript services now have access to a new generation of faster, more precise imagesetters, as well as improved halftone-screening technologies (see "Hell's Angles"). Three, it's finally possible to find people running PostScript equipment who actually know something about color.

Superior Scanning Without good input, good color is impossible. A $10,000 Nikon slide scanner—previously the favorite of PostScript service bureaus—cannot compete with the $70,000-plus machines serious shops are now buying. The premier scanners in PostScript shops today are the Optronics ColorSetter, the Scitex Smart Scanner PS or SmartTwo PS, and Screen USA's SG-2010. These machines are similar to the input devices used in CEPS systems, but they have an interface that enables a Mac to drive them directly. Some PostScript service bureaus—mostly those that are outgrowths of traditional prepress shops—make scans on conventional CEPS scanners and transfer them to the Mac via add-on interfaces.

Because the scans come from high-end scanners, their quality is excellent. Midrange scanners like the BarneyScan GIS 4520, the Array SpeedScanner, and the Eikonix 1412 can also produce good results, but typically don't provide the same highlight and shadow detail as the more expensive devices, especially at larger sizes.

Better Imagesetters The imagesetters setting the standard these days are the highly accurate drum-recorder models—the Agfa SelectSet 5000, the Optronics ColorSetter 2000, the Linotype-Hell Linotronic 630, the Scitex Dolev PS, and the Purup Press America ImageMaker 80/10. Also popular at serious color shops is the Linotronic 530, an upgrade to the standard L300. In the right hands, other imagesetters, like the Varityper 5330 and the Agfa 9800, can produce
change in their production process want to know is whether the switch will save money. The answer in the case of Mac prepress is yes, but the savings may not be in the form of hard production dollars. Time, as they say, is also money.

If you are looking to cut your prepress bill, the proprietary-links CEPS path to Mac prepress probably isn't for you. Prepress shops using these systems have invested millions of dollars and emphasize personal service. Their costs are high.

Many people initially believed that the prepress-links systems would lower costs at CEPS service bureaus by reducing the system and staff time required to produce pages. But it soon turned out that hitches in the PostScript-to-proprietary translation made the process anything but automatic. As I write this, for example, none of the CEPS RIPs can automatically bring over a color TIFF file placed in a layout; only Grosfield and Scitec can correctly interpret a call for white type to knock out of a photograph; only Hell can automatically separate spot color in a four-color page and print a fifth sheet of film for special inks. None of the systems can interpret information from programs like QuarkXPress, Adobe Illustrator, or Aldus FreeHand about how elements should overlap—which means that any trapping you might try to do on the Mac will be a waste of time. Workarounds exist for all of these problems, but they typically require staff time on the CEPS system or have other disadvantages.

Prepress-links production, on the other hand, generally isn't any more expensive than traditional stripping and separation, and you still enjoy the benefits of desktop design. In addition, industrious publishers willing to coordinate closely with the CEPS service bureau and do as much of the production work as possible themselves may actually save money on some jobs.

The ideal job for prepress-links production is one in which multiple pictures on a page fall into rectangular boxes; catalogs are the most often cited example. Because digital scans are easily archived, anyone who frequently reuses pictures—as long as they reuse them at similar sizes—will also save money.

In contrast to CEPS shops, PostScript service bureaus, with their lower equipment and staff costs, have been extremely aggressive in their pricing. How aggressive? Results of an informal survey I sent out to ten PostScript and CEPS service bureaus around the country indicate that bringing fully composed color pages to a PostScript service bureau costs, on the average, half what it costs to send files through a prepress link or to do it traditionally.

The survey asked for cost estimates of a half-dozen jobs of varying complexity. To make the level of service comparable between CEPS and PostScript shops, I asked the PostScript shops to include a color-correction cycle in their estimates. So the 50 percent savings figure for the PostScript route includes the cost of a preliminary proof of the scans—typically handed over along with the low-res position file—and a guarantee.

Programs such as Adobe Photoshop give you control over how colors will print, making it possible to do prepress on the Mac. But having the capability to do the color work on the Mac is not enough: operators still need to understand color printing to effectively use these tools.
Navigating the Low Road

Here is the basic process for PostScript-based color prepress, using these two pages as an example. The precise division of labor varies among publications.

1. Scan photos. Send photographs as transparencies to a service bureau for hi-res scanning. (Macworld uses the services of Digital Pre-Press International.) Designer receives low-res versions of scans for placement in layout program.

2. Create files. Create text and computer-generated images, including object-oriented graphics (for example, in Adobe Illustrator or Aldus FreeHand) and bitmapped graphics (for example, in Adobe Photoshop in SuperMac's PixelPaint, or via a screen-capture program).

3. Fine-tune images. Do color correction and retouching of color scans using a Mac or a dedicated retouching system. (Macworld's service bureau retouches scans in Photoshop.) Output a color proof to verify color. (Macworld's service bureau outputs proofs on a Fuji Color Art system.) Do further retouching or correction if necessary.

4. Do the layout. Place all elements in a page-layout program such as Aldus PageMaker or QuarkXPress. (This layout includes a scanned photograph, an object-oriented EPS file with linked TIFF images, a computer-generated screen shot, type, and various color elements generated in PageMaker.)

5. Send final layout to the service bureau. For PageMaker, export the layout as a .SEP file. Substitute the high-res scanned photos for low-res versions in the layout. Run Aldus PrePrint to make color separations. For QuarkXPress, substitute the high-res scans and make the color separations from within QuarkXPress. (Macworld uses the PageMaker/PrePrint option.)

6. Output film negatives. Send the separation files to an imagesetter for output. (Macworld's service bureau uses an Agfa Compugraphic SelectSet 5000 imagesetter.) Create a color proof for final review and for the printer to use as a press check. (Macworld's service bureau again uses a Fuji Color Art system.)

that final color will match the original transparency.

Many Mac publishers currently pursue a partial desktop solution to color, stripping individual CEPS photo separations into pages that have been imageset with color type and tints in position. To see if going all-desktop is worth the effort, I also asked for a bid using this half-and-half approach. Again, the fully composed Mac pages were significantly less expensive—a third less than the mixed method.

Naturally, not everyone who goes to a PostScript service bureau for production will save 50 or even 25 percent. Shops vary, as do users. To best exploit the potential for cost savings, you have to shop around and work intelligently. Avoid, for example, providing unnecessarily complex PostScript files that take forever to print, and learn to do your own trapping in programs like FreeHand and QuarkXPress. (For an introduction to trapping, see “Setting Traps,” Macworld, May 1991. For advice on working with color files, see “Prepress Progress Report,” Macworld, October 1990.)

Money Isn’t Everything

Both high- and low-road publishers agree that desktop production of color pages saves time and effort and can actually result in better products. One obvious advantage is that once you have a color page, the cost of adding color elements is small, since the main cost—color separation—does not depend on the amount of color used. "If it were done conventionally, we just couldn’t afford the stripping and redos that would be involved in the amount of color we use," notes Michael Grossman, design director of the very colorful Entertainment Weekly (produced via Scitex's VIP).

Another aspect of quality is control, a word frequently heard on the lips of Mac color publishers. These individuals like knowing that when they crop a picture, trap an illustration, cut a silhouette, or correct color to bring out the nuances in a photograph, what comes back from the prepress service bureau won’t be an interpretation or approximation. Some call it design integrity; others focus on the time saved from not having to send unsatisfactory work back.

The time savings that comes from doing full-color Mac design probably won’t come in the form of shorter turnaround for film production. In fact, you might want to leave an extra day at the end of your production...
cycle in case anything goes wrong. Remember that although a traditional prepress service bureau can always put more color strippers on a rush job, there’s no way to break up a complex digital page so that two machines can process it. Also, strippers and pasteup artists rarely just give up on a job, as computers sometimes do—for reasons that often take hours to track down.

The most significant time savings are the result of collapsing the design and production processes into one. Janet Waigel was the design director on the launch of the Scitex VIP-produced TV Time, a weekly viewer’s guide. “We do this with fewer people and in half the time it would take us doing it traditionally,” she says. “Once a layout is done, it’s there, it’s finished. There’s no late-night quilting bee gluing it down, and no time spent cutting film. It’s a one-stop process.”

Of course, preparing your own pages for output can mean spending extra time on jobs you never had to do before, like trapping. Generally, however, the designers I spoke with felt strongly that the trade-offs were balanced in their favor. Tim Boyse of Ikon Creative Services in Los Angeles recently created some packaging for RCA-Columbia Pictures Home Video.

Publications that live or die by the quality of their color should stay with the high end. But the differences between the two roads to Mac color are diminishing. For most publishers, both approaches now offer good quality.

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“Three years ago, doing pasteup by hand, it took three people about 24 hours to produce a mechanical of a videotape box,” Boyse says. “Now—even though we’re setting the type and making the separations ourselves—I can do a box in three or four hours.” Asked whether the main difference was just using the Mac in the first place—for type and tints—or doing fully paginated designs, Boyse responds that “going halfway is a big waste of time. It doesn’t make sense to produce a tight black-and-white just for approval, and then go back and remove backgrounds from type so a color house can have line art to shoot.”

Three aspects of fully integrated desktop publishing work together to make the process a flexible one when it comes to making changes to design or copy. The most important is that you do not send out for film until the absolute end of the production cycle. Another is that you can resize scans up to that final step. And the third is that it is easy and inexpensive to generate very accurate color mock-ups.

Tighter mock-ups sound like a simple matter, but the ability to see what a job will actually look like combined with the ability to make even substantial revisions easily and inexpensively can have a profound effect on people’s work routine and relationship with clients. “The main advantage is not making last-minute changes to film,” notes Don MacLeish, print manager at Lawrence Advertising in Anaheim, California, which produces retail ads for Standard Brands Paints (a fussy client where color is concerned). MacLeish takes his client through two revision cycles using QMS color printouts, and then moves on to a previously unimaginable step: “The buyer comes in [to the imagesetter change. The Linotype-Hell merger is a symbol of the current state of affairs—the joining of one of the CEPS pioneers with the firm whose Linotronic brand name is a synonym for imagesetters. It is clear that as time goes by, the differences between the two roads to Mac color will diminish, but meanwhile, those picking a Mac-based prepress method will do well to take a few considerations besides price into account.

One consideration is quality. Perhaps more because of knowledge than technology, CEPS service bureaus still produce the highest-quality separations. Their work is also more consistent, requiring fewer rounds of corrections, and they trap pages correctly. In Macintosh page-layout programs, only the most ingenious workaround artists can find ways to trap all the elements they want to use (though proper trapping is quite possible for people who work in FreeHand or Illustrator). As a general rule, publications that live or die by the quality of their color—fashion magazines, coffee-table books, luxury catalogs—should stay with the high end.

At the moment, PostScript imagemakers are also incapable of producing poster-size work. (This may change, however. By the time you read this a company called Optrotech Graphic Arts should have released the Sprint 110, a drum-based imagesetter with a print area of 39.3 inches by 32 inches.)

Service and support vary from business to business, but overall the PostScript service bureau is a more do-it-yourself kind of place and offers fewer services. If you go the PostScript route, you’ll likely be encouraged to learn to trap the artwork yourself and perhaps to make your own color separations (though many shops will gladly provide these and other services, such as retouching, usually at reasonable rates). PostScript service bureaus almost certainly won’t employ any traditional strippers, nor will they correct color film by manually etching dots on it; some PostScript shops may even send out for color proofs or scans. CEPS shops serious about Macintosh color prepress, on the other hand, often have their own PostScript imagesetters, which they use for mak-
**HELL'S ANGLES**

Usually, the last thing most publishers want to concern themselves with is the process by which high-resolution printing devices calculate the angles of halftone screens used in four-color film. But new developments are making one aspect of the abstruse process—the difference between rational and irrational screening—something PostScript publishers who want to get the highest quality need to understand. If you imagine a page as a piece of graph paper divided into very small squares, a rational screening system demands that all halftone dots fall within the squares; they can't fall on a line. This is fine if the rows of halftone dots are at 90 or 45 degrees, but four-color printing requires four nonoverlapping angles—usually at 45, 90, 75, and 15 degrees. As anyone who's played with graph paper knows, there's no way to fit rows of dots at 15 and 75 degrees neatly on the grid squares. You have to approximate. This approximation is a major source of moirés in PostScript halftoning, which has always used a rational screen method. By trial and error, Adobe and other developers have found the best approximations of the traditional angles, and PostScript printing is not the problem it once was.

As this article was being written, however, alternative technologies promising to improve the situation even further were beginning to emerge. The biggest news is that imagemester users now have access to irrational techniques similar to those used on high-end CEPS systems. Irrational screening is a very complex matter mathematically, but it essentially amounts to the ability to place dots on the lines of the graph paper, thus eliminating the need to round off angles. Hell holds the patents on irrational technology and has previously shared them only with the other Big Four CEPS makers (Scitex, Crosfield, and Dainippon Screen). Following the Linotype-Hell merger last year, however, the company released an irrational screening system as an option for its RIP 30 processor and as part of its new RIP 40. Early reports say that the results from this system, which the company calls HOQ, are excellent.

Although blocked by Linotype-Hell from using the tried-and-true irrational techniques, Adobe has meanwhile invented a completely new halftoning method, dubbed Accurate Screens. By the time you read this, the technology, which Adobe claims will be every bit as good as the Linotype-Hell standard, may be available on imsetmsetters using variations of Adobe's Emerald RIP technology.

The Optronics ColorSetter 2000 has always used proprietary hardware and software that reduce screening inaccuracies. The company says that by the end of this year it will release a completely new screening system based on its own and Linotype-Hell's irrational technologies (the two firms entered into cross-licensing agreements earlier this year). Optronics says the new screening method will add clarity and better tonal modulation to separations.

ing text changes or for outputting complex PostScript graphics. That's the nice thing about the high-end: one way or another, they can always deliver the job.

Whether you go the PostScript or CEPS route, remember that the shop you end up working with will be your partner in production. Interview prospective partners carefully before picking one. Look at samples of the work they've done. If you go with a PostScript shop, try to find one with experienced color-printing professionals on staff. If you go the CEPS route, be sure to probe the staff on their level of experience with desktop publishing. In either case, get a sense of how long they've been doing desktop color, how much effort they've put into it, and how much work they've produced.

The service bureaus that are making this process work recognize that many users need help to succeed at color production. Larger service bureaus may offer seminars or have publications they have prepared that explain the color-publishing process. And the good PostScript service bureaus offer to teach you how to trap files or how to calibrate color-separation software.

Once you have picked a prepress service bureau, be sure to coordinate with the staff carefully before you produce your first job. Describe the job carefully, being sure to mention all the programs you're using and all the elements the pages are likely to contain, as well as how the job will be printed. If you go to a CEPS service bureau, be sure to ask about the problem elements, such as PostScript graphics with lots of blends, or files with a fifth color. Such elements may require special handling, and waiting to handle them until after you turn the job in for output is a good way to blow both your deadline and your budget.

Whether you follow the high or low road, two final pieces of advice will stand you in good stead. First, do not try to change over your entire operation in one swoop—especially if you're on deadline. If you publish a magazine, for example, start with one or two articles, then evaluate the process to see where the snags are.

Second, learn as much as you can about color printing. Talk to your prepress service bureau, go to a press check and ask questions, read books, experiment. The more you learn, the more control over the process you'll gain, and the more new things you'll be able to achieve. Before long you may be surprised at how something you began for efficiency's sake has become a source of great creative satisfaction.

See Where to Buy for contact information.

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*Contributing editor Joe Matazoni is a consultant and writer living in Oakland, California. He has followed the growth of imaging for Macworld for the last five years.*
Scanners in View

This year's roundup of gray-scale scanners may startle you for an unlikely reason. Bucking the trend seen in nearly every other peripheral group, these scanners haven't changed much since last year. There are a few minor surprises, software improvements, and some new contenders, but the top choice remains the same as last year's—the Xerox Imaging Systems GS plus—and several other products held steady as well (see "Grade-A Gray Scale," Macworld, October 1990).

We love innovation, but those rare occasions when technology lets us catch our breath offer important opportunities. We know these scanners so well that we could refine our tests to reflect more clearly the nuances that often distinguish the best machines from the pretenders.

The most important test measured shadow sensitivity—how well scanners differentiate among subtleties in shadow areas. Next in importance, we recorded how much image-altering electronic noise, or static, scanners generate. We also judged how well the scanners capture detailed line art, and we timed their scanning speeds.

Macworld
Lab ranks 13 gray-scale scanners for image quality, speed, and software

by Steve Roth

Artist Eric Adigard created this range of images from a scanned photograph by adjusting the scale, dither pattern, resolution, and number of gray levels.
Quality Control

Before you leap to the test results, however, consider the factors that contribute to each scanner's scores. No scanner grabs a perfect image. Most scanning software includes brightness and contrast sliders that let you adjust the gray levels in an image. The trouble with these two controls is that they throw away information. When you brighten an image to bring out dark details, for instance, light areas wash out to white. The better scanners also provide gamma control, a correction technique that improves image quality without throwing away information indiscriminately. You can bring out details in shadows, for instance, without losing the details in the light areas.

And almost every scan destined for printed output needs sharpening—a method to reduce blurriness, especially in details (see "Looking Sharp"). With some effort, you can sharpen scans after they're captured in Letraset's ImageStudio, Aldus Digital Darkroom, or Adobe Photoshop (which provides the best sharpening filters). Only one scanner in this roundup provides sharpening while you're scanning—the Agfa Focus II GSE Scanner.

It may not seem like it, but scanners are sort of like radios. In their attempts to capture information, scanners generally come up with some static. With scanners, this noise appears as stray pixels that don't match the gray in a particular area. It causes a speckled look that is especially visible in lower-resolution scans and is accentuated by sharpening.

Though it can look similar to noise, a diffusion dither—a way to reconfigure the dot pattern of a scan to boost image clarity—actually improves a laser-output scan. If you plan to produce much of your work on lasers (as opposed to imagesetters), look for a scanner with a good diffusion dither, or software (such as Photoshop) that lets you create a diffusion dither from a gray-scale scan.

How Scanners Capture an Image

Gray-scale scanners capture an image by converting varying intensities of light to digital signals that can be interpreted by the Macintosh. Through a variety of mechanical schemes, such as the mechanism used by the Hewlett-Packard HP ScanJet Plus shown in the inset at bottom right, a light source (A) passes across the paper image to be scanned. The image is reflected, often through a lens, onto an image sensor (B). This sensor, composed of microscopic photoelectric cells (see image at top right), produces electrical impulses of varying voltages—higher voltages are generated by lighter, more reflective areas on the image, lower voltages by darker areas. The analog voltage signal is fed into an analog-to-digital converter chip, which then forwards the digital signal to the computer.
**Speed Factors**

In Macworld Lab tests the scanning times varied by only a factor of two from the fastest (the Pentax IQ Scan, with an average scan time of 31 seconds) to the slowest (the Abaton Scan 300/GS, with an average of 67 seconds), not counting the plodding ThunderWorks-driven Apple Scanner and ThunderScan Plus (see "ThunderScanning"). These reasonably close times eliminate scanning speed as a major buying consideration except for high-volume users.

You should be more concerned about speed if you work with a scan in Photoshop or another image processor. The results can be excellent, but the time penalties steep.

**Driving the Scanners**

Several scanners have moved away from DAs and stand-alone scanning programs, instead offering plug-in modules that let you scan from within ImageStudio, Photoshop, and Digital Darkroom. (Photoshop can use Digital Darkroom's plug-ins, and all the plug-ins we tested worked with both.) Several scanners also come with one of those programs. The scanners that include Photoshop have opted for Photoshop LE, or Limited Edition, which doesn't make separations.

One thing that improved this year is the way scanning software handles the scaling/resolution question. Some of the scanners (from Apple, AVR, Canon, Dest, Pentax, and Prime Option) still make you do the arithmetic if you want a scan of a certain size at a certain resolution, but the others do the math for you.

Some scanners have increased resolution—but be skeptical. The line-art test shows that higher resolution does not necessarily mean better line art. The 400-dpi Agfa Focus II GSE Scanner and 600-dpi Prime Option Phovos 600GS did not produce better line art than some of their 300-dpi counterparts.

In another minor change this year, more scanners interpolate dots—add extra dots between scanned dots to simulate higher resolution. This method does not pick up additional detail, but it does result in smoother output with fewer jaggies.

The following ranking reflects how well the scanners handle these considerations. Now, in true David Letterman style, here are the scanners from the bottom up—worst to best.

**Pentax IQ Scan**

When you think Pentax you think great optics, right? Think again. Despite a curvaceous, space-age design, the Pentax IQ Scan is a terrible machine. First and foremost, it offers only 4-bit (16-gray-level) scans. Given that deficiency, its shadow-sensitivity results were impressive—until we saw the noise test. The Pentax scored far below any other gray-scale flatbed. This scanner captures subtle differences, but drowns them out with noise. Its line-art results are similarly disappointing.

The IQ Scan's two pieces of software both scan only to memory, not to the hard drive. The DA doesn't even have a preview, so you're selecting blind. It does have five-level gamma control and a selection of five dither patterns (though no diffusion dither). The Photoshop plug-in has a preview, along with the basic controls for scan area, mode, and resolution. And unlike the DA, the Photoshop module shows available and required memory for the scan. But that's about all. Despite its futuristic looks, the only way to describe the IQ Scan is primitive.

**Apple Scanner**

When it came out a few years ago, the Apple Scanner was a standout, with some of the best software around. But this 4-bit unit has not aged gracefully. It failed the shadow-sensitivity test miserably and placed near the bottom in the noise and line-art tests. Its once-innovative software now looks unnecessarily complicated. The original Apple Scanner included the AppleScan application and HyperScan, a clever stack Andy Hertzfeld created for scanning into HyperCard, but now it comes with only AppleScan.

If you already have an Apple Scanner, however, Thunderware's ThunderWorks for the Apple Scanner software ($149) is worth buying for the throw-scrolling feature alone. Move the image with a grabber hand, and when you release the mouse, the image keeps moving in order to review...
SCANNERS AT A GLANCE

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<td>200, 300, 200, 300</td>
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<td>12-600/1</td>
<td>30-900/3</td>
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<td>2, 256</td>
<td>2, 256</td>
<td>2, 16</td>
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<tr>
<td>Busted software</td>
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<td>PLE</td>
<td>MCV</td>
<td>AP</td>
<td>SD</td>
<td>PP</td>
<td>DD/PS</td>
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<td>Scanning modules</td>
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<tr>
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<td>Maximum image size (in inches)</td>
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<td>8.3 x 12.7</td>
<td>8.5 x 14</td>
<td>8.5 x 11</td>
<td>8.5 x 11</td>
<td>8.5 x 14</td>
</tr>
</tbody>
</table>

- = yes; 0 = no. * The Scan 300/5 model, for $1195, comes with 16 gray levels. ** Optional Picture Pac holder for books and magazines. $525. *** Noise when using DA. 1 Not with ImageCopy DA. 2 User-installed. 3 With Photoshop. 4 With ImageStudio and Abaton Scan DA. 5 Resolution option up to 1600 dpi, but only at smaller scaling percentages. 6 Limited by zoom level and image size. An area of any previous scan serves as grey preview. "With MacImage. ** With ImageCopy DA. 8 Can increase to 64 with ThunderWorks software ($149).

** 2 and 256 only with Photoshop plug-in. ** AP = AppleScan, APC = Abaton Printer Calibration, AS = Abaton Scan DA, DD = Digital Darkroom, DS = DeskScan DA.

a large image in a small window—every program should have it.

ThunderWorks uses multiple passes to capture 64 levels of gray, but this process takes more than twice as long as the next slowest scanner does, and the results aren't much to crow about. For $1799, forget the Apple Scanner.

Dest PC Scan 3000
The Dest PC Scan 3000 came out near the bottom in the shadow-sensitivity and noise tests. It's surprising that the noise test came out even that well because the scanner displays obvious streaking (see "Shadow Detail").

The PC Scan 3000's Publish Pac scanning software is adequate, though you need to go through three dialog boxes to set up scanning parameters. There are five zoom levels once you've captured the scan (convenient for checking details), and a decent help system.

But the previewing feature is abysmal. As soon as you drag a scanning selection over the small black-and-white preview, everything outside the selection disappears. When you zoom in on the preview, the PC Scan 3000 just magnifies the already jaggy image into an unrecognizable mass. Publish Pac has automatic contrast and brightness adjustments, but these don't work well either. This scanner is nothing short of terrible, and neither is the $2040 price.

AVR 3000/GS Plus
The AVR 3000/GS Plus registered average results in all tests, and its software has fewer features than any of the other scanners. This unit offers control over mode (256 gray-scale, halftone, or line art), contrast, brightness, and resolution. That's it. There's a black-and-white preview, and a pointer tool to select the scanning area. (A quirk in the pointer reveals the scanner's non-Macintosh origins—it points the wrong way—up and to the right.) At $1990, pass on this one.

Canon IX-30F
The Canon IX-30F is about as middle-of-the-road as you can get—in all our tests, in price ($1545), and in software quality. This machine lacks controls for brightness in gray-scale and halftone modes and has no contrast control—period—much less gamma. The IX-30F offers a basic set of paint tools (pencil, eraser, marquee, gray palette, and convenient seven-level zooming) for cleaning up scans, and a decent-size scan preview (though it's black and white). We found nothing terribly wrong with this scanner, but nothing to recommend it either.

Truvel TZ-3
The Truvel TZ-3 is the only overhead scanner in this roundup. Its lens, mounted on a moving arm, passes above a flat bed. Place a special target sheet on the scanner bed, then turn the aperture, focusing, and zooming rings on the lens until the image is set up right. This can be tricky and time-consuming, and you have to go through it just about every time you change the size of the scanning area. And the size of the scanning area is limited by memory—a terrible flaw in a scanner capable of 900dpi, 256-gray-level scanning. (Figure 6MB per square inch at those settings.) All this trouble results in slow, clean scans, with little noise, that unfortunately don't pick up shadow detail terribly well—hardly a ringing endorsement for a $7690 machine.

The TZ-3 stands out, however, in capturing line art at high resolution. In our tests, scanning at 841 dpi, the TZ-3 scored far and away better than any other scanner. If you can't live without top-quality line-art scanning, buy this machine. If your needs are any more general, forget about it.
The Agfa Focus II offers several attractive qualities. Its McView software features reasonably impressive gamma control and includes options for adjusting the lightness of highlights and shadows, an automatic density control option, a user-definable correction curve, and a set of canned corrections such as Dark Original and Brighten Highlights. The as-you-scan sharpening also works well, though not as well as Photoshop's filters. (All of the Agfa Focus II's controls would be much more useful if the manual's explanation went beyond a few terse, uninformative sentences.)

Other features include a de-screening option for removing the dots from previously halftoned material (basically a blurring filter; Photoshop's works better), and a feature that corrects for out-of-alignment line-art scans. You draw a line parallel to a horizontal line in the scan, and McView rotates, in 1-degree increments, the whole picture to align with the horizontal. It's a good idea, but many jobs require movements finer than 1 degree.

McView also provides vectorization—conversion of bitmaps to objects that you can save in various popular formats. It also allows calibration for fine-tuning output; adjustments of halftone screen frequency (the number of lines per inch) and angle for proof prints and EPS saves; a densitometer for checking gray values in scans; and basic paint tools for cleaning them up.

The Focus II was one of the top choices last year, based on excellent shadow sensitivity, but its shadow results this year disappointed us. It placed fourth in noise, and its line-art output was average. This scanner still shows promise as a production workhorse, but at $1195, smart shoppers will steer clear.

Umax UG80 Grayscale Scanner
One of last year's newcomers, the $1495 Umax UG80, fared well in our shadow-sensitivity and speed tests. And its software (plug-ins for Photoshop/Digital Darkroom and ImageStudio) has improved since last year, allowing you to change scale or resolution independently, with the software doing the arithmetic.

The documentation hasn't improved, however; there is none aside from what comes with the bundled copy of ImageStudio, and a couple of cryptic Read Me files. And the UG80 really fell down in our line-art trials, dropping it out of serious competition with the scanners that follow.

Abaton Scan 300/S
The 4-bit Abaton Scan 300/S is basically identical in software and function to its sibling, the 8-bit Scan 300/GS, which is one of our top choices in this roundup. You can't expect high-quality imagesetter halftones out of this scanner, but at $1195, the price is right (as is the software) for line-art work and if you're scanning images for position only.

Agfa Focus II GSE Scanner
The Agfa Focus II offers several attractive qualities. Its McView software features reasonably impressive gamma control and includes options for adjusting the lightness of highlights and shadows, an automatic density control option, a user-definable correction curve, and a set of canned corrections such as Dark Original and Brighten Highlights. The as-you-scan sharpening also works well, though not as well as Photoshop's filters. (All of the Agfa Focus II's controls would be much more useful if the manual's explanation went beyond a few terse, uninformative sentences.)

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The Focus II was one of the top choices last year, based on excellent shadow sensitivity, but its shadow results this year disappointed us. It placed fourth in noise, and its line-art output was average. This scanner still shows promise as a production workhorse, but at $1195, smart shoppers will steer clear.
**Scanner Tests**

<table>
<thead>
<tr>
<th>Shadow Detail</th>
<th>Line-Art Detail</th>
<th>Noise</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Longer bar is better</strong></td>
<td><strong>Longer bar is better</strong></td>
<td><strong>Shorter bar is better</strong></td>
<td><strong>Shorter bar is better</strong></td>
</tr>
<tr>
<td>Abaton Scan 300/GS</td>
<td>12</td>
<td>5.6</td>
<td>1.15</td>
</tr>
<tr>
<td>Abaton Scan 300/S</td>
<td>0</td>
<td>5.0</td>
<td>2.14</td>
</tr>
<tr>
<td>Agfa Focus II GSE</td>
<td>0</td>
<td>5.6</td>
<td>1.14</td>
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<tr>
<td>Apple Scanner</td>
<td>0</td>
<td>4.5</td>
<td>1.92</td>
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<td>Apple Scanner w/ ThunderWorks</td>
<td>1</td>
<td>2.8</td>
<td>1.47</td>
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<tr>
<td>AVR 3000/GS Plus</td>
<td>9</td>
<td>4.0</td>
<td>1.23</td>
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<tr>
<td>Canon IX-30F</td>
<td>9</td>
<td>4.5</td>
<td>1.35</td>
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<tr>
<td>Dest PC Scan 3000</td>
<td>4</td>
<td>4.0</td>
<td>1.64</td>
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<tr>
<td>La Cie Silverscanner</td>
<td>12</td>
<td>4.0</td>
<td>4.29</td>
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<tr>
<td>Pentax IQ Scan</td>
<td>5</td>
<td>4.0</td>
<td>4.98</td>
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<tr>
<td>Prime Option Phovos 600GS</td>
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<td>5.6</td>
<td>1.91</td>
</tr>
<tr>
<td>HP ScanJet Plus</td>
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<td>0.91</td>
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<td>Travel TZ-3</td>
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<td>Umax UG60 Grayscale</td>
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<tr>
<td>Xerox GS plus</td>
<td>13</td>
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<td>1.52</td>
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**Shadow Detail** Distinguishing between subtle gray differences in dark areas is a gray-scale scanner's most difficult task. We measured the values that each scanner captured when scanning a calibrated 32-gray-level test strip; the differences in the darkest 5 to 8 bars on the strip are so subtle that they're hard to detect with the naked eye. The graphs you see above are simple counts of how many subtle differences among the darkest 16 bars could be distinguished by each scanner. The higher the score, the better the scanner differentiates between gray values in dark areas. To determine these numbers, we calculated the mean gray value of all the pixels that each scanner captured for each gray bar. The pixels in a medium-gray bar might have an average value of 113 (an ideal black would be 256), for instance; a light bar might have an average value of 29. Then we looked at the difference in average value between adjacent bars on each scan to determine that scanner's ability to distinguish those two gray levels.

**Line-Art Detail** To find out how well these scanners capture line art— the tiny details, such as the patterns in an old-fashioned etching—we scanned a series of progressively more tightly stacked lines from a test sheet. If we could count how many lines there were in the scan, the scanner did its job. The value you see here is the maximum number of lines per millimeter that each scanner could recognize when scanning at its highest resolution.

**Noise** Electronic noise generated by a scanner affects consistency. Every pixel should be identical in a given gray bar; to evaluate the scanners' consistency we measured the standard deviation, or spread, of values within each of 37 different gray bars as scanned by each scanner. The results shown are the averages of those values for each scanner.

**Speed** We timed two 8-by-11-inch scans—one at 300 dpi in line-art mode, the other at 200 dpi in gray-scale mode (at 256 gray-levels, except as noted). The numbers shown here represent averages of the gray-scale and line-art results, in seconds. If a scanner could be driven by more than one program, we measured the times in each program (they varied widely) and averaged the results.

*Scanned at 16 gray levels. **Scanned at 64 gray levels.

really faltered, though, in the amount of noise it generated—producing obviously stippled images at lower resolutions.

The Phovos 600GS comes with a Photoshop plug-in and an rder—a Chooser item—to select the scanner in the Chooser. This can be exasperating; you have to go to the Chooser to switch between scanning and printing. Even worse, the flatbed's cover will not stay up by itself. Other nits to pick: the Phovos 600GS cannot scale while scanning and offers only a small, black-and-white preview. Several ostensibly sophisticated options, such as MTF Correction, and Bold Lining, are not explained in the paltry documentation.

**Hewlett-Packard ScanJet Plus**
A few years ago Hewlett-Packard brought reality to gray-scale scanner prices with the ScanJet Plus, priced at a then-incredible $2090. That price just dropped a whole lot more—to $1590—again undercutting just about every other comparable scanner.

For that money you get a scanner that scored near the top in noise and average in line-art trials, but that fared poorly in shadow sensitivity, making its excellent noise control nearly irrelevant. And there are no gamma controls to help you clarify details. The ScanJet Plus is just average in its scanning speed.

The ScanJet Plus's easy-to-use DeskScan software partially compensates for these failings. DeskScan's unique gray-scale Live Preview updates the preview image every time you change a setting. Though it's a small preview, you can zoom in on a selection, and DeskScan rescans that area so you can examine it in detail. The option for automatic contrast and brightness adjustment is convenient, though you still have to fine-tune those settings manually.

Another winning feature is the ability to scan directly to the printer (for trying scans out quickly or using the ScanJet and your printer as a slow copying machine).

Even with these assets, there is only one compelling reason to buy the ScanJet Plus: some programs,
such as Microsoft Word, require scans to be pasted in from the Clipboard. The ScanJet Plus can scan directly to the Clipboard, accommodating this idiosyncrasy for about $400 less than the similar (though higher-quality) Xerox GS plus.

**Abaton Scan 300/GS**

The Abaton Scan 300/GS was the surprise of this roundup. It was second only to the Xerox GS plus in detecting shadow details and came in a respectable fifth in our noise tests. The three gamma settings further improve that gray response. Line-art results were average.

The Scan 300/GS’s software includes either ImageStudio or Digital Darkroom (your choice), a scanning DA, and plug-ins for Photoshop/Digital Darkroom and ImageStudio. (Among these software choices, avoid the Photoshop plug-in, which has disappointing resolution choices and cannot scale an image while scanning.) There’s a stand-alone calibration program that lets you modify scans so they print looking more like what you see on screen, and an informative how-to HyperCard stack (though it explains more about the scanner than about the Mac software).

The Abaton Scan DA suffers from a major bug—it treats line-art scans like gray scale for the sake of required memory, meaning you need eight times as much memory as is really required for line art. The only other disappointments in this $1595 scanner are the speed (it’s more than 45 percent slower than the Xerox GS plus for gray-scale scans) and the lack of a diffusion dither.

**Xerox Imaging Systems GS plus**

When Xerox bought Datacopy a couple of years ago and the old hands from Datacopy left, bets were that the great scanners and software that Datacopy produced would dry up in a couple of years. But the GS plus hangs on as my favorite gray-scale scanner.

The GS plus led the pack in shadow sensitivity, and although it placed low in the noise test, it wasn’t noisy enough to interfere much with image quality. It was medium-slow on the speed tests and it was right in the thick of the pack on the line-art test.

What makes the GS plus so attractive, aside from excellent gray response, is its MacImage software—the best scanning application available—and ImageCopy DA, a quick-and-easy scanning program.

MacImage includes superior gamma correction (including a spate of preset curves and the ability to customize curves), amazing halftoning control, some special gray-scale effects, and 11 zoom levels. The GS plus bundles a calibration program that creates a gamma curve that can then be used in MacImage. MacImage provides the best and easiest way to get good scans, but only after you experiment some and closely study the manuals (Xerox should print new manuals for this version, 2.3, of MacImage, rather than rely on a skimp addendum).

MacImage doesn’t have a preview per se, but you can select an area of any previous scan for your next scan.

While MacImage can be daunting for a first-time user, the ImageCopy DA is a breeze (it even allows the GS plus to scan to the Clipboard). ImageCopy’s preview, though black and white, is dithered for clarity.

About all I’d add to this $1995 scanner are a good diffusion dither and some image-modification software, preferably Photoshop. The GS Plus is well worth $400 (plus the price of Photoshop) more than the Abaton or HP offerings. If you can afford it, this is the scanner to buy.

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**THE SILVERSCANNER COLOR OPTION**

Can an inexpensive color scanner beat the gray-scale crowd on their own turf? To check it out, we ran the $1999 Le Cie Silverscanner, the favorite inexpensive scanner in our color flatbed scanner roundup (see “Affordable Color Scanning,” *Macworld*, June 1991), through our battery of gray-scale tests.

While the Silverscanner picks up shadow details with the best of the lot, the trade-off is noise far worse than that of any scanner in the gray-scale roundup except the Pentax IQ Scan. So if you’re scanning at lower resolutions and using sharpening filters, be prepared for some noticeable speckling and splotchiness. The Silverscanner didn’t fare terribly well in the line-art test, and it was average on speed.

If you don’t require the very best in gray-scale scanning, however, and feel you might need color scans now or in the future, choose the Silverscanner.

Along these lines, a new 600-dpi color scanner from a longtime leader in the scanner arena merits a close look. Microtek’s $2195 ScanMaker 600ZS, based on the popular but recently discontinued 300ZS model, began shipping at press time. Microtek is also shipping the $1695 ScanMaker 600GS gray-scale unit based on the old 300GS model. And at press time Hewlett-Packard indicated that it expects to ship a new product, the ScanJet IIC, shortly after this article appears. The $1995 scanner will feature 24-bit, single-pass color scanning; and 8-bit gray-scale scanning at 400 dpi.

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**Looking Sharp** Nothing does more to improve the look of scanned images than sharpening. The image on the left was printed as scanned. The image on the right was sharpened with Photoshop 2.0’s Unsharp Masking filter.
REVIEWS

Computer-Controlled Stereo VCR

PC-VCR

Pros: Accurate to within one frame; feature-packed; excellent VHS, S-VHS, stereo hi-fi VCR in its own right; titling feature; staggering unrealized potential. Cons: Inscrutable manual; programming required to permit Mac control; insufficient, poorly documented software. Company: NEC Technologies. Requires: Mac Plus. List price: $2100.

"If you build it, they will come." That line from Field of Dreams might just as well have been uttered by NEC hardware engineers talking about programmers. Let's build the world's most intelligent VCR, they said. We'll give it the brains of a Mac Plus, state-of-the-art video features, and a frame-accurate search capability. Let's give it a serial port, so that any personal computer can give it instructions. And let's hope somebody writes the software that will unleash all this power.

Thus the PC-VCR was born: a magnificent machine, a superlative VCR, designed and executed with great imagination, but shipped with almost no useful software.

It's a VCR

The PC-VCR hardware is slim and attractive. Its color matches the Macintosh, and its tape door and control panel are neatly hidden by a flip-open front panel, as is common in recent high-end VCRs. As a VCR, the unit's features include automatic tracking, S-VHS recording and playback, an eight-event programmable timer, a remote control with an on-screen menu system (which is exactly as hard to understand as on other VCRs), indexing to quickly locate newly recorded programs.

The cleverest innovation is the unit's time-code stripping scheme. Before you can access any of the PC-VCR's great features, you have to play a cassette from beginning to end, so that the PC-VCR can record frame-counting signals onto an unused part of the tape's control track. Incredibly, and unlike SMPTE or other common time-code schemes, the PC-VCR's time-code stripping doesn't touch the existing audio or video bands. In other words, you can time-stripe your most valuable tapes, and nobody but the PC-VCR will ever know that it has been modified. (Note to video editors: When you're getting ready preparing to edit footage, this nondestructive time code saves you one generation of tape copying, since you don't have to duplicate the original just to add SMPTE code to the audio track.)

Once you've striped the tape, the VCR can fast-forward or rewind to a specific frame automatically. Actually, that's not quite true—one of the few drawbacks to the system is that the VCR doesn't actually read the time code when rewinding or fast-forwarding. When it's hunting for a particular time-code address, it zips to a point just before the spot you've specified, slips into play mode for a moment to get its bearings (by reading the time code), then zips some more, and so on. In other words, it finds a spot by using the same trial-and-error method you use on a VCR—except that the PC-VCR does it with mathematical (albeit sometimes still poky) efficiency.

It's a Computer Peripheral

Once you've connected the PC-VCR to the Mac's modem port, the PC-VCR offers much, much more. Seated at the computer, you can control all transport functions (rewind, play, record, stop, pause, and so on); mute the audio; change the record speed; turn the thing on or off; eject the tape; use the character generator to super-
impose titles on something you're recording; and so on. (The character generator is fabulously useful, except that only three sizes of type are offered, in one style [all capitals and no apostrophe], and the larger two sizes look jagged.) In fact, computer control of the VCR permits access to hundreds more possibilities than either the remote control or the front panel offers.

Unfortunately, you have to issue all these commands by programming them. The PC-VCR's own language isn't nearly as difficult to learn as, say, Pascal; everything is a coded two-letter command followed by a number. To change to channel 5, you type in CN5. All of this is documented in the manual, but it's by no means for the layperson; the writing is technical, few examples are provided, and you're never told what you'd use each command for.

Worse, to issue these commands, you have to use a telecommunications program like MicroPhone. Typing text codes is about as unfriendly an interface as there is.

The HyperTalk Connection

Fortunately, there's the promise of a better way: HyperTalk. If you're adept at programming in HyperCard, you can use XCMDs to control the VCR too, making it possible to build your own software. (The unit does come with a sample HyperCard application, but it's feature-poor and not frame-accurate.) Alas, these XCMDs aren't documented anywhere; when asked how to learn to use them, NEC spokespeople suggest opening the provided sample stack and "studying" them. (That is, that's what NEC says if you're lucky enough to find somebody in that vast corporation who's ever heard of this product.) After dropping two grand on a piece of equipment, you'd think you'd get a little more help than that.

At the moment, then, the truly incredible powers of the PC-VCR rest in the hands of programmers. But the situation is about to change dramatically. NEC reports that at least 30 companies are developing software for the PC-VCR. Furthermore, NEC plans to replace the currently included software with something much more powerful. If you want to find out what's available—and whether or not the shipping software has been improved by now—call 800/562-5200; at the prompt, press 632.

When all this software development comes to fruition, it's going to be an amazing time for both home and semipro video jocks. Just thinking about the programs on the way can increase your heart rate. Imagine, a video database: type a keyword, watch the clip play on your screen. Or how about editing software that permits you to hook up two PC-VCRs to edit and dub quickly and easily, with single-frame accuracy.

Developers are also working on a quick, simple way to set the VCR for recording programs: click on the icon representing a television show, and drag it onto the appropriate square of an on-screen calendar. A quick program will let you download broadcast-TV listings from CompuServe and transmit them to the PC-VCR's internal buffer; now the machine knows what shows will be on when. And finally, imagine presentation software that lets you show clips instead of slides. (A somewhat buggy plug-in already is included with the unit for use with Aldus Persuasion.)

Ahead of Its Time

Technologically speaking, the PC-VCR is about as well done as such a device could be. It doesn't feel like a VCR with something grafted onto it; instead, it feels as though it was designed from the ground up with flexibility and creativity in mind. Of course, having a VCR that can jump to a precise frame of videotape doesn't have as many repercussions in the multimedia world as you might think. For example, you can click on a HyperCard button that says Go to Closing Credits and immediately watch the gaffers' names scroll by; the PC-VCR is still a VCR, and it still takes time to fast-forward the tape. That's why videotapes—which provide instant random access—won't become obsolete just yet.

But presenters can minimize tape transport delays by arranging their video "slides" in the correct order on the tape to begin with. Video editors won't find instant access critical. And high-end video nuts everywhere will welcome the machine's programmable smarts. At the moment, the PC-VCR is a highly communicative machine with nobody to talk to. But when software appears that takes advantage of its flexibility, it will play an interfaced field of dreams.

—David Pogue

See Where to Buy for contact information.

PASSPROOF

Pros: Simple, elegant, nonintrusive; reasonably effective. Cons: Works only on SE or Mac II series; can't protect external floppy drive; port covers can be removed with scissors.

Company: Kensington Microware.

Requirements: Mac SE or II series; hard drive; System 8.0. List price: $99.95.

A good security product has to strike a delicate balance: it must protect the computer without making access a hassle for legitimate users. After all, if you seal your Mac in a block of cement, your security problems are over.

Kensington's PassProof is a remarkably elegant combination of hardware and software for securing every route of access to the Mac. It won't stop a truly determined thief, but neither does it get in the way of everyday use.

Lock It Up

The best component of the PassProof kit is a well-engineered, Macintosh-color key lock for the main floppy drive. Not only does the lock slip in quick as a wink, but the thing simply will not come out without the unique cylinder key. Bobby pins, paper clips, and prying utensils all fail to dislodge it without destroying the Mac's case. The lock has a satisfying, solid feel when you turn the key. The downside is this: you have to buy two PassProof kits if you have two internal floppy drives. And there's no PassProof component for an external floppy drive; if you own one, you'll have to disconnect it, or you'll defeat the whole point of using PassProof.

(continues)
The kit also includes flat steel plates that cover the floppy port and the SCSI port in the back of the Mac. Each is secured by a pair of screws that have abnormal heads, for which a special screwdriver (more like a deformed allen wrench) is included. These plates prevent people from getting bright ideas about attaching an external drive, thereby circumventing PassProof’s other elements. There’s an additional special screw for the Mac II cover, to prevent people from making off with your prized NuBus boards.

Software Padlock

PassProof’s software is more complicated, but only slightly so. Once you’ve installed the Control Panel device in the System Folder, you enter a master password; you are now the Master User, with exclusive rights to change the program’s options. Up to 255 other users can have access to the Mac itself, however, once you’ve given each a user name and a password. From now on, the software will demand a valid user name and password every time the Mac is turned on; both successful and unsuccessful attempts to sign in are neatly recorded in a log file.

The password policy is pretty strict: Uppercase and lowercase characters count; as you enter the password, you don’t even see corresponding asterisks (because that would give away how long the password is); and you can require a series of sequential passwords, which must be entered in the correct sequence—and PassProof counteractes no mistakes. The nice thing is that you, the Master User, never have to lie awake at night worrying what you’ll do if you forget your password—because you hold the physical key to the floppy drive as well. If you forget your password, just start the Mac from an unprotected floppy and reinstall PassProof.

The PassProof software includes a tight, nicely done screen dimmer. If the Mac sits idle for x minutes (you decide), the screen goes dark, a moving icon bounces around the screen, and you must reenter your password to regain access. All this is optional; you can still choose between the security of the screen dimmer and the lush absurdity of After Dark’s Flying Toasters.

Incidentally, it’s not PassProof. It’s PassProof™. Kensington puts that trademark on all four of the files PassProof puts in the System Folder—and the software won’t even run if you take™ off an icon name. PassProof is not System 7-compatible (according to the company, by the time you read this, it will have a new version that will be compatible).

Leaving the Back Door Open

Alas, a complete security system is only as strong as its weakest link, and PassProof has one. It’s those special screws for the SCSI and floppy ports. You can’t turn them with a Phillips or normal screwdriver. You can, however, turn them with the blade of a pair of scissors. If somebody is really bound and determined to get into your Mac, and is armed with an external drive, PassProof isn’t going to represent more than a ten-minute delay. But if you are concerned, Kensington will send you a set of redesigned screws that solve the problem, at no charge.

In the meantime PassProof’s real value is the psychological hurdle it presents. Any casual or nonbloodthirsty thief is likely to be deterred just by glancing at the solid-looking floppy-drive lock. PassProof won’t transform your Macintosh into a fortress—but it does create a sturdy checkpoint at the drawbridge.

—David Pogue

See Where to Buy for contact information.

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**THE AMERICAN HERITAGE ELECTRONIC DICTIONARY 1.0**

**Pros:** Complete word definitions; excellent dictionary search capabilities; recognizes misspelled words as well as any spelling checker does; clear, concise manual. **Cons:** No keyboard shortcuts; poor online help; weak thesaurus; numerous inconveniences and small design flaws. **Company:** The Writing Tool Group, a subsidiary of WordStar International. **Requires:** Mac Plus; System 6.0.2; hard drive with 3MB of free space. **List price:** $99.

---

**Online Dictionary and Thesaurus**

There are few writer’s tools as important as a dictionary and a thesaurus. For writers who use the Macintosh, on-line dictionaries, such as Spelling Coach Professional (Deneba) and Webster’s Ninth New Collegiate Dictionary (Highlighted Data) on CD ROM, have been around for a while now, but sadly, all fall well short of the ideal. Electronic thesauruses, such as WordFinder (Microlytics), Thunder 7 (Baseline Publishing), and Coach Professional, have also been available for some time, but they too fail to match the best printed thesauruses. I was thus cautiously hopeful when I received for review a new online dictionary and thesaurus, the American Heritage Electronic Dictionary, originally from Houghton Mifflin Software.

According to The Writing Tool Group, the dictionary portion of the American Heritage Electronic Dictionary contains the more than 116,000 definitions and 28,000 main entries of the American Heritage Dictionary, Office Edition; the thesaurus portion, Roget’s II, contains synonyms for over 42,000 words. The entire program comprises a desk accessory (DA) and nine data files that occupy a hefty 3.1MB of disk space. Unfortunately, all nine files must be stored in the System Folder; you cannot place them in a folder of their own, either within the System Folder or anywhere else.

(continues)
We design quality into each of our products and services. Then we set the Street Price so you get the best deal. And since our price always includes support services and an extended warranty, you not only get the best price, you get the best value.

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Our MacAvenue line of hard drives, monochrome and color displays and modems gives you a value-priced alternative for Mac peripherals. Our hard drive is more than just another pretty case. Its metal interior and plastic exterior—designed like the Mac's—control airflow and buffer the drive noise. But don't take our word for it. Ask Robert Wiggins, MacUser's longtime business columnist, who gives the MacAvenue drive his "highest recommendation." On top of that, MacUser magazine awarded our 40MB Quantum drive 4.5 mice. And to make your MacAvenue drive an even better value, we give you Now Utilities, a useful collection of a dozen productivity-enhancing programs, FREE!

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Protege Displays

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<td>Protege Full-page Display With Video Card</td>
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<td>Protege Dual-page Display With Video Card</td>
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<td>Includes cards for Macintosh SE, SE/30, Mac II, Classic, LC, or IIGS</td>
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<td>Applied Engineering High-Density 3.5&quot; 1.44K Floppy Drive</td>
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PRINTERS, SCANNERS AND FAXES

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DoveFax $297

COMMUNICATIONS

<table>
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<td>Farallon Computing PhoneNET Connector Din-8</td>
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Enforced microLaser

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Umax Umax Color Scanner $2276 $1389

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MicroTek IMS 300Z Color Scanner $2275 $1929
Orchid OrchidFAX Modem $2270 $485
Refax Telax R421010 $2270 $895
Selko Label Printer $2285 $189
Texas Instruments microLaser Toner Cartridge $3831 $46
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Epson MicroLaser XL
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Ideally, the American Heritage Electronic Dictionary would open automatically, the way Thunder 7 does, in selected applications (such as your word processor)—but it doesn't. Instead, you must manually select the DA each time you want to launch the program. Ideally, the DA would add its menu (entitled AHED) to the currently active application the way Coach Professional does, but this occurs only if the Finder is turned on. If MultiFinder is turned on, the AHED menu is added to the separate, and much less convenient, DA layer. (If you use a trick not mentioned in the manual—pressing the option key while selecting the DA—the AHED menu will be added to the current application's menu bar.) Even less conveniently, the application whose menu bar contains the AHED menu must be stored on the start-up volume; if it's stored anywhere else (in a different hard drive partition, for example, or on another drive), the dictionary refuses to run.

Another disadvantage is that it cannot, at the press of a key, search for a word you've selected in a document the way Coach Professional does. To look up a word or search for a synonym, you must open the appropriate window with a command from the AHED menu and either type in the word manually or paste it in from the document. No keyboard shortcuts are provided, and there's no way to add them.

In most instances, the dictionary locates and displays one or more definitions in the dictionary window's scroll box after a short pause. (When I tested this software, the entire program slowed to a crawl on rare occasions; quitting and relaunching always solved the problem, however.) The lookup function has no trouble recognizing plural nouns and verb forms other than the infinitive, and if you misspell the word you're looking for, it displays a list of properly spelled alternatives. Unlike Webster's Ninth New Collegiate Dictionary, American Heritage is as intelligent as the best spelling checkers when faced with such mistakes as missing first letters (such as **conne**ction instead of *connection*), phonetic substitutions (*plegmatic* instead of *phlegmatic*), and reversed letters (*aptriotic* instead of *patriotic*).

By and large, the definitions are more complete than those in Coach Professional, and they include pronunciation, hyphenation, parts of speech, inflections (different forms for number, tense, and so on), etymology, and occasional usage notes. Unlike Webster's Ninth New Collegiate Dictionary on CD ROM, the American Heritage Electronic Dictionary has no illustrations or spoken pronunciations. Conveniently, you can look up the definition of any word within a definition simply by double-clicking on it. Not so conveniently, you can copy only one word at a time from a definition to a document. (In Coach Professional, you can copy any part of a definition. In Webster's Ninth New Collegiate Dictionary, you must copy the entire definition: a copyright notice is added automatically.)

When it looks up a word, the dictionary searches only the head words, those found at the start of each main entry. A special SearchText command unique to this program, however, searches the entire dictionary to locate entries containing a specified word or, using the command's Boolean functions, combination of words. For example, SearchText can find all words based on a specific Latin root. And it can generate a list of Greek gods (plus a few other stray words) by searching for **Greek** and **god**. SearchText also works well as a kind of reverse dictionary; if you can't remember the word for the study of insects, for example, SearchText can ferret out entries containing both *study* and *insects*, and thus find **entomology**. A variety of special search symbols enable you to narrow a search to a certain part of speech, a geographic region, a type of usage (such as slang or archaic forms), and so on.

The thesaurus window—reached by means of a menu command or a button in the dictionary window—is almost identical to and just as cluttered as the dictionary window (see "Too Many Menus"). Thesaurus entries are sorted by meaning and, unlike those in Coach Professional, always display the appropriately inflected forms (if the noun you enter is plural, for example, all the synonyms are plural). The thesaurus does not recognize misspelled words (you'll need to switch to the dictionary for that) and, as with the print edition of *Roger's II*, it lists only close synonyms (no distant synonyms, related words, or antonyms). Also in contrast to the more comprehensive *Roger's International Thesaurus* (my favorite thesaurus, currently available only in book form) and Coach Professional, the electronic *Roger's II* has a rather restricted word list, and it lacks synonyms for such commonplace words as *theater* and *patriot*, for example.

The American Heritage Electronic Dictionary contains several unusual features in addition to the dictionary and thesaurus. Its Wildcard command locates all words that contain a specified string of known letters and either a fixed or indeterminate number of unknown letters. For example, cross-word-puzzle players can find a five-letter word that begins with *b* and ends with *z*, and songwriters can find words of any length that rhyme with *happily*. The Anagram command generates a list of words that contain the same letters as the word you specify; if you enter *sport*, for example, Anagram returns with *ports* and *stroop*. If the Wildcard or Anagram window lists a word you don't know, a double-click will reveal its definition.

Clearly, the American Heritage Electronic Dictionary has many minor irritants and small flaws and the thesaurus and online help are also of (continues)
problems with TrueType technology itself, while the latter is a function of the way certain applications use font ID numbers rather than names. (At press time, Ares Software was beta-testing a new version of FontMonger that the company claims will actively and accurately address these problems of incompatibility.)

Despite these problems, FontMonger would be a bargain at twice the price. Its extensive font-customization tools, combined with an elegant and easy-to-learn interface, bring powerful typographer’s tools to the desktop.

FontMonger’s Alterations menu offers built-in changes, such as Small Caps, Slant, Superior, and Inferior. With these you can easily choose all or a range of characters within a font to create a small-caps typeface, an italic typeface for a font that does not have one, or subscript and superscript numbers. These alterations can also be combined to create new typefaces, such as a Slanted (or italicized) Small Caps typeface.

I’ve Grown Customized to Your Typeface

Double-clicking on any character in FontMonger’s Key Caps-like display brings up a FontMonger character dialog box, which includes a Composite panel designed to help you automatically create composite characters such as horizontal and vertical fractions (that is, \( \frac{1}{2} \) and \( \frac{1}{100} \)).

The Composite button to the left of the fraction buttons allows optimum customization; you can create a composite of any number of characters, in any number of fonts, and with any number of symbols, limited only by what you consider good taste. Characters or composites of characters can also be mapped to custom key combinations.

The Readouts panel provides control of width and height (what percent the character is scaled from its original size), horizontal and vertical distances (how far a character is moved up or down by \( \frac{1}{1000} \) point), slant (the number of degrees a character is obliqued, or italicized), and letterspacing.

The last box on the Readouts panel is even more helpful: the Context box allows you to type in letters that are placed before and after the character you select, so you can evaluate how you’ve changed or created a character in relationship to adjacent characters.

FontMonger does not limit you to characters within a single typeface or even to typefaces themselves. Open up any number of fonts and cut and paste characters between the keyboards—kind of like cross-font pollination.

You can also create your own symbols and save them as EPS or PICT files and import them into your commonly used font. It was easy and straightforward to incorporate some common Macworld symbols, like the end box (\( \square \)), directly into the font used for Macworld’s body text.

It’s the Little Things that Count

Little touches make FontMonger’s interface impressive. If a font is installed or in use, FontMonger makes a copy of the font you need to work on. And the System 6.0.X context-sensitive help messages rival or surpass System 7’s balloon help.

It will be some time before users can extensively test and retest format conversion using the numerous configurations and seemingly limitless number of fonts in the Mac world—as I noted, a number of problems have resulted from the immaturity of TrueType technology. But FontMonger is much more than a conversion utility. Its font-manipulation capabilities and easy-to-use interface make its $99.95 price a real steal for desktop publishers at every level.

—Luis Camus

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COLORSNAP 32+

Pro's: Quick to digitize; feature-packed software; high-quality images.
Cons: Abysmal manual; poorly designed interface; displays only one image at a time. Company: Computer Friends.
Requires: Mac II; 4MB of RAM; hard drive; B- or 24-bit color video board, external video device. Recommended: 8MB of RAM. List price: $995.

QUICKIMAGE 24

Pro's: Easy to use; high-quality images; excellent manual; low price.
Cons: Strange, nonstandard interface; no color-correction features; slow to digitize. Company: Mass Microsystems.
Requires: Mac II; 4MB of RAM; hard drive; System 6.0.5; external video input device; cables. Recommended: 8MB of RAM. List price: $695.

Wow, is desktop video taking its sweet time to arrive. Even a task as simple as capturing a single frame of moving video onto your screen requires a NuBus board costing nearly $1000. The shortcomings of recent entries, the ColorSnap 32+ and the QuickImage 24, illustrate how difficult creating such a product must be.

Hooking Up

The first thing you do is slip one of these NuBus boards into the Mac. With its two large, sandwiched circuit boards, the ColorSnap can be a tight squeeze; you may have to make sure it's positioned at the end of your row of NuBus slots.

Next you plug a videocassette recorder, camcorder, or still-video camera (like the Canon XapShot) into the jacks on the exposed end of the board. You can hook up regular TV signals (NTSC composite) or S-VHS signals to either board; the ColorSnap also has a jack for RGB (computer monitor) signals, and comes with cables. You have to provide your own cables in order to use the QuickImage, but you can connect two devices at once and switch between the input signals from within the QuickImage program.

Now you copy the controller program to the hard drive (the QuickImage also requires an INIT), run it, and turn on the VCR or camera. You see the incoming video picture, in gray or color, in a 2-inch-square preview window. The ColorSnap updates this display slowly—perhaps twice per second; the QuickImage, on the other hand, shows the video in full real-time motion, so it's much easier to choose your moment of capture.

At the instant you see the frame you want to capture, you click on the Capture button. You lose control of the Mac for about three seconds (ColorSnap) or ten seconds (QuickImage) while the computer processes that fraction-of-a-second image. Then, suddenly, a gloriously clear window appears, containing an impressive full-color digitization of the video frame you wanted, filling the screen of the Apple 13-inch color monitor. You can save the image in a PICT or TIFF file of any color depth (ranging from black and white to 16 million colors). The QuickImage also has some special-effects filters, but they generally succeed only in mucking up the image.

Both packages, incidentally, come with a plug-in module so that you can capture video directly into Adobe Photoshop. The ColorSnap includes similar modules for QuarkXPress and ColorStudio.

Interface in Your Face

Beyond this basic similarity in function, the experience of using these two packages is utterly different. For some reason, both manufacturers decided to jettison the standard Macintosh interface. The QuickImage interface has some weird. Next-like square buttons that don't convey nearly as much information as Mac buttons. For instance, because they are identical rectangles, there's no default (highlighted) button. And because of their color scheme, these mutant buttons are never dimmed. You sometimes wind up repeatedly clicking on something that's actually disabled (since you have no visual clue). There are other oddities in the QuickImage software, too; toggle switches—controls where you're asked to choose one of two options—are handled inconsistently within the program.

But count your blessings: at least the software is structured simply and intuitively; at least you always know where you're going and what's happening. And the manual is terrific.

The ColorSnap software, on the other hand, is a sprawling landscape of oddly implemented features. Its Gallery feature in particular—a potentially useful keyword-searchable image database—is filled with software design errors. Choose a menu item, and nothing happens. Two consecutive menu commands bring up the exact same dialog box. And there's no Window menu, so it's entirely possible for a small window (such as the Gallery) to get permanently lost behind a larger one, making you save and close (continues)
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the larger one just to view what's behind it.

No Manual Transmission
But at least somebody probably looked over the ColorSnap's software before shipping it; that's clearly not the case with its manual. The typos are one thing—that, for some unhappy reason, is par for the course in Macintosh manuals—but this manual goes far beyond. It refers to commands that don't exist. Paragraphs end mysteriously in mid-sentence. Illustrations don't match the screen. After a few pages of this, you stop trusting it—and you get angry. On a piece of public-domain software you could forgive this slapped-together effect, but not on something that set you back a thousand bucks.

There are trade-offs everywhere in the feature sets of these two packages. ColorSnap takes far less time to capture the image, but QuickImage lets you have more than one image on the screen at a time, so you can compare takes. ColorSnap has its Gallery but doesn't let you select just a portion of the image to copy or save (QuickImage offers a standard selection marquee). Both companies have one or two excellent technical-support staffs; both can sometimes be hard to reach (although Mass Micro's number is toll-free). The QuickImage has a multiple-exposures feature that snaps the shutter several times in succession (at a rate you specify), creating an image each time— theoretically, a great feature for animators. Trouble is, the QuickImage takes ten seconds to shoot a frame (even if you tell the program to take them, say, every two or five seconds)—and what's the use of snapshots taken that far apart?

On the other hand, the QuickImage lets you have multiple open windows. In other words, you have the luxury of comparing successive attempts at capturing an image, by viewing all of them on the screen at once. Or you might open several windows containing the same image—one color, one black-and-white, one dithered, and so on—as you hunt for just the right effect.

The QuickImage is clearly the well-documented, more carefully designed and reliable product; the fact that it is $300 cheaper than the ColorSnap and comes bundled with a stripped-down version of Photoshop only makes it more attractive. The ColorSnap's feature list is longer, and the actual digitizing process is much faster. But nobody should be subjected to the unpolished software and almost insultingly slapdash manual. Neither manufacturer has quite mastered the Macintosh interface, but the maker of the QuickImage has at least mastered the art of quality control.

—David Pogue

SELECTED SOFTWARE

L-VIEW MULTI-MODE

Pros: Sharp focus; six resolutions; pop-up menus; large cursor and menu fonts; hot keys; screen saver; screen capture; online help; optional OCLI antiglare screen; tilt-and-swivel stand; power indicator; controls easy to access. Cons: Inflexible configuration; no gray-scale option.

Company: Sigma Designs. Requires: Mac SE. List price: Display system $1999; with OCLI panel $2299.

QUICKVIEW Z21

Pros: Four resolutions; gray-scale option; virtual screens; pan; zoom; large menu fonts; hot keys; screen saver; online help; tilt-and-swivel stand; chemically etched antiglare screen; flexible configuration. Cons: Soft focus; no power indicator; controls hard to access. Company: E-Machines.

Requires: Mac SE. List price: Mac SE or SE/30 display system $1995; Mac II display system $2400; 1MB upgrade $425 (Mac II only).

If you are impressed by the Radius Pivot's quick-change act—from landscape to portrait orientation with a flip—wait till you set your sights on the chameleon CRTs from Sigma Designs and E-Machines. The L-View Multi-Mode and the QuickView Z21 switch resolutions at the touch of a button, displaying tiny text one second and oversize icons the next. It's like having multiple monitors in a single box.

The Sigma Designs L-View Multi-Mode is a monochrome monitor with a 19-inch-diagonal picture tube that can display 120, 92, 72, 60, 46, or 36 dots per inch. The E-Machines QuickView Z21, on the other hand, measures 21 inches diagonally with resolutions of 80, 72, 40, and 36 dpi. If you add a 1MB memory-expansion kit to its video controller, the QuickView is capable of displaying 8-bit graphics with up to 256 levels of gray.

I tested both monitors on a Mac IIci, so installation was as easy as inserting the NuBus video controller, dropping some files into the System Folder, then restarting. Initial configuration is handled via special Control Panel devices (cdevs) provided with each monitor; thereafter you can change resolutions with user-specified hot keys. The L-View Multi-Mode cdev has a Next-like interface that makes it difficult to tell which options are enabled, standard check boxes would be better. The QuickView, in comparison, has separate and clearly marked controls for adjustments, configuration, and optional utilities.

Both monitors suffer from distracting jitters and pulsing if situated within a foot of another monitor, so be sure you have enough desk space to liberally separate displays. Furthermore, the L-View Multi-Mode must be situated to the right of any other monitors to avoid problems when switching resolutions. The QuickView is more flexible; it can go on either side and doesn't need to be the start-up or main screen, as does the L-View.

Multiple Resolution
Once properly configured, both monitors work exactly as advertised, allowing you to switch resolutions on the fly. Just press the appropriate hot key, and the screen is instantaneously redrawn at the new resolution.

A monitor's resolution determines how many discrete picture elements (pixels) the monitor can display in a given area, commonly measured in dpi. If WYSIWYG displays are important to you for desktop publishing, stick to 72 dpi; otherwise, use whatever resolution is best suited to the particular task at hand. At resolutions of less than 72 dpi, images appear (continues)
When I heard “balance sheet,” I broke into a sweat. I know type, advertising, printing. Now I was forced to do our books. No choice.

We were on our third part-time bookkeeper in eleven months, and she was called away suddenly. Sound familiar?

But I’m the boss and the buck stops with me. We had bills to pay, payroll checks to write, invoices to send, truces to set aside.

And deadbeats to collect from—only I had no idea who owed us how much or for how long. Some suppliers may have even thought of us as deadbeats. I needed to know our cash flow, and get a handle on all this. But I didn’t have a lot of time.

Step one: find an accounting program that feels as familiar as our Macs, that starts out easy, but has lots of reserve firepower for later on.

I found atOnce! The manual looked orderly. I dug in...

The familiar with the unfamiliar atOnce! starts you off with a tutorial that uses HyperCard, one of my old favorites. I was at home.

The tutorial was actually fun and got me comfortable. It takes you step by step through the program, and gives you some easy-to-swallow accounting basics so you’re not reading a foreign language. There’s context-sensitive help, just in case.

And while you learn, you can start to set up your books. So it doesn’t come in a flash and you sweat a little. But you do it and you learn.

I started off light. Double-clicked on one of the default charts of accounts and my General Ledger was practically set up for me. Then entered a few client names in Accounts Receivable, to get an idea of what was coming in. Prepared six invoices—and atOnce! calculated sales tax. Nice. Printed the invoices which I redesigned in atOnce!—realigned a field here, change a font there. The usual.

Then ran a Customer Aging Report to identify the slow-payers (I had no idea such a terrific thing was even possible).

What I didn’t know was costing my company. I discovered a key client who hadn’t paid in two months. I called and collected and now he wants to know about atOnce! I wrote payroll checks for the staff, and sent our bank a balance sheet I printed out myself—no sweat.

From fear and loathing to passion. Now I even study the management reports atOnce! generates.

I’m still an art director. But atOnce! helped me become a better businessman!

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System requirements: Macintosh Plus or above with at least 1MB RAM, System 6.0.7 or above, and a 720K floppy disk drive, 512K free. Includes 1505 Pavilion Place software, Peachtree atOnce! and Peachtree SuperRail Printer. System requirements may differ. All software included with Peachtree atOnce! is a registered trademark of Peachtree Software, Inc. Macintosh Plus, Macintosh, MegaPlus, AppleShare, and AppleTalk are registered trademarks of Apple Computer, Inc. Microsoft Windows and Microsoft Excel are registered trademarks of Microsoft Corporation. Money-back guarantee is available if purchased from Peachtree Software, Inc. Reproduction or re-sale without written permission is prohibited. 90023224 Thin.
The only thing missing from our new spreadsheet is the learning curve.

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With a billion cells and 149 advanced business functions, Resolve is powerful enough to meet your spreadsheet needs now and in the future. Yet its power is readily accessible—for example, zooming, so you can choose to see the forest or the trees.

Effortless Graphs.
Making charts and graphs with new Resolve is so easy it makes your head spin. Select your data. Select one of 25 chart types and the results appear before your eyes.

The Ultimate Scripting Tools.
For power users, the Resolve scripting language provides a fully structured development environment, to create ingenious, customized applications. For new users, Resolve automatically writes a script by recording your actions. One click on the assigned button automatically triggers the script.

A Family of Applications.
New Resolve joins the Claris family of System 7 software. Software that makes you more productive, because it shares a common interface, tools and commands.
Finished in a Flash.
Create graphics and handle text with tools you're already comfortable with. Select colors from the 81-color palette. Your important presentations have never been easier to prepare.

The System 7 Spreadsheet

Introducing Claris Resolve.

A spreadsheet was never the sort of thing to inspire fantasies. But then along came the new Claris® Resolve™ spreadsheet.

For the first time, Resolve lets spreadsheet power flow to your fingertips freely and intuitively. It utilizes interfaces, tools and commands familiar to anyone who's ever used a Mac. Nothing comes between you and complete spreadsheet performance.


But lurking just beneath the surface are enough tricks to inspire any power user. 149 built-in functions to help solve any business problem. 25 kinds of charts and graphs to excite the most jaded audience. Elegant, built-in database functions so you can swiftly access your data. And advanced analytical solutions to impress the math wizards.

Here's just one example of the outstanding design of Resolve. With Resolve, you can modify graphs directly in your spreadsheet. You don't have to switch back and forth between spreadsheet and chart modes. Think of the time savings. Not to mention the ease.

Yet, perhaps the most shining quality of Resolve is how it exploits System 7's most powerful functionalities – Publish & Subscribe and Inter-Application Communication. With Resolve, you can put charts in other documents and files and link them dynamically – so when you change any information in the spreadsheet, all the linked charts change as well. What's more, you can create hybrid solutions, like creating a HyperCard® program to access a database, send data to Resolve, and create and display a chart. All automatically.

New Resolve is the latest addition to the Claris family of software for System 7 – a new generation of applications that work together more simply, more powerfully, more gracefully than any software for the Macintosh ever has before.

Special offer for owners of other spreadsheets: Get Claris Resolve for only $99. Call 1-800-544-8554, ext. 98.

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larger than normal, perfect for reducing eyestrain or giving a demo to a large group. Conversely, at higher resolutions everything is smaller, so, for example, you can cram more information on the screen in a spacious spreadsheet.

With the L-View Multi-Mode, when you switch among the six resolutions available, you also change the pixel dimensions of the monitor, from 1664 by 1200 pixels at 120 dpi, to 512 by 384 pixels at 36 dpi (the dimensions of the original 9-inch Mac screen). This is significant because applications rely on pixel dimensions to determine where to place screen elements such as dialog boxes and windows. Therefore you should launch applications only after you set the monitor to the resolution at which you intend to work; otherwise, alert boxes may appear off-screen, beyond the cursor's reach. With MultiFinder, of course, you can have a spreadsheet open at 120 dpi, then switch to HyperCard and change the resolution to 36 dpi. Just avoid switching resolutions within applications.

With the QuickView, the monitor's pixel dimensions are locked in at startup based on your choice in the Control Panel. Changing resolutions has no effect on pixel dimensions. The picture simply zooms in or out, depending on whether you switch to a lower or higher resolution, respectively. When you zoom in, only a portion of the total picture is visible. To see the rest, you pan around by simply moving the pointer to the edge of the screen, then the area just beyond the bezel slides smoothly into view.

Pan and zoom work especially well with the QuickView's unique Virtual Desktop feature, which allows you to specify pixel dimensions greater than the physical screen. Basically, memory on the controller is used to simulate a screen too large to be displayed all at once (up to 10,240 by 960 pixels with the optional memory kit). But by panning, you can view different portions of the virtual desktop. (Conceptually Virtual Desktop is similar to Berkeley Systems' Stepping Out II, a utility that creates virtual desktops on any monitor, but which is considerably slower because it's implemented in software.) So that you don't lose your bearings on really big desktops, the menu bar can be locked to the top of the screen, dialog boxes can be automatically centered in the physical screen, and the panning feature can be turned off temporarily.

The 21-inch QuickView has the ability to display a maximum of 1,228,800 pixels (1280 by 960). In its 120-dpi mode, the 19-inch L-View Multi-Mode displays over 60 percent more information—1,996,800 pixels (1664 by 1200)—enough room for almost 2000 standard-size cells in Excel, for example. Granted, the text is quite small, but I personally prefer the ability to see as much as possible without having to pan around to get the big picture.

In addition to multiple resolutions, each monitor sports a host of nifty features. The L-View Multi-Mode has options for pop-up menus, enlarged menu-bar fonts and cursors, as well as simple screen-capture and screen-saver utilities. The QuickView also offers enlarged menu-bar fonts and a screen saver, plus the ability to fine-tune the brightness and contrast controls through software.

Sigma Designs' L-View Multi-Mode (left) and E-Machines' QuickView Z21

Image Clarity
Fancy features aside, the true test of a monitor is how well it displays images. To my eyes, the L-View Multi-Mode appears both sharper and brighter than the QuickView, although the E-Machines monitor is by no means excessively fuzzy or dim.

I was unable to detect flicker at any resolution on either monitor, although admittedly the perception of screen flicker is subjective. A vertical scan rate of 65Hz—the screen is redrawn 65 times each second—is considered sufficient to eliminate flicker. The L-View Multi-Mode boasts a 92Hz vertical refresh rate at 72 dpi, but only 60Hz at 120 dpi. The QuickView checks in at 59Hz or 76Hz, depending on screen resolution.

Although both manufacturers provide built-in tilt-and-swivel stands, ergonomically E-Machines loses out to Sigma Designs. The brightness and contrast knobs are inconveniently placed toward the rear of the QuickView, the power switch is on the back, and there is no power indicator. On the L-View Multi-Mode, brightness and contrast knobs are up front but unobtrusive, the power switch is easily accessible on the right-hand side, and a power indicator is clearly visible on the front.

The L-View Multi-Mode meets European standards for very-low-frequency (VLF) electromagnetic emissions (see "The Magnetic-Field Menace," Macworld, July 1990) and battles glare with an optional OCLI screen. The QuickView, on the other hand, has a chemically etched screen with low curvature to reduce glare. While the screen does a good job at diffusing overhead glare, focus is a little softer as a result.

I found the Sigma Designs L-View Multi-Mode easier on the eyes and pocketbook. By tying resolution to pixel dimensions, its mode of operation is also conceptually easier to grasp, since you always have the entire desktop right in front of you. However, for certain niche applications, the virtual desktops of the E-Machines QuickView Z21 may be just what you need. It too is a fine, flexible monitor, although a bit pricey.

—Owen W. Linzmayer
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An Amazing Resemblance

Like its predecessor, NumberMaze Decimals & Fractions couches math drill and practice in a maze-game format. The student uses the mouse to move an object through a maze riddled with doors, gates, walls, and rivers. The object might be a buzzing bee lured by a honeycomb, or any other randomly selected creature.

When a playing piece hits a wall, the point of view on the screen changes from a relatively plain PacMan-style maze map to a meticulously illustrated head-on view of a gate. Different gates are based on different art styles; some are just beautiful. But to a kid, these gates are simply obstacles, and the only way to get past them is by solving the math problems that appear next to them.

Problems range from simple decimal place questions appropriate for young grade-schoolers (“Write as a decimal nine hundred and ninety-nine”) to complex fractional computation problems that will challenge teenagers, such as \[ 14 \div 8\frac{1}{2} = \]

NumberMaze takes advantage of the sound capabilities built into System 6.0.7. A speech option in the File menu lets you choose whether the program recites the problems when they’re displayed. Graphic obstacles respond to correct answers with animated sequences: doors open, curtains part, and boats cross rivers. There’s lots of variety in these sequences, but not enough to prevent repetition, even in the same game.

Smart Mazes

NumberMaze Decimals & Fractions responds intelligently to incorrect answers. The first mistake is answered with a cursor under the first incorrect digit. Additional mistakes cause the Help menu to flash, reminding the student that hints are available. Eventually the program reveals the correct answer. If a student makes repeated mistakes, the program suggests that the student might want to work on an easier level.

NumberMaze Decimals & Fractions provides several variations on the basic plot. Some walls have no gates; the only way to get past the wall is by locating a ladder and moving it to the wall. Some mazes are littered with apple cores and pop cans that must be picked up before the maze can be completed. An occasional whirlwind might pick up a playing piece and deposit it in another part of the maze. Each time a player reaches the goal—a house in the corner of the maze—a new decoration is added to a room in the attic.

A third-grader can start with the easiest level of NumberMaze Decimals & Fractions and work his or her way up sequentially, skipping forward or backward on command. Each completed level presents an opportunity to print a certificate of completion. An older child can work with problems more appropriate for his or her grade level. There are dozens of mazes for each grade from 3 to 8, plus options for adult learners. Each curriculum is modeled after leading textbooks.

This program is designed to be used in either the classroom or the home. Special lab packs and network versions are available for classroom use. The program can record the progress of students in password-protected student files.

The accompanying CustomMaze Decimals & Fractions program enables teachers or parents to display or print files for individual students or the entire class. A teacher can even request printed problem sets for students to use away from the computer. When used with System 6.0.7 and sound-input hardware, the program allows you to customize its speaking voice. And the excellent manual has thorough instructions for the teacher or parent who wants to adjust the curriculum for special situations.

Maze Praise

I asked my young software-testing team to compare this program with NumberMaze. They unanimously agreed that as much as they’d praised the original, Decimals & Fractions is even better. They especially liked the graphics and the added plot twists.

But they also tired of it more quickly than they did the original. After a few sessions they complained about the repetitious scenes and the tedious math problems. This isn’t surprising, given all the time they spent playing the original NumberMaze—there’s not a great deal of novelty here for a NumberMaze veteran. The older kids were the most vocal when boredom set in; cute mazes and buzzing bees just can’t keep a teenager happy forever.

Nonetheless, this program is an important addition to the growing family of educational software for the Macintosh. It’s an educationally sound, entertaining, and thorough approach to a neglected part of the math curriculum.—George Beekman and the Shoobedoob Software Testing Team

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Introducing ColorPage™ E16, now 16-inch color priced just right for the entire office. For big, bright, beautiful color plug the ColorPage E16 into your Macintosh LC, IIci or IIci built-in video; no additional hardware necessary. Need room for working with large spreadsheets, desktop publishing layouts or multimedia applications? Add an E-Machines accelerated 8 or 24-bit color interface card and turn your ColorPage E16 into a high performance screamin' fast display. Go ahead, experience what high performance color is really like, and how affordable 16-inch displays have become.
Macintosh users in science, engineering, and manufacturing control instruments ranging from digital thermometers to laser beam profilers to factory-size machining stations. Only a handful of companies serve this market, perhaps because National Instruments (NI) took a big early lead in both data acquisition and interface programming and has energetically maintained that position over the years. NI's LabView 2 is formidable. It is the easiest icon-based programming system available, its interface-building facilities are relentlessly complete, and nearly every interface you can imagine has been packaged in one of LabView's libraries anyway.

I/O, I/O, It's Off to Work We Go
To make the Mac useful as a lab instrument, you must contrive to get data into the computer (with an analog-to-digital conversion board), represent the data in a convenient form for processing and graphic display, and also get control signals back from the Mac (digital-to-analog conversion) to control experiments or real-world machine functions. All the input/output functions and swapping data back and forth from registers on the Mac to buffers on the data-acquisition boards can, of course, be done in C, Pascal, or assembly language, but this is error-prone and unconvivial work. The software solution to this difficulty, substantially pioneered by NI, is the virtual instrument, or VI, a screen programmed to show the set of buttons, knobs, indicators, and connectors you would find on a real instrument. You can use one of the preprogrammed VIs in the package (there are more than 100 from NI, and still others from third parties) or construct one by connecting control-element icons from an assortment of palettes. The VI consists of the front panel that simulates an instrument, and a block diagram of control elements that constitutes the program defining the instrument. VIs and block diagrams can be simply modified and combined—you can hook up an NI I/O board, display your acquired data on a virtual Hewlett-Packard oscilloscope, and (particularly if your equipment uses the general-purpose interface bus, or GPIB, interface) program Mac-directed experiments.

New for 2
This scheme is wildly superior in time savings and bug avoidance to text-based data-acquisition programming. Other vendors offer some similar programs—Analog Connection Workbench from Strawberry Tree, for example—but no one offers anything this size. LabView 2 includes more than 600 support files, for a full 20MB of software support. The program incorporates speed and convenience improvements. The main speed improvement is the inclusion of a compiler: the block diagrams are automatically compiled upon execution (for $495 you can buy a run-time module and use it to distribute compiled VIs or other applications) and run about as fast as an MPW Pascal program. Since LabView 2 includes an impressive digital-signal processing (DSP) function library and routines for array/matrix processing, having a compiler means that you can do intensive number-crunching in LabView itself, rather than sending the data out to other programs. This is a serious numeric programming environment worth a few thousand dollars in its own right, with Hilbert transforms, every type of digital filter, statistical analysis, diagonalization of complex matrices, and a hundred or so other built-in capabilities.

Convenience has been enhanced principally by meeting Macintosh users' expectations better: Connections between elements now automatically stretch when you move them in block diagrams, cut-and-paste now applies to clusters of VI elements, scroll bars now let you move around in charts and graphs, and the set of control icons has been expanded to cover nearly every common type. For the cases, which should be rare at this point, in which you absolutely need to call C or Pascal routines, LabView now offers code interface nodes as a way to link the routines to your block diagrams. And now you can produce more-realistic front panels.

The View for You
You don't need a Mac IIfx to write letters to Grandma, and you don't need LabView if you're just monitoring the temperature in your wine cellar once a day. Here's a quick decision algorithm: if you didn't know what GPIB was when you woke up this morning, it's quite possible that LabView 2 is overkill for your needs. For simple data-acquisition tasks, products (both hardware and software) from IDAC, Biopac, IOtech, World Precision Instruments, or GW Instruments will be cheaper and faster to set up at first. But there are good reasons why LabView is the standard at serious research organizations and instrument companies. It can handle any data I/O or processing task easily, it makes quick work of complicated interface or numerical-analysis problems, and offers, besides a brilliantly executed programming scheme, access to a vast array of canned solutions from NI and dozens of third parties. And if you have the kind of professional instrumentation and control needs LabView was designed to address, at $1995 it's a remarkable bargain as well.—Charles Seiter

See Where to Buy for contact information.
THE OREGON TRAIL

Pros: Thoughtful educational simulation; entertaining arcade sequences; outstanding color graphics. Cons: Some events are repetitive; students can choose to avoid educational aspects of the game; copy-protected.

Company: MECC. Requires: Mac Plus; System 6.0.2. List price: $49.95.

WAGON TRAIN 1848


If there are classic educational software packages, MECC's The Oregon Trail is surely one. Nearly all the middle-school kids I know have played the simulation game on Apple II computers at school (admittedly, I live in Oregon). What's more, they love it.

MECC's new version of The Oregon Trail includes several new features that take advantage of the Macintosh's additional capabilities; Wagon Train 1848 is a first-time-ever network version of the game.

Setting Out on the Trail

Both games are a detailed simulation of the hazardous journey pioneers took from Independence, Missouri, west to Oregon's Willamette Valley. They're designed for kids age 10 and up. As in other MECC games, a password-controlled Management menu lets teachers and students access customizing options.

After entering a name and choosing an occupation, a player acquires clothes, food, wagon parts, oxen, and miscellaneous supplies for the trip. The amount of money he or she begins with depends on the chosen occupation; as in the real world, bankers, for example, have fatter wallets than do teachers. But players who finish the trip can earn higher point totals despite choosing less financially rewarding occupations.

Once outfitted with a wagon and supplies, it's time to begin the journey. Three window panes monitor the wagon's progress. The top one shows an animation of the trip; the middle one traces the route on a map; and the bottom one provides a play-by-play in a scrolling trail log (see "Wagons Ho!"). Some events are out of the players' control, but these games are not for passive potatoes. Players must continually take stock of conditions and make critical decisions. Stopped at the Kansas River crossing, they must decide whether to ford the river, caulk and float the wagon, or spend $5 for a ferry ticket.

Interactive buttons labeled Pace, Rations, Buy, Trade, Guide, and Rest give players control over many of the excursion's parameters. My young caravan especially liked Talk, which brings up images of people along the trail who have words of wisdom to share; and Hunt, which temporarily turns the simulation into an arcade-style shooting game. Occasional hunting is necessary to keep food on the table, but many kids choose it even when their wagons are stuffed with rations. Players who survive the hazards of the Great Plains and the Rockies are rewarded with another arcade-style treat: a shortcut raft trip down the Columbia River.

All is not fun and games. A player who makes foolish decisions (and sometimes even wise ones) can lose supplies, food, traveling companions, even his or her life—an element of realism that brings history to life as few textbooks can.

My testers unanimously praised the Mac version of The Oregon Trail, agreeing that its vivid graphics and added features make it far superior to the Apple II version. Asked if they learned from it, they responded less uniformly. Some said they just played it for the "fun stuff" like hunting and rafting; others said it helped them understand what it was like to be a pioneer in 1848.

Circle the Wagons!

The two simulations are identical except for one critical detail: Wagon Train 1848 allows several students to join in the same simulation from networked computers; it may be the first groupware for kids. No file server is necessary; the lab pack comes with enough disks for five computers, with an option of buying additional five-station packs.

Each computer represents one covered wagon in a wagon train. As students travel together, they can trade supplies, food, and the like with each other, send messages to each other, hold on-screen conferences, and monitor the status of all other wagons in the train. Decisions can be made either democratically or autocratically, depending on the chosen form of government. Either way, the group interaction—problem solving, negotiations, communication—tends to become the major focus of the game, overshadowing the hunting, rafting, and other favorites of the single-player game. Wagon Train 1848 brings cooperative learning to the small screen.

My testers played Wagon Train 1848 for hours. In the process, they (continues)
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uncovered a bug that can spoil the experience. Sometimes network messages come across garbled, occasionally freezing a computer and locking it out of the game. (When this happens, the other players can continue the journey without the “missing” wagon.) MECC promises to fix the bug in a maintenance upgrade this fall. Let’s hope so. Wagon Train 1848 pioneers an entirely new genre of educational software; it deserves to finish the journey.—George Beekman and the Shoohedooop Software Testing Team

See Where To Buy for contact information.

**SPACESHIP WARLOCK**

**Pros:** Ground-breaking color graphics and 3-D animations. **Cons:** Often slow. **Requires:** Mac II; 4MB of RAM; CD ROM drive; 13-inch or larger color monitor; System 6.0.2. MultiFinder not recommended. **Company:** Reactor. **List price:** $95.

Spaceship Warlock is set sometime in the future. You start out penniless in an alleyway on the planet Stambul, and you struggle to free humanity from powerful but (surprise!) evil aliens called the Kroll. Along the way you meet the beauteous but skeptical Stella, her starliner-captain father, and the nefarious pirate Captain Hammer and his mutant crew.

The creators of Spaceship Warlock, Reactor’s Mike Saenz and Joe Sparks, rightly do not label it a game, instead calling it an “interactive movie” because the plot pretty much proceeds from A to Z with few diversions. However, it does have lots of standard adventure-game elements: problems to solve, mazes to navigate, and several places where you just have to blast those hulking-yet-so-unlovable aliens.

What sets Spaceship Warlock apart from other personal-computer adventure games is not its classic story line but its amazing high-resolution color graphics and three-dimensional animations. In one remarkable sequence, 3-D asteroids tumble past the windows of the spaceship. The boulders look so much like asteroids that I found myself wondering if the crew could pilot the ship past all the hurtling rocks. An added attraction is the totally unexpected and hilarious Robin Leach send-up near the beginning, and there are other humorous touches later in the game.

Not all adventure-game fans will find Spaceship Warlock completely absorbing; the interactive-movie format offers little room for different successful approaches to the same problem and affords only a few ways to make serious mistakes (mostly by getting killed in battle). That’s not necessarily bad: if you’ve ever made a mistake in the adventure game Zork Zero, say, and had to start over several thousand moves later... well, need I say more. But if you demand a new challenge at every turn, if you have to find a puzzle or a clue in every new frame, you probably won’t find Spaceship Warlock challenging as a game, though you may find it entertaining. Personally, I found its game aspect acceptable.

The main problems with Spaceship Warlock are its repetitiveness and slow speed. Too many times you are sent back to your quarters, only to be recalled soon after you get there. You can get around that by going to the nearest view screen and clicking on it; usually the captain then summons you right away. I must say, even as I was slogging along with my slower-than-spec CD ROM drive (Reactor recommends using drives with a 380 milliseconds or faster access time), I was eager for the next alien encounter or the next asteroid belt. If the slowness really bothers you and you have a high-capacity hard drive, you can copy the 128MB of programs and data from the CD ROM onto your hard drive. The game then plays blazingly fast.

The best news for adventure-game fans is that Spaceship Warlock is light-years ahead of Reactor’s earlier effort on CD ROM, the erotic Virtual Valerie. If Reactor’s next effort is even one-tenth as much improved in its story line and robustness it will be fabulous. I recommend that Reactor offer a choice of male and female points of view in its next opus, since Spaceship Warlock fits a little too snugly in the category of “toys for boys.”

**A Great Excuse to Buy a CD ROM Drive**

At its list price of $95, Spaceship Warlock is costlier than most games. Since it takes only about 8 to 10 hours of playing time to get through (depending in part on the speed of the CD ROM drive), some might not consider it a good value. But given the tremendous amount of work that went into creating the 128MB of programming, music, sound effects, graphics, and so on, it’s hard to see how Reactor could charge any less. After all, Spaceship Warlock is coffee-table software.

If you already have a CD ROM drive and you appreciate terrific graphics, Spaceship Warlock is a great candidate for your CD ROM library. If you don’t yet have one, Spaceship Warlock is an excellent excuse for buying a CD ROM drive. For better or for worse, I found the thumping theme song going through my head in the shower. OH, oh-oh-OH, SPACESHIP WARLOCK—Tom Moran

See Where To Buy for contact information.

*Your Best Friends in the Universe* Captain Hammer of the Spaceship Warlock orders you to lead a boarding party of mutant space pirates onto an enemy battle cruiser.
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**Spreadsheet Compiler**

**MASQUERADE 1.1**

**Pros:** Easy way to construct financial applications; simpler than using "real" programming language; macros and charts on worksheet. **Cons:** Less than full Excel functionality. **Company:** Night Diamonds Software. **Requires:** Mac Plus; System 6.0. **Recommended:** Hard drive. **List price:** Version 1.13 $695.

A spreadsheet compiler is a program that turns a spreadsheet—including formulas, macros, and charts—into a stand-alone application. On the PC side of the fence, several compilers appeared four years ago for the ubiquitous Lotus 1-2-3 worksheets. Masquerade now offers developers a way to include much of the scope and flexibility of Excel in compiled worksheet-based applications. Although it can also compile worksheets saved as SYLK files from Full Impact and Wingz, it's really designed as a way for Excel users to convert templates or "applications" in Excel into real double-clickable programs with their own icons.

The key points about these applications is that, unlike worksheet templates still coded in Excel, they do not require Excel itself to run, they are compact, and they cannot be changed by the end user. In Masquerade, the security aspect of compilation is further enhanced by password-based encryption, so curious users can't even inspect the application's resources with ResEdit.

**Applications**

This development environment, while encouraging, does not have the flexibility of generic applications such as MacApp, much less the power of a standard programming language. Although they can be used to solve eigenvalue problems in quantum physics, spreadsheets are really about money, and Masquerade applications will mostly be concerned with sales, income, expenditures, and financial controls. Since most third-party developers working with databases or spreadsheets ultimately focus on applications in these areas, Masquerade's limitations shouldn't be a problem.

Here's the process. You start with a new worksheet or import one in SYLK format and develop the worksheet—or worksheets (Masquerade can handle linked sheets)—until it follows your design. In developing a worksheet that corresponds to an original Excel design, you must note the four important differences: some Excel functions and macro commands aren't available, database functions aren't present, the worksheet itself can include charts (a big plus), and macros can be included or stored on a separate sheet (you store them on separate sheets if you need backward compatibility with Excel). Another interface difference, one that lets you create an "independent application" flavor, is Masquerade's menu-bar customization, a dialog box macro function, and the use of on-sheet buttons (push buttons for macro activation, radio buttons and check boxes for choice selection). It's also possible to add a help annotation for any worksheet cell.

The principal difference between Masquerade and a standard spreadsheet program is in the Compile menu, which offers Create Application as an option. In practice the compilation process is quite forgiving, compiling formulas in which you have made errors. The process can take less than a minute for a small worksheet (10 by 20 cells) consisting mostly of formulas and text, and ten minutes or more for complex linked sheets. I used a variety of samples from the Heizer Software collection of Excel templates ranging in size from 360K to 585K. The use of compilation, although nearly automated, requires that you know a bit about Mac program organization, or at least have an understanding of what a resource is and why and when you need ResEdit. As a rule, all but the simplest worksheets require some modification to ensure that Masquerade can recognize all the functions and macros used in the Excel examples. If you are developing applications for use with Masquerade, you can usually avoid conflicts in the first place and make extensive use of buttons and custom menus to design more attractive applications. After compilation, you will want to test your application extensively to catch errors the compiler ignored, perhaps using the simulation mode to step through your work.

**Entomology**

This is a new program, it's ambitious, and it understandably has some bugs. Window handling can be mysterious, charts sometimes fail to appear as expected, grid lines and frames get fragmented, and crashes seem to occur once an hour in steady use. But version 1.1 is a great improvement over 1.01, and Night Diamonds is conscientiously whittling down the bug list—there's close interaction between the customers and tech support.

**SUM**

If you have recorded a few macros, you can produce compiled versions of your favorite templates. If you want, for example, to design a multiperson expense account form for use on a network—say you want your sales staff to enter their expenses and have the program calculate reimbursements and print a report—the Masquerade approach is simpler database programming than 4th Dimension's, and much easier than starting from scratch in Pascal. Furthermore, your staff will only be able to enter data, with no possibility of tampering. If you want to design a basic dental-office accounting system for sale to small offices, you can get the job done faster in Masquerade than in alternative approaches. If you can live with some flaws while Night Diamonds works on polishing the program, you will find Masquerade a valuable programming investment. —Charles Seiter

See Where to Buy for contact information.
MANAGE the unmanageable

Ray Peddin hadn't felt so much in the hot seat since he completed his Air Force tour of duty in Vietnam.

As Director of Management Information Systems for Stanford University Clinic, he was responsible for replacing their existing computerized systems with more sophisticated technology.

The project was both complex and risky. The accounts receivable contained $38 million, a perishable asset for which significant losses could be incurred if the conversion were not 100% effective. The last time the system was updated, millions of dollars had been lost, as well as the jobs of those responsible. Understandably Ray was nervous.

He turned to the professionals at Micro Planning International for assistance. An MPI consultant worked with Ray’s team, the new system vendor, and an independent health care consultant, to coalesce their views of the project into one workable plan - acceptable to all involved. He trained team members in the principles of project management, as well as how to use MPI’s state-of-the-art software to control the project. The plan was revised to resolve resource conflicts and a suite of custom reports for monitoring the project was developed.

Stanford Clinic's new Management Information System was up and running December 13, on target. In Ray's own words, "I couldn't have done it without MPI. The consultant was an experienced professional and the software unparalleled in ease of use and sophistication."

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Circle 217 on reader service card
**CD ROM Drives**

**CDA-431**

**Pros:** Good audio facilities; compact design; switchable SCSI termination.

**Cons:** Driver software doesn't notice some disc ejections; documentation needs improvement.

**Company:** Chinon America.

**Requires:** Mac Plus. **List price:** $999.

**PLI CD-ROM**

**Pros:** Good audio facilities; switchable SCSI termination.

**Cons:** No power indicator.

**Company:** PLI. **Requires:** Mac Plus. **List price:** $899.

Two new CD ROM players—one from Chinon, a relatively new player in the Mac market, and one from PLI, one of the oldest suppliers of Macintosh hard drives—are the latest of a growing group of third-party CD ROM players available for the Mac (for a review of drives from NEC, Toshiba, and CD Technology, see Macworld, September 1990). I found that both these drives performed well, and although the Chinon unit is the lowest priced CD ROM drive Macworld has reviewed to date, it doesn't skimp on any essential features.

**CDA-431**

The CDA-431 drive doesn't take up much room on the desktop because the external power supply sits on the floor. The drive's front panel has both power-on and drive-activity lights, as well as an eject button. The drive has excellent audio facilities, with a front-panel headphone jack and rotary volume knob, and stereo line-level RCA-jack outputs on the rear panel. The drive mechanism is made by Chinon. The SCSI address is set with DIP switches.

The software that comes with the unit includes two drivers, one for the Macintosh Plus and SE, and one for the SE/30 and the Macintosh II family, along with files that allow recognition of CD ROMs in the High Sierra, audio, and ISO 9660 formats. You control the audio features of the drive with a desk accessory called CD Control, which resembles an audio CD player's remote control.

One bug I found with the driver software: if you use the eject button on the CDA-431's front panel, the driver software doesn't notice that the disc has been ejected, and it doesn't dim the icon of the CD ROM on the desktop. If you then attempt to double-click on the icon, you receive an error message.

With the CDA-431, Chinon includes a CD ROM disc from Educorp (version 2.0) that contains more than 500 megabytes of public domain and shareware software. I found this CD ROM to be a very mixed bag; although there are many useful programs and files on the disc, a lot of the files included, especially the clip art, are mediocre. There are also many duplications; Educorp could have used a bit more care in putting this collection together.

The user manual is generally complete, but lacks Chinon's address and phone number for technical support. A diagram of the rear panel also incorrectly identifies the two audio output jacks as "Power Jacks."

The CDA-431 is priced below the top-rated drive we reviewed in September 1990, the CD Technology Porta Drive, and has better audio facilities as well. However, the Chinon unit cannot match the speed of CD Technology's Toshiba mechanism, which is still the fastest drive Macworld has tested.

**PLI CD-ROM**

The PLI CD-ROM is a zero-footprint unit, sized to fit under a Mac SE or Classic. Based on a Sony mechanism, the PLI drive has very good audio facilities. The front-panel headphone jack has a rotary volume control, and there are stereo line-level RCA-jack outputs on the rear of the unit. The PLI CD-ROM drive has a rotary SCSI-ID selection switch. The front panel lacks a power-on indicator, but has a light to show drive activity. Like the Chinon unit, the software includes an INIT for mounting CD ROMs, and a DA for controlling the drive's audio functions.

The PLI CD-ROM was faster in my speed tests than the Chinon drive, and the difference is readily apparent when you use it. The general response of the PLI CD-ROM—in particular when launching files—feels quicker than that of the CDA-431, although the PLI CD-ROM, like all CD ROM players, is much slower than a magnetic hard drive. I did find, though, that setting the RAM cache to at least 64K in the Macintosh's Control Panel greatly speeds opening multiple files in succession, because the Macintosh does not have to reread the directory on the CD ROM each time I give it the Open command.

Both drives incorporate a welcome addition to external SCSI devices, namely, switchable SCSI termination. Using switches on the units, you can configure the drives as internally or externally terminated. I would like to see more drives using external termination.

**Best for the Bucks**

Either choice is a good value in today's market. Chinon's CDA-431 unit wins points for taking up less desktop real estate, for the included software CD ROM, and for being the low-price leader among the drives Macworld has reviewed.

The PLI CD-ROM is a solid unit that was faster in our speed tests, but its suggested retail price is more than that of the CDA-431. If performance is the most important factor for you, then the PLI CD-ROM is the better choice between these two units (but test out a Toshiba-based player before buying a drive).—Tom Negrino

See Where to Buy for contact information.
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Chart and Diagram Creation Software

TOPDOWN 3.0


Just about any graphics package on the market can create charts and diagrams, but none does it better or more easily than Kaetron Software Corporation's TopDown.

A TopDown document is essentially a graphic description of how to get from point A to point Z. TopDown can be used to describe a business plan or to show how an accounting department works, how to defuse a bomb, or how to make a hamburger.

Each step is represented by a predefined or custom graphic image, accompanied by text. You join symbols together, either manually or automatically, by using lines with arrowheads. To read the chart, the viewer finds the beginning and follows the arrowheads (images and symbols can also be numbered).

Often a step in a procedure requires further explanation. TopDown allows you to create a related step, or subset, as a separate drawing through its Create Next Level option. Any symbol can have a lower level, and those symbols that do sport a drop shadow for easy identification.

New Features

The most obvious improvements to TopDown are in the new version's handling of text. Version 2.0 treated a text block as just that—a block: it was all one style and all one color (black). Version 3.0 allows any character in any text block to be of eight styles and any one of eight colors. Providing you don't go overboard using them, these elements should help direct the reader's attention along the desired paths.

Another improvement is the addition of the text-import capability. You can now type a script in a word processor and have TopDown import the script and place the text inside a string of connected symbols.

TopDown has six new predefined line paths, for a total of nine (line paths provide options for routing lines among symbols). Each of the nine predefined paths is accessed by pressing the $key and a numeral key from 1 to 9, so it is now easy to experiment until you find the most logical and least congested route. Line paths can also be set manually.

Easier and Better

You select symbols and other drawing elements from palettes. Two new palettes contain 24 node connectors, which are used to show how lines cross and connect to other lines. The new Select Palettes option lets you choose which of nine palettes are to be displayed (see "Plentiful Palettes").

TopDown enables you to attach Notecards, or comments, to each symbol in a drawing. You can choose a new option to make all symbols with attached Notecards outlined in gray.

Some of TopDown's new features also make the program easier to use. You can resize a symbol to accommodate text that exceeds the size of the symbol, and you can move symbols in small increments by using the arrow keys. The Undo command is now fully functional. In previous versions it didn't work in all circumstances, such as when you wanted to restore deleted text. Now it does.

The program is compatible with System 7, though it doesn't take advantage of Publish and Subscribe, and supports Apple's TrueType font technology. According to the company, the next version, due out in the first quarter of 1992, will support more System 7 features.

TopDown keeps getting better. Version 3.0 has reached a new level of sophistication and ease of use—a remarkable feat considering its price hasn't increased.—Philip Bishop

Plentiful Palettes You can select which of the nine palettes will be displayed in the revolving palette at the far left of the screen (you move through the palettes by clicking on the arrows at the bottom). The nine palettes are, from the left: ANSI (American National Standards Institute) flowchart symbols, two palettes of icon symbols, two palettes of node connectors, and four custom-symbol palettes. The custom symbols are being used in the chart.

Macworld • October 1991

EARL WEAVER BASEBALL 1.5

Pros: Excellent simulation; can control pitcher and batter; provides a variety of ballparks; addictive. Cons: Missing many attractive features of MS-DOS version; copy-protection scheme; disappointing digitized sounds. Company: Electronic Arts. Requires: Mac Plus; System 6.0.4. List price: $49.95.

In the MS-DOS league, Earl Weaver Baseball garnered rave reviews, but when it was transferred to the Macintosh league, the simulated baseball game lost something on its fastball. The first clue is the documentation: a 60-page MS-DOS manual and a 12-page Mac supplement. Things get worse. The first item in the Mac document is headlined "Rained Out." It details all the MS-DOS features Electronic Arts left out of the Mac version, including pitching practice; park editing; frame-by-frame slow motion; team and league editing and creating; printing; and features for creating, drafting, and trading players. The player and team statistics are also limited, and there is no support for color. I wish they hadn't told me. I wish they'd produced a Mac-only manual and just told me what I was getting, not what was missing. I mean, who wants to go to a baseball game knowing it's going to be rained out? (continues)
In the 15th Century design tools were quill ink pens and crude styles of paper.

By the 18th Century man had advanced to the drafting table with the T-squares, slide rules, precision ink pens and the dreaded eraser.

In the 20th Century the first CAD programs were very slow and extremely difficult to use, not to mention the expense of buying them.

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* Fits Macintosh models SE/30, II, Ile, Iici and Iifx

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Circle 364 on reader service card
The The skies brighten

The Skies Brighten

Though you do arrive at the ballpark soggy, before long the skies brighten. First, though, Electronic Arts has a special kind of torture for you. It's called the Codewheel—two pieces of round cardboard, one a ¼-inch larger than the other, fastened together at the center. Each time you launch Earl Weaver Baseball you must enter a number from the Codewheel in order to start the program—Electronic Arts' answer to copy protection. It's fun the first time around; thereafter it is annoying. Lose the Codewheel and the game is over before it begins.

Soggy—and now a bit frustrated—you arrive at the ballpark. But which ballpark? You get to choose from 32 fields. You can, for example, decide to play in Boston's famed Fenway Park, complete with it's imposing "Green Monster" (the 37-foot-high left-field wall).

You can begin the game right away, but most users will probably want to customize the game. Set Ground Rules allows you to choose one of four skill levels, plus make the all-important choice: You Manage, You Play, or Earl Manages. Choose You Play and you get to swing the bat and hurl the ball (with a little help from the keyboard or the mouse). This decision may also make real-time simulation a literal fact, because a You Play game can last almost as long as the real thing. In You Manage and Earl Manages modes you can select an option that allows only one pitch per batter, which greatly speeds up proceedings. Also in the Manage modes you get to make decisions such as whether to steal second or pitch around a batter.

Excellent Animation

The game is played on a split screen. The left pane is an aerial shot of the ballpark and players and includes a working scoreboard—which not only shows the score, but also who is batting, as well as other details of the match. The right pane shows the pitcher and the batter (see "Play Ball"). The animation is excellent and provides for a lot of honest-to-goodness fun and excitement. When a ball is put into play, the aerial view enlarges to fill both panes.

A pitch in Earl Weaver Baseball is made up of three actions controlled by either pressing keys on the keyboard or moving the mouse. One action selects the type of pitch (for example, a fastball breaking to the right), the second selects the location in the strike zone where you want to throw the pitch, and the third initiates delivery (for you can select another option, such as a pickoff attempt). The level of control is remarkable, although in the beginning you'll need to refer to the manual to recall which option is which. Moving the mouse to select options is also an art that takes some mastering.

Instant Replay and Slow Motion Replay let you review a play. And you can take batting and fielding practice, though not, as noted earlier, pitching practice. Earl Weaver Baseball comes with an eight-team Old Timers League comprising the great names of baseball from the turn of the century to 1975. For $19.95 you can buy a disk containing all 26 major league teams, players, and stadiums from 1989.

There are oodles of statistics to keep the most insatiable stat-head happy. The digitized sounds, though, will please few: a hit ball sounds like radio interference, a home run is greeted by silence, and an umpire growls "Outta there!" But if you're into baseball, you'll suspend disbelief and relish criticisms. You'll want to try just one more time to get that curveball past Yaz or to launch a bomb over Fenway's "Green Monster." I did.

This is a good program—but it could be a lot better.—Philip Bishop

See Where to Buy for contact information.

MAC-TO-MAC 1.0.1

Pros: Good security options; runs in background; provides messaging capabilities. Cons: Doesn't copy select folders, only files. Company: Caravelle Networks Corporation.

Requires: Mac Plus; AppleTalk network; System 6.0.1; 1MB of RAM; hard drive. List price: 5-pack $250; 10-pack $350; 50-pack $1500; site licenses available.

Caravelle Networks Corporation's file-transfer program has many of the features I like to see in a file-transfer program and will likely give Gizmo Technologies' Send Express a run for its money.

Mac-to-Mac consists of one INIT and two desk accessories, Mac-to-Mac FileShare and Mac-to-Mac TextPhone. The FileShare DA enables you to connect to another Mac on the network and transfer files to and from your Mac. The TextPhone DA is a network "chat" accessory that allows you to trade messages with a remote Mac; TextPhone also includes an answering-machine option for storing incoming messages while you're away from the Mac.

Mac-to-Mac FileShare

The most important part of Mac-to-Mac is the FileShare DA. It has a full complement of folder-based access privileges to protect your files. The most basic level of disk-access control is via a user-defined password. You can assign read-only privileges, and you can set access privileges for indiv

(continues)
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The next time you read another claim for a trackball, remember the one that has earned all the acclaims. Turbo Mouse.

vidual folders, but not for files (see "Setting Privileges"). The privileges parallel those used on AppleShare servers—open folder, view list of files in folder, read files from folder, write files to folder, and overwrite files in folder. In addition, you can protect individual folders with their own password.

I tested Mac-to-Mac over EtherTalk and LocalTalk networks. Even on LocalTalk networks, the speed of file transfers was adequate. And the fact that Mac-to-Mac operates in the background makes it a handy way to transfer files between Macs.

The file-transfer interface resembles that of Apple's Font/DA Mover. Your Mac's disk appears in one window, and the remote Mac appears in another window. You simply shift-click to select the files to be transferred, select the destination folder (by opening it on the remote Mac window), and start the transfer. You cannot transfer an entire folder's contents by selecting the folder, however. According to the company, the next version of Mac-to-Mac will include an option to transfer an entire folder. You can create new folders on the local and remote Macs to handle any new files. Mac-to-Mac's logging option keeps track of all files sent and received while you are away from the Mac.

I did, however, run into a problem on occasion. Mac-to-Mac did not know that it had completed a session. After completing a file transfer, I disconnected the Mac, but the remote Mac behaved as if it were still connected (a flashing icon at the Apple menu indicating that the remote Mac is busy). When I tried to reconnect to the remote Mac, I received a message that it was still engaged in a session.

Mac-to-Mac TextPhone

Mac-to-Mac supports an answering machine for phone-style text communications. With the answering-machine feature, callers can leave text messages that you can read later. TextPhone also has the ability to use MacinTalk to "speak" your messages to you. Since it uses MacinTalk, not everything is fully understandable unless you read the message at the same time.

What It's Not

Mac-to-Mac is not a substitute for a file server or a peer-to-peer network operating system. It's a file-transfer utility. If you want to work with a file, you must transfer it to your Mac. You cannot keep one copy of a file in one location and share usage across the network.

And TextPhone is not a substitute for an E-mail system. It's meant for one-on-one communications and requires that both Macs (sender and receiver) be turned on in order to work. TextPhone's answering-machine feature makes it more useful than an ordinary phone or chat application, though.

Even with an AppleShare file server on our network, I found Mac-to-Mac to be a useful adjunct, especially when I am looking for a file that is on someone else's Mac.

—Dave Kosjar
See Where to Buy for contact information.

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Small-Business Accounting Software

M.Y.O.B. 2.0

Pros: Provides flexible invoicing; inventory record keeping includes ability to account for manufactured items. Cons: No payroll module.


Tired of running your business out of a shoe box? Or with one of those easy-to-use checkbook programs that don't actually do much? Maybe it's time you stepped up to a real business-accounting program—one that generates standard business forms, keeps detailed records of your assets and liabilities, and uses double-entry bookkeeping to produce accurate financial statements. M.Y.O.B. 2.0 includes five basic modules—Checkbook, Sales & Receivables, Purchases & Payables, Inventory, and General Ledger.

The Checkbook module essentially works like a computerized checkbook; you record checks in a window that resembles a check, and you record deposits in a window that resembles a deposit slip. M.Y.O.B. updates checking-account balances, prints checks, and records income and expense amounts. Business owners can start off using just the Checkbook. However, if you just want automated check-writing, you'll probably be happier with a checkbook program like Intuit's Quicken ($59.95).

The Sales & Receivables module generates customer invoices and monthly statements. It also tracks unpaid customer invoices and payments. M.Y.O.B. includes two invoice forms: one for products sold and one for services provided. Also, you can choose whether to print invoices on preprinted forms or on your own business letterhead.

The Purchases & Payables module is basic, but it does everything most businesses would ever need: it generates purchase orders, tracks unpaid vendor invoices, and lets you set up invoices for paying vendors—something you'll do later with the Checkbook module.

The Inventory module provides some handy inventory-management tools. It keeps detailed records of both the dollar value and the units of inventory. And it lets you easily price and reprice items. The module even has a simple bill-of-materials feature called Autobuild. Autobuild, usually used by manufacturers, records si-
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Circle 80 on reader service card

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multaneous decreases and increases in different inventory items. For example, a business that makes skateboard out of roller-skate wheels and mahogany planks decreases its inventory of roller-skate wheels and mahogany planks and increases its inventory of finished skateboards whenever it manufactures its product. Autobuild can record all these changes in one fell swoop. One noteworthy weakness of the Inventory module, however, is that it forces you to use the average cost per unit to value your inventory—this can be a problem if you want or are required to use another costing assumption, such as last-in-first-out (LIFO) or first-in-first-out (FIFO).

Finally, the General Ledger module acts as a central repository of financial information. It collects information from all the other modules and lets you enter any additional financial data—for example, money borrowed from a bank, stock sold to investors, or asset depreciation. The General Ledger then uses all this information to prepare the balance sheet, which lists assets and liabilities; and the income statement, which calculates profits and losses. The program does not prepare the third standard financial report, the cash-flow statement, but this omission isn’t as remarkable as it sounds. Cash-flow statements are notoriously difficult to prepare with a computer and are usually available only with accounting programs that have built-in report writers.

Besides the five basic accounting modules, M.Y.O.B. also provides Administration and Card File modules. The Administration module defines miscellaneous accounting settings such as your company name, your M.Y.O.B. password, and the beginning and close of your fiscal year. The Card File module maintains an address list of the people with whom you do business, so that after you enter a name on checks, purchase orders, invoices, and statements, the person’s address automatically appears. You can also use the Card File to print mailing labels.

Given these features, then, who should use M.Y.O.B.? As a C.P.A., I recommend the program to small businesses with, say, somewhere between $200,000 and $1,000,000 in sales. Businesses of this size usually need more than just a computerized checkbook, but they don’t need all the horsepower of a fully featured business-accounting program like the Great Plains Accounting Series. In comparison, businesses doing less than $200,000 in sales probably don’t need to bother with a system that uses double-entry bookkeeping. But businesses with more than $1,000,000 in sales will want an accounting program that has a few more features.

—Stephen L. Nelson
See Where to Buy for contact information.

Graph-to-Number Converter

FLEXITRACE 1.01

Pros: Detailed numerical analysis of published charts and graphs; excellent help and tutorial. Cons: Can’t read some markedly printed color area charts. Company: Tree Star.


A few years ago Tree Star introduced its first product, the novel program FlexiGraph. FlexiGraph ($149) lets you draw line, pie, or bar charts from tables, and then converts the artwork into a table of numbers. Besides its legitimate uses, FlexiGraph provided a stern test of character, making it simple to fudge business or scientific results. As if to restore the karmic balance, Tree Star has introduced FlexiTrace, a program that lets you check published data by converting scanned charts to tables of numbers. You can scan charts from scientific or engineering journals, pen-and-ink-based scientific chart recorders, the stock market pages, or newspapers.

Tree Star’s execution of the concept is remarkably clean. Basically, you scan a chart into FlexiTrace as a 72-dots-per-inch PICT or MacPaint file. To clean up most scanned graphs, FlexiTrace removes little spots, spikes, and unwanted grids, and smooths data. You then redimension the graph if necessary (or select log coordinates), pick a sampling rate, and invoke the Trace command. The program outputs an x, y table as tabbed text to the Measurements window (see “X and Y Mark the Spot”). The captured data can be sent to the Clipboard and then to a spreadsheet or statistics program. You can also override the trace function and direct the program to measure areas and distances between points.

Interpreting Charts

Tree Star clearly experimented with hundreds of scanned graphs in working out its filtering algorithms. A smudged 2-by-2-inch stock chart from an ancient Value Line review yielded clean data, and a scatter chart with six types of nearly indistinguishable tiny markers was also successfully interpreted (after doing some hand tinkering while following FlexiTrace’s manual). As the quality of your scans gets worse, they necessarily become harder to trace. For example, a photocopy of a multicolor area chart that comes out looking like layers of mud isn’t easily scanned and interpreted.

If you want to investigate business trends from data in journals or newspapers, FlexiTrace is exactly what you need (along with a scanner and a good regression program). If you want to digitize precomputer instrument scans, spectra, pen plots, or chart- recorder output from various devices, FlexiTrace is effectively your only convenient choice. And if you want to scrutinize published research results, the program is invaluable. The company that developed a product that could be abused as the slickest way to fake data has now completed the cycle by offering a program that’s the best way to keep everybody honest.

—Charles Seiter
See Where to Buy for contact information.
Why 9 out of 10 project managers choose this path.

**The Leader**

Oh sure, a few take other paths. But for 92%* of those who buy project management software for the Macintosh®, all roads lead to MacProject® II software.

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*Source: International Data Corporation, April, 1990. *Refundable by Claris with proof of purchase of MacProject II.

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No wonder commercial software developers command 3-digit prices. After all, they have to pay for the programmers, the lawyers, the ads, and the phone calls. And 50 cents for the disk. On a budget? Go generic. In the software world they call it shareware; in many cases it is written by the same programmers who write commercial software. But because you get shareware from online services like America Online or CompuServe, you don’t pay for manuals, mailing, or marketing—you don’t even pay for the disk. You just send the programmer the requested token of appreciation: maybe $25, maybe a postcard.

You might notice that this month’s column doesn’t seem to include any dogs; that’s because all these programs are either popular online or ultra-useful, and I consider them grossly underpublicized. You can download these from America Online, CompuServe, or almost any other online service, or you can get them from a user group.

**Switch Boot 1.0**

Are you cautiously trying out System 7 but finding yourself switching back to System 6.0 frequently (because some program is System 7-shabby)? Then you’re probably spending half your life opening the Startup Disk control panel to switch partitions or hard drives.

Not anymore. Switch Boot (by John Mancino, free) is an INT whose window appears when you press the S key while the computer is starting up. It lists all your volumes or partitions. Select the one you want to boot from, and hit the enter key. That’s it—no control panel, no fuss. Switch Boot even has a Shut Down button in case you’re overcome with indecision and want to forget the whole thing.

**Compact Pro 1.30**

Compact Pro (formerly Compactor) is like StuffIt: it encodes any file or folder into a compressed format called an archive. Archives usually take up much less disk space than original files and take less time to transmit with a modem.

But Compact Pro (Bill Goodman, $25) is more efficient—it takes less time to compress a file by the same amount—than StuffIt Classic or Stuff-It Deluxe. For better or worse, Compact Pro also has far fewer options, making it easier for many of us to use. Furthermore, the clarity of the manual runs circles around many commercial manuals.

Compact Pro can make self-extracting archives that expand when double-clicked (adding 13K to the archive’s size). And under System 7 or with MultiFinder, Compact Pro compresses in the background.

The commercial, INT-based compression programs DiskDoubler and SuperDisk compress more efficiently still, and decompress files on the fly (without requiring a trip to an application). But for the money and the simplicity, Compact Pro is it.

**Pixel-Flipper 1.3**

If you own a color or gray-scale monitor, you probably know how to change it to black and white: open the Control Panel, wait, click on Monitors, wait, and so on. There had to be a better way. First there was Switch-A-Roo, a nifty, free shareware F-key that switches between two color depths (say, black and white to 256 colors) when you press a key combination.

But now there’s the Pixel-Flipper cdev, which is more useful yet (Chris Sanchez, $10). Instead of toggling between just two settings, Pixel-Flipper pops up a menu anywhere you click, from which you choose any setting: black and white, 4-bit, 8-bit, whatever. If you have multiple monitors, you can change each one independently. In any case, Pixel-Flipper is fast, slightly less awkward to use than an F-key, and about a million times more convenient than the Control Panel.

**RamDisk + 2.11, AppDisk 1.2**

A RAM disk, you might say, is the flip side of virtual memory; it treats mem...
ory as disk space, while virtual memory treats disk space as memory.

RamDisk+ ($20) is the best RAM-disk shareware program because you can set it to autocopy a set of files onto the RAM disk it creates. It also has online help, a good sense of humor, and clearly the most sophisticated programming. Bummer: it doesn't run under System 7.

For 7-savviness, you will want the clever AppDisk program (Mark Adams, $15). The Mac thinks AppDisk is just another open application—so you can "eject" your imaginary disk just by quitting AppDisk. A feature that autosaves your data back onto a real disk makes AppDisk safer than most RAM disks.

MaxAppleZoom 1.3
This cdev (Naoto Horii, $25) works only on single-monitor Mac II systems using a 4- or 8-bit Apple Display Card and the standard Apple 13-inch color monitor. Put MaxAppleZoom (MAZ) into the System Folder and try not to let your jaw hit the floor.

You know the 14-inch black band around the perimeter of a monitor? MAZ eliminates it, filling every single pixel behind the glass with usable image, right up to the plastic collar. Suddenly you've got a 704-by-512-pixel screen instead of 640-by-480—as though you traded up to a monitor that's 17 percent bigger.

Other than your mood and productivity, this masterpiece doesn't affect a thing: software and hardware never know it's there. (On my Mac, MAZ even likes System 7.) Makes you wonder: if all of that screen area is usable, why does Apple leave the dark border around the edges?

If you're already a MAZ user, you discovered that the program abruptly stopped working one day this summer. By the time you read this, MaxAppleZoom 1.4 may have been released—or the geniuses of the shareware world may have written a patch that brings 1.3 back to life.

THE DESKTOP CRITIC

THE BIG SCREEN MaxAppleZoom substantially increases the amount you can see on a Mac II monitor by eliminating the black band all the way around the screen (before, left; after, right).

SCSI SLEUTHS In the event of a SCSI snafu, cdevs can be invaluable. SCSIInfo (above) gives more details, but SCSIProbe gives you better information on your SCSI universe.

SCSIInfo, SCSIProbe
Crisis quiz: You power up the Mac, but the hard drive icon doesn't appear. Who ya gonna call?

For starters, call up SCSIInfo (Robert Easterday, pay what you want). It's a SCSI detective; it tells you the make, model, capacity, partition info, and SCSI address of every SCSI device attached to the Mac (addresses 0 through 6), and more. It has a Mount button that can often bring a SCSI device that's acting flaky online (SCI is like that).

Without SCSIInfo, you'd be utterly at a loss to know why a drive isn't mounting; the cdev at least tells you whether the Mac is "seeing" a drive, giving you a head start in solving the problem. You might prefer the cleaner-looking SCSIProbe (Robert Polic, free); while it omits some of SCSIInfo's info (such as Interleave and System Version), it does display all seven SCSI addresses, including that of your ever-lovin' Mac, which is always at position 7.

Temperament 2.0
Okay, there's not much to this cdev (John Rotenstein, free). All it does is sit there and devour all those Word Temp files that Microsoft Word leaves in its wake.

Can you imagine a big software company wasting its time writing something this simple and this good? No way.

Contributing editor David Pogue is an efficiency addict, utilities fiend, and shareware junkie in Manhattan.
PRIZE WINNING PRINTERS

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- 35 resident fonts
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Panasonic Laser Printer...$2,088

This Panasonic model laser printer includes 2 paper trays, genuine postscript, 11PPM, Appletalk & cable. This one's great!

Epson Laser Printer...$2,188

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NEW PRODUCTS

Edited by Mary Margaret Lewis

This section covers Macintosh products formally announced but not yet evaluated by Macworld. All prices are suggested retail. Please call vendors for information on availability.

HARDWARE

BLP Elite Printer
PostScript printer that comes with 17 PostScript fonts, 2MB of RAM, and built-in AppleTalk for sharing files over a network. Provides a control panel for configuring the printer and for monitoring its status. Has user-adjustable sleep mode. $1599. GCC Technologies, 617/890-0880.

Character Scanner
Full-page desktop scanner that functions as sheetfed and hand-held scanner. Compatible with all major OCR software. Scans in 64 levels of gray, and has selectable output resolution of 100 dpi to 400 dpi. $599. Computer Friends, 503/626-2251.

The ColorArtist Scanner

LightningScan Compact
Portable scanner that connects to disk drive port. Device weighs 5 ounces and is slightly larger than a deck of cards. Includes SnapGuide scanning guide that prevents side-to-side swaying. Scans images up to 4.2 inches wide and has settings for 100, 200, 300, and 400 dpi. Comes bundled with ThunderWorks image-editing software and desk accessory for scanning graphics or text from within any application. $399. Thunderware, 415/254-6581.

Laser Access Switch
Autoswitch that allows two to four Macs to share printer or other peripheral. Bi-directional switch enables one computer to share up to four peripherals. Can be used in conjunction with line extenders and buffers. Four-port parallel model $169.96; two-port parallel model $119.95. Solectek, 619/450-1220.

Ovation Projection Panel
Color LCD projection panel capable of displaying live video without an add-in computer video board or external adapter boxes. Permits connection of optional powered speakers. Sound level from a VCR or other audio source can be adjusted from the bundled Ovation hand-held remote control unit. Works with Mac and IBM-compatible personal computers. $8495. Proxima Corporation, 619/457-5500.

PassProof for the Mac IIci
Data-security hardware-software combination that consists of PassProof software disk, lock that fits in disk drive, two keys on a key ring with a serial-number tag, floppy-port plate, SCSI-port plate, tamper-proof Mac II case screw, tamper-proof plate screws, and a custom screwdriver. A hardware-locking device, a round key-lock, prevents physical access to the Mac's drive. Metal security plates prevent floppy and SCSI port access. Software protects against unauthorized system access and contains password protection, screen-locking, and user-access tracking features. 1MB minimum memory. $99.95. Kensington Microware, 415/572-2700, 800/535-4242.

Platinum 400MB Hard Disk Subsystem
Internal and external 400MB mass-storage subsystems. Internal version is fully compatible with Mac IIcx and IIci computers. Includes CMS SCSI utilities 6.0, which supports passwords, partitioning, and AUIX; Symantec's SUM II utilities for data recovery, data encryption and back-up; documentation; and a one-year warranty. Internal model $3799; external model $3999. CMS Enhancements, 714/222-6000.

Workgroup Laser Printer
10-pages-per-minute laser printer with 50 resident Hewlett-Packard Series II (continues)
fonts, dual-bin paper handling, and custom controller. Can be upgraded to PostScript page-description language compatibility. Designed for the needs of small to medium-size workgroups, and comes with two board slots that can accommodate a full library of HP-compatible fonts on smart boards. $2595. Mannesmann Tally, 206/251-5653.

**SOFTWARE**

**Edit Master Mac**

Computer-based videotape-editing system for professional video editors. Offers pull-down menus, 999-event dual-list management and cleaning capability, and ability to create lists in a variety of formats. Provides sync roll recording and dynamic tracking. Also provides longitude time-code and vertical-interval time-code frame editing. 2MB min. memory. $4500 to $16,000, depending on configuration. CV Technologies, 201/784-3555.

**EPS Exchange**

Utility that allows user to import Aldus FreeHand 3.0 drawings into Adobe Illustrator 88 and Illustrator 3.0 for editing and printing, while retaining details of original artwork. 1MB min. memory. $149. Altsys Corporation, 214/680-2060.

**GeoVista**

Presentation software for creating maps representing geographic areas within the United States. Maps can be used to display sales, marketing, and demographic information. Enables user to enter information directly from the keyboard, or to display information contained in any major database or spreadsheet. Maps can be exported in Paint or PICT format, or printed directly by GeoVista. 1MB min. memory. $249. Newton Technology, 617/630-0145.

**Golf Teacher**

HyperCard-based golf tutor that incorporates animation, text, and sound to increase user's knowledge of playing golf. Explores basics of the game, covering grip, swing, hooks, and slices, as well as advanced techniques used in short game, sand play, and putting. 1MB min. memory. $34.95. FYI Publishing, 817/599-3362.

**Harbor Master**

Software for predicting ocean tides and tidal currents. Displays information about tidal currents at 2900 tide locations worldwide, including 2300 locations in the continental United States, Alaska, and Hawaii. Has an option to display multiple tide tables, calendars, and graphic windows. Has a toggle switch to move between standard time and daylight time, the ability to display the tide table or current data in a calendar format, and an option to save annotations to text files, and graphics to PICT format. 1MB min. memory. $149. Zihua Software, 408/372-0155.

**Help**

Utility for diagnosing Mac configuration problems. Analyzes hardware and software configuration to detect potential or existing problems, and suggests actions to fix any detected problems. Generates reports that include charts and tables that the user can customize to show summary or detail information about each topic. 1MB min. memory. Single user $149; 10-pack $795. Teknosys, 813/620-3494.

**InterPlot**

Application that enables scientists, engineers, and other technical users to plot two-dimensional data and perform traditional and graphical data analysis. Includes a palette of tools for on-screen integration, differentiation, statistical operations, and other mathematical operations. Provides scrollable plot windows that are one printed page in size, multiple plot page layout, and object-oriented drawing tools. Automatically propagates x and y error values. User can select fill patterns and colors for point and line styles; data labels can contain mixed fonts, superscripts, and subscripts. 1MB min. memory. $34.95. FYI Publishing, 817/599-3362.

**MasterKey**

Utility designed for recovering forgotten or unknown passwords in Microsoft Excel, Wingz, and WordPerfect. Generates password-recovery reports for Mac and MS-DOS files, has online help screens, and provides technical-support line. Program can be used only with access code supplied with manual. 1MB min. memory. Version for use with Wingz $135; versions for use with WordPerfect and Microsoft Excel $165 each. New Visions, 405/523-1639.

**Microsoft Schedule+**

Time-management program built on the architecture of Microsoft Mail for AppleTalk Networks 3.0. System is integrated with Microsoft Mail to enable workgroups to share individual calendars. Users can view appointments and book meetings from directly within Microsoft Mail and can access network and personal user lists maintained on Microsoft Mail. Includes privacy protection. 1MB min. memory. 5 nodes $195; 20 nodes $775. Microsoft Corporation, 206/882-8080.

**Pax Imperia**

Simulation game in which users build space empire. Can be played by an individual, by multiple players on single computer, or by up to 16 players over network. User selects a galaxy in which to build an empire. Players choose planets on which to create simulated societies, with military-and (continues)
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In 1968, OCLI was honored by the Academy of Motion Picture Arts and Sciences with a Class II Scientific or Technical Award "for the development of an improved antireflection coating for photographic and projection lens systems." This is the same coating OCLI uses on MacGlare/GuardPlus™ filters.

MacGlare/GuardPlus™ filters are the ultimate relief from eyestrain, fatigue and headaches caused by glare from your Macintosh monitor. OCLI's patented anti-glare coating eliminates up to 99% of the glare, stops annoying flicker, enhances contrast, and improves viewability of images on your Macintosh display.

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Circle 374 on reader service card
political-action options. Empires have a set number of resources, and players must determine how best to use those resources politically and militarily to thrive. 1MB min. memory. $59.95. Changeling Software, 203/623-1963.

Quick Art Herbs
Collection of more than 150 clip art images of baskets, flowers, herbs, and berries. All drawings can also be modified in a paint program. 1MB min. memory. $34.95. Wheeler Arts, 217/599-6816.

Radar
Protocol-independent network-management software that gathers information about CPUs and printers on a network. Software can control printers; search a network for specific items, based on various user-selectable criteria; and generate customized reports based on the information gathered. Network data displayed in a graphic format. 1MB min. memory. 50 users $399; 51-199 users $499; 200 or more users $599. Sonic Systems, 408/725-1400.

ReadingMaze
Reading software for children from preschool through second grade. Incorporates more than 300 early words. Increasingly challenging mazes invite kids to learn and practice basic reading skills. Player moves through rooms of illustrated house to search for objects that may help to solve picture, letter, word, and sentence problems. 1MB min. memory. Black-and-white version $49.95; color version $69.95. Great Wave Software, 408/438-1990.

Read My Lips
Multimedia utility that allows users of existing word processing, desktop publishing, and presentation software to annotate documents with voice and sound. Utility accepts pre-recorded sounds in either snd or AIFF formats, or user can record voices or other sounds with a microphone and application's record function. User can record to and play back from disk. Supports any sound device that is compatible with System 6.0.7 or later. 1MB min. memory. $119. Prairiel, 313/485-6278.

Resolve
Spreadsheet for producing financial models, analyzing numerical data with charts and graphs, and publishing reports with charts and graphs to other documents. Supports 32-bit color for importing photographic images, supports a variety of color printers, and enables users to annotate worksheets with sounds. 1MB min. memory. $399. Claris Corporation, 408/987-7000.

Stack Enhancers
Software that integrates preprogrammed tools into HyperCard stacks, complete with all necessary buttons, fields, scripts, and icons. Enables user to create interactive HyperCard stacks without scripting. Provides tools for creating bookmark system, card index, travel guide, progress gauge, animated text, and others. 1MB min. memory. $69. Cheshire Grin Productions, 416/896-8077.

SuperDisk
INIT for data compression that automatically compresses any file or folder the user designates with a .s extension or dragged into a .s superfolder. Does not change Finder information on compressed files; compressed files retain original type, icon, creator, and forks. Also creates auto-expanding files that can be opened on any Mac system, whether or not it is running SuperDisk. $89. Alysia Software Corporation, 415/566-2263.

SuperDuper
Automated disk-copy utility that can verify that copy is identical to original disk. Program writes unique serial number on each copy disk. User is free to make selections from the menu bar or to switch applications under MultiFinder while utility is in use. 1MB min. memory. Standard version $79; autoloader version $150. NeoConcepts, 408/899-4821.

Temath
Set of numeric and graphic tools for exploring mathematical concepts and problems. Includes reflection, root-finder, curve-intersection, tangent-line, and arc-length tools. Also includes a matrix calculator that performs matrix arithmetic and solves systems of linear equations, and an expression calculator. 1MB min. memory. $39.95. Brooks/Cole Publishing Company, 408/373-0728.

Tristan
Pinball game whose background is a picture of Tristan, the knight from the Arthurian legends. Uses representation of paddles and mazes as in real pinball games. User operates paddles using various keys on the keyboard. 1MB min. memory. $69.95. Amtex, 613/967-7500.

What Time Is It?
HyperCard 2.0-based program that helps children learn to tell time. Children place clock's hour and minute hands to correspond to digital clock display, or enter numbers in digital clock display to correspond to analog clock. Minutes before and after the hour can be entered. Includes context-sensitive hints at every step. Computer speaks the time with digitized sound. Five levels of difficulty. For ages 4 through 10. 1MB min. memory. $14.95. Arch Cape Software, 301/680-8004.

(continues)
As long as you love us, it’s all right. And love us you will. Statistical software from SPSS is designed to work the way you work. By giving you the power to enter, edit, manage, analyze and present data on virtually every type of PC, workstation, minicomputer and mainframe. By giving you better decision-making ability through the most comprehensive set of statistical procedures available. And by giving you a choice of options to meet your specific data analysis needs. So if you’re thinking about statistical software, think about flexibility. Because flexibility means value. And when it comes to value, we top the charts.

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HyperCard 2 in a Hurry
Book that introduces fundamentals of HyperCard 2 through series of self-study, hands-on sessions. First two sessions introduce HyperCard 2 as tool for information storage and retrieval, and four remaining sessions illustrate essential techniques and tips for building a variety of HyperCard stacks. Class-tested by students. Covers debugger. Written by George Beekman. $20.25. Wadsworth Publishing, 415/595-2350, 800/876-2350.

The Little System 7 Book
Brief but detailed guide to System 7. Covers virtual memory, desk accessories, new Finder and control panels, and TrueType fonts; gives advice on multitasking, customizing the desktop, creating aliases, file sharing, and networking. Includes one chapter on tips and one on troubleshooting. Written by Kay Nelson. $24.95. Peachpit Press, 415/527-8555, 800/283-9444.

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HOW TO

Quick Tips

MAKING TOOLS FOR SIMM REMOVAL, ORGANIZING WORD 4 TABLE COMMANDS, CREATING QUICK CROP MARKS, AND MORE

BY LON POOLE

Some people still think price and an extra hole are the only differences between a 1.4MB high-density floppy disk and an 800K disk. They send tips about drilling or cutting out an extra hole in an 800K disk and reinitializing to boost its capacity.

This is false economy. Although the disks may look alike if you pull open the metal shutter, the coating that magnetically stores the programs and documents is not the same. A 1.4MB disk's coating must resist demagnetization more strongly than an 800K disk's coating because initializing at the higher capacity packs the magnetic bits in the coating closer together. When you initialize an 800K disk at 1.4MB, its magnetic bits may eventually demagnetize one another. Moreover, drilling or cutting a hole may cause particles of plastic to fall inside the disk housing, where they can scratch the disk surface. In addition, pushing an 800K disk to higher capacity makes it more susceptible to external magnetic fields (such as a magnetic paperclip dispenser with a paper clip sticking out the top). Don't risk your hard work to save a few bucks-initialize disks at their rated capacity.

Keeping Columns in Line

I use Microsoft Word 4 on a Mac IIci and am annoyed that tables and business forms frequently do not line up when printed. Words and numbers that appear nicely formatted on the screen wander to the left and right as much as three or four character positions. How can that be avoided?

Norman C. Peterson
Santa Monica, California

Sounds like you're lining up columns in tables and arranging items in forms by pressing the space bar. Use the tab key instead, and set the position of tab markers in each paragraph's formatting ruler. For more information, look up Tabs, Show Ruler, Paragraphs, and Tables in the manual.

The software that controls the printer, called the printer driver, observes tab settings precisely, but it may adjust the blank spaces between words. The printer driver usually adjusts word spacing on fully justified lines and in documents printed on a LaserWriter or another PostScript printer when the Page Setup command's Font Substitution option is turned on. It may also adjust spacing to account for the difference between screen (72 dots per inch) and printer resolution (300 dpi on a LaserWriter).

Centesimals Too

At the Puerto Rican Cycling Federation we use Excel 2.2 and Works to compute the riders' results. The programs can handle hours, minutes, and seconds, but for certain events we need centesimals too.

Manuel Domenech
San Juan, Puerto Rico

You can keep time to the nearest hundredth of a second in Excel 2.2 or 3.0 (but not Works) by keeping your times in four separate columns—one for hours, one for minutes, one for seconds with centesimals, and one that combines the other three columns. The following formula combines hours from cell B2, minutes from cell C2, and seconds with centesimals from cell D2.

=TEXT((TIME(B2,C2,D2),"h:mm:ss")&TEXT(D2-TRUNC(D2),".00")

To add up a set of times, use three SUM functions to total hours, minutes, and seconds separately. Then use a formula like the one above to combine the totals. To average a set of times use a formula like this:

=TEXT((TIME(0,0,(B10*3600+C10*60+D10)/ROWS(B2:D9)), "h:mm:ss")&TEXT((D10-TRUNC(D10))/ROWS(B2:D9),".00")

Here cell B10 contains the total hours, C10 the total minutes, and D10 the total seconds for the times to be averaged. The ROWS formula computes the number of times to be averaged, assuming one time per row.

(continues)
QUICK TIPS

HOW TO

JClock Removal

Last spring I installed a helpful INIT called JClock that displays the current time in the menu bar. Now I want to remove the clock because it obscures the icons that appear when I use MultiFinder. I tried dragging the INIT out of my System Folder and even reinstalling my system software. I can't guess what the trouble is, but I hope you can!

Byron E. Crews
Minneapolis, Minnesota

JClock installs itself in the System file, so you must throw away your System file before reinstalling the system software. Otherwise the Installer dutifully copies JClock to the new System file. After reinstalling the system software, you must also reinstall all fonts and desk accessories you have added to the System file.

Instead of reinstalling a new System file, you can remove JClock from the existing one with Apple's ResEdit utility. Make a backup copy of the System file. Using ResEdit, open the System file you want to fix, open the INIT resources, select the JClock INIT (it probably is ID=4), choose Clear from the Edit menu, and quit ResEdit, saving changes when asked.

SIMM Brackets

TIP: Recently I installed a new pair of SIMMs to increase my Mac's memory. Removing the case to get at the SIMM sockets was easy, but spreading the retaining clips to release the old SIMMs caused lots of frustration and sore fingers. I was tempted to use a screwdriver but thought better of it. Instead I made a tool from an ordinary tongue depressor by cutting one end at a 45-degree angle.

Al Teplow
Oakland, California

Be very careful when removing old SIMMs because those retaining clips break easily. A non-metallic letter opener or a watercolor brush handle works well. A popsicle stick cut as you describe should also work. Repairing a broken clip means replacing the entire SIMM socket (an Apple dealer will probably insist on replacing the whole logic board).—L.P.

Toner Shake-Up

TIP: If the toner in your GCC PLP II, PLP IIs, BLP II, or BLP IIs laser printer seems to be running out prematurely on the left side of the page, you may not have to replace the toner cartridge immediately. Instead, dim the lights in the room so you don't damage the photo-sensitive drum inside the printer, and take the toner cartridge outside or to a trash can. Shake the cartridge vigorously for a couple of seconds to redistribute the toner. The next time you print it should look as if you just bought a new cartridge.

William Rogers
Long Beach, California

For its laser printers, Apple suggests gently rocking the cartridge from end to end to redistribute the toner along the length of the cartridge.—L.P.

Button, Button

TIP: In FileMaker Pro, I like to make buttons for commands I use frequently, because clicking a button is faster than choosing a menu item. But I found that some commands could not be assigned to a button. For example, the New Request command, which lets you specify additional criteria when finding records, isn't on the pop-up menu of commands that can be assigned to buttons. Then I noticed that the New Record command—which has the same keyboard equivalent as New Request (⌘-N)—can be assigned to a button. I made a button and assigned it the New Record command. It functions as a New Record button when I am browsing or as a New Request button when I am finding. So if a command you want to assign is not on FileMaker Pro's list for buttons, see if a listed command has the same keyboard equivalent.

Jeanette Foshee
Boone, Iowa

Handy Table Commands

TIP: I find myself frequently using Microsoft Word 4's inconvenient Cells and Tables commands. I greatly increased my productivity by using the Commands command to put 18 table-related commands in my Work menu (see "Work Table") which I now use exclusively as a Table menu.

Don Beck
Stow, Massachusetts

QUICK CROP MARKS

To quickly create accurate crop marks that are smaller than the page size in page-layout and drawing programs—such as Aldus PageMaker, QuarkXPress, Aldus FreeHand, or Adobe Illustrator 3.0—try this tip from Scott Jones of El Cerrito, California.

1. Draw a rectangle the size of the area you want cropped. Select it and send it to the back.

2. Draw a straight line exactly along the top border (using snap-to guides if you want) that extends half an inch or so beyond the sides of the rectangle. Set the line thickness to the weight at which you want the crop marks to print. Duplicate that line and drag it to the bottom border. Do the same with the left and right borders. Select all four lines and send them to the back.

3. When you are ready to print, enlarge the rectangle to give as much space between the crop marks and the image as you desire. Then set the box's line and fill colors to white (or paper color).
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I put table-related commands in my Document menu because I use my Work menu for opening frequently used documents. Many Word users are unaware that they can customize Word’s menus with the Commands command, which lists many commands not on standard menus.—L.P.

The Right Style

**TIP:** When you import a Word file into a QuarkXPress file with the Get Text command’s Include Style Sheets option turned on, styles from the Word document don’t replace QuarkXPress styles of the same name. As a result, the formats of paragraphs with those styles change to match the QuarkXPress style definitions. In particular, the QuarkXPress Normal style replaces Word’s Normal style. This can cause major problems because Word defaults to the Normal style, and people typically base styles they create on Normal without changing the style name.

To work around this problem, use Word’s Define Styles command to rename the Normal style to Normal,n (see “Style Renaming”). Then import the Word document into QuarkXPress as usual. The Normal,n style remains intact because its name doesn’t exactly match the QuarkXPress Normal style.

Within QuarkXPress, you can easily make the style sheet definitions from the Word document apply to the QuarkXPress Normal style and to styles based on it. In the Style Sheets dialog box, select the Normal style from the scrollable list of style names and click the Edit button to get the Edit Styles dialog box for the Normal style. Then use the pop-up menu to set the Based On option to Normal,n.

Ward Barnett
Minnetonka, Minnesota

(continues)

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**Work**

<table>
<thead>
<tr>
<th>Insert Table...</th>
<th>Table to Text...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show Table Gridlines</td>
<td>Table...</td>
</tr>
<tr>
<td>Cells...</td>
<td>Merge Cells Split Cell</td>
</tr>
<tr>
<td>Insert Columns</td>
<td>Insert Rows</td>
</tr>
<tr>
<td>Insert Cells Right</td>
<td>Insert Cells Down</td>
</tr>
<tr>
<td>Insert 1 Above Row...</td>
<td>Insert 1 Below Row...</td>
</tr>
<tr>
<td>Delete Columns</td>
<td>Delete Rows</td>
</tr>
<tr>
<td>Delete Cells, Shift Left</td>
<td>Delete Cells, Shift Up</td>
</tr>
<tr>
<td>Cell Borders...</td>
<td>TLBR Single Cell Border</td>
</tr>
<tr>
<td>TLBRM Single Cell Border</td>
<td></td>
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**WORK TABLE** You can turn Word 4’s Work menu into a Table menu by using the Commands command to add table-related commands to it.

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- Auto adjustments
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START-UP STUFF IN SYSTEM 7

TIP: With System 7, system extensions (formerly called INITs or start-up documents) go in the Extensions folder, and control panels (formerly called Control Panel devices or cdevs) go in the Control Panels folder. Both special folders are inside the System Folder. But some older extensions and control panels don’t work inside the special folders. I work around this by putting aliases of such items in the System Folder itself.

Rus Nelson
Portland, Oregon

I do just the opposite. I put the recalcitrant extensions and control panels directly in the System Folder. System 7 automatically installs extensions and control panels located directly in the System Folder as well as those in the special Extensions and Control Panels folders. As a result, I don’t need to put aliases of those extensions in the Extensions folder. I do make aliases of all control panels residing directly in the System Folder and put those aliases into the Control Panels folder. The aliases let me access the control panels in the System Folder by opening the Control Panels folder (from the Apple menu).

Whereas older system software installs system extensions and control panels only in alphabetical order, System 7 installs them in three groups, alphabetically within each group. It starts with the Extensions folder, goes next to the Control Panels folder, and finally installs extensions and control panels it finds in the System Folder itself. This change in the installation sequence can cause problems for older system extensions and control panels.—L.P.

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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, 1991).
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Getting Started with
Customizing Databases

How to Fine-Tune Your Electronic Filing System for Accuracy and Efficiency

BY JIM HEID

Remember “The Lucy Show,” in which the zany redhead was secretary to a bank president, one Theodore J. Mooney? Few things pushed Mr. Mooney’s blood pressure to the bursting point more than being unable to fathom Lucy’s ditzy filing system, in which the Jenkins file was under “N” (“because he’s such a nice man”) and the Smith file was under “T” (“you meet with him on Tuesdays”), but Lucy could always find things in a flash.

There’s a moral to this story: The best filing system is one that’s tailored to the way you work. This also applies to the electronic filing systems you can create using database managers such as Claris’s FileMaker Pro, ACIUS’s 4th Dimension and File Force, Odesta’s Double Helix, ProVue’s Panorama, or the data-management features in Microsoft Works and Excel. Most database managers provide dozens of features that enable you to customize a filing system—to help ensure the accuracy of your data and to help you locate, sort, and print it more easily.

But many database users don’t bother to investigate these customizing options; instead they rely on the data manager’s preset, out-of-the-box settings for entering, storing, sorting, and printing information. If you are a member of this group, you aren’t getting the most from your software, and you are probably working harder than you need to. This month I examine the ways you can customize a database with most Macintosh database managers. “Customizing a FileMaker Pro Database” shows how to apply these concepts to the most popular Mac data manager, Claris’s FileMaker Pro.

Preparing the Fields

Database customizing begins with choosing the appropriate types of fields for the data you store. (In database parlance, a field is a single piece of information, and a group of related fields form a record. Think of a Rolodex file: one card compares to a record, while the individual pieces of information on the card—name, address, phone number—compare to fields.)

When you create a new database, you give each field a name that reflects its contents, such as Last Name or Zip Code. You can also specify what kind of data that field holds—text, numbers, or dates, for example. Most database managers are preset to create text fields, and if you’re in a hurry to start filing, you might just accept that setting as you define each field. Don’t do it—think about the type of data each field will hold, and specify field types accordingly.

Choosing the right field type is especially important when you know those fields will hold numbers or date values. Although you can store numbers or dates in a text field, it isn’t a good idea. Most data managers can apply calculations to the values in a number field—adding a sales tax percentage to a subtotal to arrive at a grand total, for example—but they can’t calculate numbers stored in a text field. And if you store date values in a text field, the database manager can’t sort the dates accurately. To a text field, “August” comes before “March;” but a date field knows better.

Using the right types of fields also helps ensure your database’s accuracy. A data manager won’t let you enter a nonnumeric value (such as a lowercase l instead of a 1) in a number field, nor will it permit you to put impossible dates such as February 31 in date fields.

When creating a database for addresses, many people make the mistake of using a number field to hold zip codes. Eight states (as well as Puerto Rico) have zip codes that be-
CUSTOMIZING A FILEMAKER PRO DATABASE

Here are some ways to apply the customizing techniques described in this column to a FileMaker Pro database. For these examples I've used a simple client database, but you can apply these tips to any type of database.

Phase 1: Defining fields and entry options. FileMaker Pro provides a variety of field types, and choosing the right one is a matter of clicking on a button or, faster still, typing a -key shortcut when defining the field. To specify a range, a list of choices, or other data entry options, click on the Options button or simply press the return key right after defining the field.

Phase 2: Laying out forms and reports. FileMaker Pro lets you create as many layouts as you like and switch between them using a pop-up menu. The program names a new layout with a number (Layout 1, Layout 2, and so on); rename it something more descriptive. To create radio buttons or check boxes for a field based on a list of values, select the field and choose Field Format from the Format menu, then choose the desired options. You can also use a layout to provide several screens of help information. Name such a layout Help, and users can view your online help by choosing its name from the layout pop-up menu. Many of the sample databases included with FileMaker Pro use this technique.

Phase 3: Creating scripts and buttons. The example button shown here, when clicked on, executes a FileMaker Pro script.

Accuracy Counts

A database is only as useful as it is accurate. A typo in a field can cause a record to be sorted incorrectly, or not found during a search. And if the field contains numbers—an employee's hourly wage, an item's price, or its quantity—the inaccuracy could cost you money. No database manager can ensure 100 percent accuracy, but most programs have features that...
that finds all clients whose accounts are past due and then prints a report listing their names. The first step in setting up an automated activity is to create the script: choose Define Script from the Scripts menu, give the new script a name, and then check the steps that the script should perform. Uncheck the Include in Menu box when you do not want the script's name and X-key shortcut to appear in the Scripts menu. Uncheck the box if you want the script to be executed only when a button is clicked on.

After defining the script, you can assign a button to it. First, create the new button by typing its text and then drawing a round-corner rectangle large enough to accommodate the text. For a flashier look for buttons that perform common functions such as adding a new record or searching, copy one of the button designs from FileMaker Pro's Buttons template. Or create your own design in a paint or draw program, copy it to the Clipboard, and then paste it into the desired form when in layout mode. (If you want the custom button to contain a text label, be sure to make the button large enough.) Next, while still in layout mode, select the button and choose Define Button from the Scripts menu. In the Define Button dialog box, click on the Perform a Script check box, and then select the desired script's name from the pop-up menu. Click on OK, switch back to browse mode, and try the new button.

**Figure:** From left to right: pop-up list, pop-up menu, check boxes, radio buttons.

For a flashier look for buttons that perform common functions such as adding a new record or searching, copy one of the button designs from FileMaker Pro's Buttons template. Or create your own design in a paint or draw program, copy it to the Clipboard, and then paste it into the desired form when in layout mode. (If you want the custom button to contain a text label, be sure to make the button large enough.) Next, while still in layout mode, select the button and choose Define Button from the Scripts menu. In the Define Button dialog box, click on the Perform a Script check box, and then select the desired script's name from the pop-up menu. Click on OK, switch back to browse mode, and try the new button.

**Figure:** From left to right: pop-up list, pop-up menu, check boxes, radio buttons.

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**Figure:** Define Button: In Browse or Find mode, set of objects will perform script.
LAbor savers. Automatic data entry and data-validation options reduce repetitive typing and help eliminate inaccurate data. At top, a pattern for a phone-number field is being specified with ACIUS’s 4th Dimension. At bottom, Odesta’s Double Helix’s flag fields can hold only one of two possible values—here, “male” or “female.”

In many databases, the contents of certain fields stay the same from one record to the next. (Most of a company’s employees may live in the same state, for example.) To streamline data entry, most programs can enter data into certain fields for you when you create a new record. Most programs can also carry over information from corresponding fields in the previous record. For those times when the data differs, you can replace automatically entered data by simply backspacing over it. And ProVue Development’s Panorama and forthcoming Panorama II boast a love-it-or-hate-it feature called clairvoyance—if you type “San F” and a previous record contains “San Francisco,” the program inserts the rest of the text for you. You can override the guess by simply continuing to type, or you can just turn off the feature.

Certain types of fields—ones that list marital status, sex, or whether an account is past due—contain one of only two possible values. Other types of fields are based on a rigid list of values—such as the list of colors available for Type A Widgets or the expense categories in a budget database. Most database programs allow you to specify these kinds of restrictions, and to select a value from a list of options by clicking on on-screen buttons or check boxes. Use these multiple-choice features to improve accuracy and eliminate the drudgery of repeatedly typing the same values.

Changing the Look of Things
When you start a new database, most programs create a simple on-screen form you can use to start entering and retrieving data. But preset forms bear nothing but fields and the labels that identify them. By creating and switching between several customized forms, you can make the database easier to work with and print its contents in a variety of formats.

Macintosh database managers have layout features that encroach on desktop publishing territory (see “Designing Data”). You will find on-screen measuring rulers and T-squares and tools for drawing lines, circles, and boxes. You can also add text and graphics such as a company name and logo. And you can change the font, style, and size of fields and labels.

But all these layout tools make it easy to create graphically tasteless forms. These won’t present your data in the best light, and they make data entry—never a picnic anyway—more arduous. Since most data managers let you create numerous forms and switch between them, I recommend creating separate forms for data entry and for printing.

Make the data entry forms simple, without a lot of extraneous text and graphics. If several people will be entering data, consider adding help text to guide less experienced users through the process. Try to position fields so that you can review data and move between fields without having to scroll; besides showing an entire record at once, this helps prevent people from accidentally skipping over fields they can’t see. And use fonts that are designed for the Mac’s limited screen resolution, such as New York and Geneva. Laser-printer fonts such as Times and Helvetica aren’t as legible on screen.

For forms that you’ll use for laser printing, the opposite applies—avoid fonts such as New York, Chicago, and Geneva, which don’t laser-print well. Many graphic designers recommend sturdy, sans serif fonts such as Helvetica and Franklin Gothic for forms. Position fields to take advantage of the paper size you’re using; since scrolling isn’t an issue for printing, don’t let yourself be hemmed in by the size of the Mac’s screen. If you are printing on preprinted forms such as invoices or label stock, use the program’s rulers to position items so they appear in the proper place. Throw in some graphic embellishments if you like; let your creative juices flow—but not gush.

One more noteworthy point about field formatting concerns the way a data manager displays numbers—particularly currency values—that are calculated by the program. Most data managers calculate numbers that are accurate to up to 15 decimal places—impressive, but overkill for currency values, which are usually limited to two decimal places. If you print an invoice or any form in which some currency values are calculated by the data manager, specify that those numbers be formatted as currency values—with a dollar sign preceding them and with only two numbers after the decimal point. This ensures that you won’t see strange values such as $25.94847267.

Tying It Up, Tying It Down
Now that you have done some serious fine-tuning, what’s left? Creating...
on-screen buttons or pull-down menus that allow anyone who uses your database to conduct common types of searches or to access various forms and reports with a click of the mouse.

Say you search a client database every Friday to print a list of new orders. With most data managers, that involves choosing a Search or Find command, typing search criteria, clicking on a button or choosing another command, then choosing Print. Automating repetitive chores like these makes the database more convenient to work with and enables inexperienced users or temporary employees to perform complex jobs without having to know every nook and cranny of the program.

Basic filing programs such as Microsoft File and Software Discoveries' RecordHolder Plus don't have the features needed to automate tasks, but nearly every other data manager offers some step-saving capabilities. Panorama, Microsoft Works, and Excel all have macro recorders. When you activate recording, the program records your actions, creating macros you can save on disk and replay later. Panorama and Excel let you list macros in a menu and create on-screen buttons that play macros when clicked on. Both programs also let you create your own dialog boxes that you might use to get information (such as some text to search for) or to display messages.

But the kings of database automation are programmable database managers, such as Double Helix, 4th Dimension, Blythe Software's Omnis 5, Oracle Corporation's Oracle for Macintosh, and Fox Software's FoxBase+/Mac. These powerhouse programs provide programming features that let you create your own dialog boxes, menus, windows, buttons, and other Macintosh interface elements. Consultants, developers, and data processing professionals use these programs to create turnkey database applications that they customize to meet the needs of specific professions or departments so the end users won't have to.

These powerhouse programs are also relational database managers: they enable you to establish links among numerous files and create forms and reports containing data from them. These database-management programs also support Structured Query Language, or SQL. An English-like data-retrieval language developed in the 1970s by IBM, SQL is popular in the minicomputer and mainframe worlds. Data managers that support SQL enable developers to create Macintosh front ends for databases that run on huge computers, so that users can access those powerful but formidable systems through a friendly Mac interface.

But few people need the full range of features programmable databases provide, and most are understandably intimidated by the complexities of relational-data management. Flat file programs—so named because they work with just one file at a time—such as FileMaker Pro and Panorama combine the most commonly used data-management features with more accessible programming capabilities. And like high-end database managers, they support networks, allowing an office to share a single database.

If your data-management needs revolve around names and addresses, you might consider an electronic address-book program such as Portfolio Systems' DynoDex, PowerUp Software's Address Book Plus, or After Hours Software's TouchBase (see "Electronic Address Books"). All three sport basic address-book essentials such as automatic phone dialing and the ability to format and print envelopes and labels. TouchBase also provides more advanced features, including customizable fields and search criteria, as well as network support that allows an office to share a single contact database. And although HyperCard doesn't have important data-management features such as different types of fields, it can search for and sort data, and it's easy to use and customize. And its free-form approach to fields may be more suitable for databases that contain a large amount of text.

But whichever database manager you use, take the time to learn its customizing features so you can fine-tune the databases and reports you create. Not only will you eliminate a lot of drudgery and make it easier to find and use your data, but—like Lucy—you'll end up with a system that fits your own peculiar needs, not someone else's.

See Where to Buy for contact information.

Contributing editor Jim Held looks at a different aspect of Mac fundamentals each month. His latest book, Macworld Complete Mac Handbook, an updated and expanded collection of more than 40 Getting Started columns, was recently published by IDG Books Worldwide.
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When Adobe Illustrator first came out, it was a revelation to Mac and PostScript users. The first truly professional illustration program for the Mac, it was as much a trailblazer as those early PostScript printers (like the one I still use).

It’s remarkable how much the program could do even then.

Now, two upgrades later, we’re at version 3.01 of both Illustrator and the accompanying Separator. Though these tips work with version 3.0, I recommend getting the 3.01 upgrade for its increased stability and compatibility with other programs.

Clone in Place
There’s still one important command missing from Illustrator 3, an omission that often confuses people—the Clone command, which lets you make a copy of an object directly on top of the original. You can accomplish this by selecting the object, pressing Z-C, followed by Z-F (paste in front).

Copy and Move Incrementally
Illustrator lets you move an object incrementally using the cursor keys, and you can copy an object and move the copy by holding down the option key and dragging the object with the mouse, but how do you combine the two—keyboard movements and the copy/move trick? To copy an object while moving it incrementally, hold down the Z, option, and shift keys while moving the object with the cursor keys.

Giving Templates the Brush-Off
It’s always been annoying that every time you open a new file, Illustrator insists on asking which template you want to use—even if you’re not planning on using one.

To avoid the annoyance of that extra dialog box, just hold down the option key while choosing New from the File menu, or just press option-Z-N. The same holds true when you’re opening a file that has a template. If you want to get rid of the template, hold down option while choosing Open, or press option-Z-O.

Kerning and Tracking Values
Illustrator 3 provides some of the best type controls around, including the critical areas of kerning and tracking. If you want to see what kerning and tracking values have been applied to text, either click on an insertion point or select a range of text, then hold down the option key. Illustrator displays the kerning and tracking values in the lower-left corner of the window (see "A Question of Values"), but you won’t be able to edit them there.

Kerning on the Edge
One unusual feature of Illustrator’s kerning is its ability to kern letters in from the left and right edges of a text block. Just place the text cursor at the beginning or end of a line (except at the beginning of the first line of a text block), and kern characters in from the edge using the option and the right arrow keys (see “Kerning Edges”). This feature makes it easy to position individual lines of text precisely, without moving the whole text block.

Transforming Your Guides
The Illustrator manuals make clear that you can grab a guide and move it by holding down shift-control. What they don’t make clear, and what is hard to see on screen, is that when you shift-control-click on a guide, that guide is selected; you can then rotate it, move it, and skew it to your heart’s content.
A QUESTION OF VALUES  When the cursor is inserted in text or a range of selected text, hold down the option key to see the kerning and tracking values in that text.

KERNING EDGES  The bottom four lines in this text block have been kerned over from the edge to allow for the hanging dingbat.

Graphic Tabs

While Illustrator 3’s paragraph formatting is a step up from previous versions, there’s one thing that doesn’t seem to work—tabs and tab stops. In fact, though, you can take advantage of a great hidden feature that Adobe calls graphic tabs. This feature lets you use any shape to define the tab stops for a block of text (see “Graphic Tabs”). You can use a normal straight line or an angled or curved one, with some limitations (discussed below). Before we cover those, however, here’s a step-by-step run-through of the procedure.

1. Type some text and insert tabs before the text that needs to be aligned.

2. When you draw a vertical line, select it with the text block, and choose Make Text Wrap. The vertical line acts like a tab stop.

3. Go back to the pointer tool to select both the line and the text block (by shift-clicking or by dragging a selection rectangle with the selection tool), and choose Make Text Wrap. The vertical line acts like a tab stop. 3. You can change the shape of the graphic tab stop. Here an anchor point was inserted and dragged over.

4. All paths act like they’re closed for the sake of text wrap, so you have to choose shapes carefully.

EPS file, the page-layout program doesn’t have to deal with printer-font memory. One caveat: type converted to outlines can make for some large and complex paths—sometimes beyond the ability of a PostScript device to handle—so make sure to check Split Long Paths on the Save/Print option in the Preferences dialog box and type the imagesetter’s final output resolution into the Output Resolution text-edit box. As you should always do when splitting paths, create a backup copy of the document before you print or save.

Start-Up Files that Work

Adobe makes clear in its manuals that you can create a file called Adobe Illustrator Startup, which contains all your favorite fonts, patterns, colors, and the like, and all those goodies will be loaded whenever you start up Illustrator. This is great because adding a bunch of fonts to the menu, one at a time, is the most troublesome thing about Illustrator. What the manuals don’t make clear is that you have to actually use an example of each font, pattern, or color in the Adobe Illustrator Startup file. You
can't just add it to the menu and expect Illustrator to remember it. So when you go through the trouble of adding all your fonts, remember to format at least one character using each font, then save the Adobe Illustrator Startup file.

The Graphic Standoff

When you wrap text around an object, Illustrator doesn't seem to have an easy way to set the text-wrap standoff from that object. But it's actually pretty simple to set the left and right standoffs. Click in the text block that you want to adjust, and set the left or right indent in the Type Style dialog box. You get this dialog box by choosing Style under the Type menu item (see "Graphic Standoff").

Rotating Angles

When you work with rotated objects, it's often difficult to get Illustrator's tools to work with you. With a rectangle that's rotated 33 degrees, for instance, horizontal and vertical scaling can make for some mean trigonometry. To solve this problem, change the Constrain angle in the Preferences dialog box to match the angle of the rotated object. The Constrain angle affects your shift-constrained mouse movements and the orientation of the horizontal and vertical axes in the Transformation dialog boxes—most important, the scaling and skewing dialog boxes.

Now, with your Constrain angle set to 33 degrees (or whatever value you've chosen), it's a piece of cake to scale that rectangle "horizontally" or "vertically."
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<tr>
<td>1GB</td>
<td>Full Height</td>
<td>$3339</td>
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### Removable Drives

<table>
<thead>
<tr>
<th>Capacity</th>
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<tbody>
<tr>
<td>45MB Syquest</td>
<td>Toshiba CD ROM</td>
<td>$ 515</td>
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<tr>
<td>Sony Optical 650MB</td>
<td>$2899</td>
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### EMAC Hard Drives

<table>
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<tr>
<th>Capacity</th>
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<th>Capacity</th>
<th>Model</th>
<th>External</th>
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<td>170MB</td>
<td>Impact</td>
<td>$ 887</td>
<td>335MB</td>
<td>Metro</td>
<td>$1590</td>
</tr>
<tr>
<td>150MB</td>
<td>Impact</td>
<td>$ 650</td>
<td>670MB</td>
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<td>$ 914</td>
<td>1.3GB DAT</td>
<td>Metro</td>
<td>$1906</td>
</tr>
</tbody>
</table>

Call about used and refurbished drives.

VISA and MasterCard accepted — no surcharge. $50 minimum on all orders.

**1-800-426-1591**

Monday through Friday 9 am to 7 pm EST

All products come with a 30 day money back guarantee against defects. 15% Restocking charge on non defective, unauthorized returns, or refused shipments. Prices and specifications subject to change without notice. Product subject to availability. $5.00 on all C.O.D. Orders; Credit Card reference is required. International inquiries welcome.

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WHERE TO BUY

A Guide to Products Featured in This Issue

This listing provides companies and phone numbers for products mentioned in this issue.


DirectColor® Radius; 408/434-1010, 800/227-2795; fax 408/845-4017. GS plus Xerox Imaging Systems; 617/864-7400, 800/284-6590; fax 617/864-4161. HP ScanJet IIc HP ScanJet Plus Hewlett-Packard; 800/752-0900.


The Oregon Trail MECC; 612/481-3500. Panorama ProVue Development Corp.; 714/892-8199; fax 714/892-8499. PassPeak Kensington Microware; 415/572-2700, 800/533-4242; fax 415/572-9675. (continues)
WHERE TO BUY

PCPC 11" Display System
PCPC; 813/884-3092,
800/622-2888; fax
813/886-0520.
PC Scan 3000 Dest Corp.;
408/436-2700.
PC-VCR NEC Technologies;
508/264-8000,
800/622-2888; fax
813/886-0526.
Pentax 11 Scan Pentax;
303/460-1600; fax
301/360-1268.
Personal Scan 280 Dest Corp.;
408/436-2700.
Phoios 500GS Prime Option;
213/618-0274,
800/622-2888; fax
PLC-CD-ROM PLC; 415/657-2211,
800/288-8754.
ProView 8 Mirror Technologies;
612/633-4540; fax
612/633-3136.
PSI Omega Rip Screen USA;
Publish-It Easy Timeworks;
708/559-1300; fax
708/559-1399.
QuarkXPress Quark; 303/
934-2211, 800/356-9363;
fax 303/377-6327.
QuickDex Casady & Greene;
408/484-9228,
800/356-9363; fax
408/848-9218.
QuickImage 24 Mass Microsystems;
408/522-1200,
800/522-7979; fax
408/733-5499.
QuickView E-Machines;
503/646-6999, 800/344-
7274; fax 503/841-0946.
Radius Color Display Radius;
408/404-1010,
800/227-2795; fax
408/844-0127.
Radius Color Display/21 Radius;
408/404-1010,
800/227-2795; fax
408/844-0127.
RasterOps BLC System RasterOps Corp.;
408/562-4200,
800/466-7600; fax
408/562-4065.
RasterOps BLX System RasterOps Corp.;
408/562-4200,
800/466-7600; fax
408/562-4065.
Scan 300 GS Abaton, a
Subsidiary of Everex Systems;
415/683-2226,
800/444-5321; fax
415/683-2151.
Scan 3600S Abaton, a
Subsidiary of Everex Systems;
415/683-2226,
800/444-5321; fax
415/683-2151.
ScanMaker 600GS Microtek;
213/321-2121,
800/654-4160; fax
213/538-1193.
ScanMaker 6000GS Microtek;
213/321-2121,
800/654-4160; fax
213/538-1193.
ScriptMaster Linotype-Hell Company;
516/434-2000,
800/842-9721.
Silverscanner La Cie;
503/691-0771, 800/999-0143.
SmarTwo Scitex America Corp.;
617/275-5150,
800/858-0489; fax
617/275-3430.
Spectrum/8 Series III SuperMac Technology;
408/245-2202; fax
408/735-7250.
Spectrum/8 II SuperMac Technology;
408/245-2202; fax
408/735-7250.
Sprint 110 Optrotech Graphic Arts;
508/687-6037; fax
508/687-0955.
StudioLink Du Pont Printing and Publishing;
800/955-6555.
ThunderScan Plus Thunderware;
415/254-6581,
800/628-0699; fax
415/254-3047.
ThunderWorks Thunderware;
415/254-6581,
800/628-0699; fax
415/254-3047.
TopDown Kaerion Software Corp.;
713/890-3434.
TypeStyler Broderbund Software;
415/492-3200,
800/521-6263.
TZ-3 Travel, Division of Vidar Systems Corp.;
408/734-9700; fax
UGS Grayscale Scanner Umax Technologies;
408/982-0771,
800/562-0311; fax
408/982-0776.
Ultra 1400 Princeton Graphic Systems;
404/664-1010.
V.I.P. Scitex America Corp.;
617/275-5150,
800/562-0311; fax
617/275-3430.
Wagon Train 1400 MECC;
612/841-3500.

Public domain software, freeware, and shareware are available through
online information services; user groups; call 800/538-9696 ext. 500 for
information on a local user group; or mail-order clearinghouses such as
EDUCORP (800/843-9497, 619/536-9999) or the
Public Domain Exchange
(800/331-8125, 408/496-0624 in California).

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Circle 87 on reader service card.
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- Store up to 120MB on fast internal hard disk drive even for MicroMac PLUS
- Save desktop space with small footprint beardless Macintosh
- Design color graphics with 8bit or 24bit color option for MicroMac SE/30
- Increase productivity when working with large documents or spreadsheets by using large monitor

Circle 92 on reader service card

The MicroMac Upgrade System comes complete with display, video card, fan-cooled power supply, cables,

Price: MicroMac PLUS with full page display $995; MicroMac SE with dual page display $1,295;
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Phone: (714) 363-9915 FAX: (714) 363-0755

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Your ticket to
Preregister now for MACWORLD Expo/Canada and get $10 to $15 off your ticket price.

The largest Macintosh event in Canada will be in Toronto Tuesday, October 8 through Thursday, October 10, 1991, at the Canadian National Exhibition Place in the Better Living Centre and Trillium Theatre. This year's MACWORLD Expo/Canada will fill you with information on the latest hardware, software, peripherals and services. It will thrill you with innovations that make the Macintosh easier to use. It will stir your imagination with new ways to put your Mac to work. And that's not all. Return the attached preregistration card with your payment by September 13, and you'll receive incredible savings — $15 off all Conference Sessions* and Exhibits, for only $70 US/$80 CDN ($85 US/$95 CDN cash at the door) or $10 or more off Exhibits—only admission, for only $15 US/$18 CDN ($25 US/$30 CDN cash at the door).**

When you preregister, you'll save time and money. We'll send your admission badge early, so you can walk right into MACWORLD Expo, right past the long lines at the door. With thousands of people expected to attend this world-class event, preregister now and maximize your time on-line at the exhibits, not in line.

If you go to only one computer show this year, make it MACWORLD Expo. Whether your Mac is in your office, studio, home, lab or class-

room, you'll find something new at MACWORLD Expo. And if you don't have a Mac yet, come and see what you've been missing from the more than 150 companies exhibiting in over 100,000 square feet. Networking, Spreadsheet analysis, Databases, Education, Research, Word processing, Accounting, Law, CAD/CAM, Forecasting, Design, Publishing, Illustration, Animation, Music, Programming, Entertainment. You'll see it all.

A selection of nine different topic areas.

At MACWORLD Expo/Canada, choose from conference sessions in nine different topic areas. You'll learn the latest from industry insiders. And to start the conference on Tuesday, we're featuring a 2-hour spectacular session on System 7.0, where you'll discover the fine points of Apple's newest and greatest operating system.

System 7.0 Survival Guide.

Demonstrations and insightful discussions on the features and fine points of Apple's newest operating system, along with a real-world report of the opportunities and obstacles 7.0 is creating.

The Multimedia Mac. Dazzling developments surrounding the exciting integration of video, sound, graphics and animation.

MACWORLD Expo Show Hours

Exhibits and Conference Programs

Tuesday, October 8
12 p.m. to 8 p.m.

Wednesday, October 9
10 a.m. to 6 p.m.

Thursday, October 10
10 a.m. to 6 p.m.
The Designer Mac. The latest trends and tips for graphic artists, ad agencies, architects and engineers.

The Business Mac. Solid advice and case studies for corporate, small business, legal and health care users.

Mac Programmer/Developer Forum. The place for novice and veteran techie to meet, learn and brainstorm.

How to Get Started Sessions. A brand-new conference for those who are brand-new to the Mac. Especially useful to new Mac Classic and LC owners!

Advanced User Workshops. Experts share their expertise to reveal hot new ideas and insider’s tricks on the Mac.

Special Interest Group Meetings. For those who are continually seeking new ways to prosper and profit from the Mac, including The Mac in Education.

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UGWUMP (User Group Welcoming/Unwinding/Meeting Place). “People networking,” provided with MACWORLD Expo’s compliments. Discover user groups worldwide, share success stories, exchange newsletters and literature, learn how to start a user group in your area, and more!

Save 15% to 40% when you fly Air Canada.
MACWORLD Expo makes it possible to save money getting to and around Toronto. Air Canada will automatically discount your fare from 15% to 40% when you call 1-800-361-7585 and ask for Event #91731.

Reduced rates for hotels and cars. What’s more, you’ll get a reduced rate when you book your reservation directly at one of the hotels listed here. Just mention you’re coming to MACWORLD Expo. But hurry, space is limited.

And if you plan to rent a car, you’ll receive a great rate from Avis when you tell the reservations operator that you’re a MACWORLD Expo attendee. Just call 1-800-331-1600 and ask for the Worldwide Discount # B136000.

Don’t miss out on incredible preregistration savings.
The deadline to receive your preregistration discounts of $10 to $15 is fast approaching. So fill out the attached form today and send it in with your payment (check or credit card). And if the form is missing from this ad, or if you have any other questions, just call the prerecorded MACWORLD Expo information hotline at (617) 361-3941.

Macworld Expo. For all that’s new in the world of Macintosh, it’s just the ticket.

and incredible savings.
Use this ticket to preregister for MACWORLD Expo/Canada by September 6 and save $10 to $15.

Please choose your package and fill out the form completely. Incomplete forms will be returned. Use one form per person; make photocopies to register additional people. Do not staple check to form. Send completed forms to:
MACWORLD Expo/Canada
P.O. Box 4010
Bedford, MA 01730

Registration forms received after September 6 will be returned. No purchase orders accepted. Registration fees are nonrefundable.

U.S. and Canadian Attendees
Your badge will be mailed to you on or about September 20. Check box indicating where badge should be sent. All other badges will be held at the Pre-registration Counter at the Better Living Centre for pick up beginning Monday, October 7.

Please register me for:
- Package One $70 US/$80 CDN**
  Conference sessions* and exhibits.
  Pre-register by September 6. (Cash only at the door: $85 US/$95 CDN**.
- Package Two $15 US/$18 CDN**
  Admission to exhibits only. Pre-register by September 6. (Cash only at the door: $25 US/$30 CDN**.

Please send my registration badge and further information to:
Please check one: □ Home Address □ Company Address

Last Name ____________________________ First Name ____________________________
Street Address ____________________________
City ____________________________ State ____________________________ Zip ____________________________
Country (if other than U.S.) ____________________________ Telephone ____________________________
If mailing to company address:
Title ____________________________
Company ____________________________

□ Check enclosed (make payable to MACWORLD EXPOSITION) Amount $ ____________________________
□ Master Card □ Visa □ American Express Amount $ ____________________________
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 September 6, you must register at the show.

Please check the appropriate information:

Your Industry or Profession
01. Manufacturer (non-computer) 16. CEO/president/owner
02. Manufacturer (computer industry) 17. Executive manager
03. Distributor/dealer/retailer/service 18. Manager/department head
05. Legal services 20. Programmer/analyst
06. Communications/publishing 21. Engineer/research & development
07. Education 22. Consultant
08. Government 23. Marketing/sales
09. Consultant 24. Educator
10. Transportation 25. Art director/graphics
11. Information services 26. Editor/writer
12. Utilities 27. Other (specify)
13. Engineering
14. Health services
15. Other (specify)

Your Title

Size of Your Organization (number of employees national and international)
28. Under 50 31. 50-99
29. 50-99 32. 1,000-5,000
30. 100-499 33. Over 5,000

Which personal computer(s) do you own/use?
34. Macintosh Classic 41. Macintosh IIfx
35. Macintosh Plus 42. Macintosh IIx
36. Macintosh SE 43. Macintosh SE
37. Macintosh II 44. IBM PC (or clone)
38. Macintosh 45. None
39. Macintosh IIx 46. Other (specify)
40. Macintosh LC

*All conference sessions are on a first-come, first-served basis with no guaranteed seating.
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#### Mac IIx System
- Macintosh IIx, 4mb RAM, 105mb HD, 1.44mb Apple FDHD, Mouse, Standard Keyboard, 14" Color Monitor, Relax 8 Bit Color Card.  
  **System 7.0 Included.**  
  **Only...** $6,220  
  With 24 bit Color ...add $270  
  With Seiko CM-1445 ...add $265

#### Mac IIci System
- Macintosh IIci, 5mb RAM, 105mb HD, 1.44mb Apple FDHD, Mouse, Standard Keyboard, 14" Color Monitor, 8 Bit Color.  
  **System 7.0 Included.**  
  **Only...** $4,465  
  With 24 bit Color ...add $539  
  With Seiko CM-1445 ...add $265

#### Mac LC System
- Macintosh LC, 4mb RAM, 80mb Hard Drive, 1.44mb Apple FDHD, Mouse, Apple Standard Keyboard, 12" Apple Color Monitor.  
  **Only...** $2,699  
  With 14" Trinitron ...add $175

#### Mac Classic SALE!
- Macintosh Classic, 2mb RAM, 40mb Hard Drive, 1.44mb Apple FDHD, Mouse.  
  **Only...** $1,199  
  with 105mb HD ...$1,599

#### Mac IIsi Special
- Macintosh IIsi, 5mb RAM, 105mb Hard Drive, 1.44mb Apple FDHD, Mouse, Standard Keyboard, 14" Color Monitor, 8 Bit Color.

#### Display Solutions

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Price</th>
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<tbody>
<tr>
<td>Seiko CM1445</td>
<td>$589</td>
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<tr>
<td>Ikegam 20&quot; Trinitron</td>
<td>$1949</td>
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<tr>
<td>Ikegam 8mb Bit Bundle</td>
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<td>Ikegam 24mb Bit Bundle</td>
<td>$3499</td>
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<td>Goldstar 1450 P/L</td>
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<td>Magnavox Professional</td>
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<td>Microtek 14&quot; MCD-1404</td>
<td>$565</td>
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<td>Microtek 14&quot; MCD-1403</td>
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<td>NEC 3DS 14&quot; Monitor</td>
<td>$685</td>
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<td>8bit 19&quot; Card</td>
<td>$489</td>
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<td>24bit 19&quot; Card</td>
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<td>Sigma Designs Monitors Call</td>
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#### RasterOps

<table>
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<td>RasterOps 19&quot; Mono</td>
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<td>ClearVue 19&quot; G8</td>
<td>$1599</td>
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<td>19&quot; 24L System</td>
<td>$5499</td>
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<td>19&quot; 8L System</td>
<td>$4159</td>
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<td>RasterOps 24s</td>
<td>$539</td>
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<td>RasterOps 24s 24tv</td>
<td>$739</td>
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<td>RasterOps 24s tvlt</td>
<td>$1189</td>
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<td>RasterOps 24s/tvlt</td>
<td>$3339</td>
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<td>RasterOps 24s/SE30</td>
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<td>Video Expander</td>
<td>$480</td>
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<td>Other RasterOps Call</td>
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#### Radius

<table>
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<td>Radius Pivot-SI/CI</td>
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<td>Radius Pivot (with card)</td>
<td>$979</td>
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<tr>
<td>Radius Portrait - SI/CI</td>
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#### Hard Drives

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<td>IDS 45 Removable Drive</td>
<td>$375</td>
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<td>IDS Clipper 20mb</td>
<td>$375</td>
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<td>MacIstor</td>
<td>$350</td>
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<td>Mac 100-ZFP External</td>
<td>$729</td>
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<td>Mac 1 Gigabyte External</td>
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<td>Mac 255mb External 325mb</td>
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<td>Mac 650mb External</td>
<td>$2670</td>
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<td>MCE 1 Erasable Optical</td>
<td>$4995</td>
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<td>1 Gigabyte Subsystem ... 35ms PLI</td>
<td>$1859</td>
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<tr>
<td>Infinity 44mb Removable</td>
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<td>Infinity 88mb Removable</td>
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<td>Syquest 44mb Removable</td>
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<tr>
<td>Maxtor 660mb Drive</td>
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#### Scanners

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<td>MicroTek 600ca Scanner</td>
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<tr>
<td>MicroTek 600ca Scanner</td>
<td>$1099</td>
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<tr>
<td>Logitech ScanMan</td>
<td>$289</td>
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<tr>
<td>DataCopy GS Plus</td>
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#### Wacom Tablets

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#### Printers

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<td>TI MicroLaser 35XL</td>
<td>$2895</td>
</tr>
<tr>
<td>NEC SilentWriter IMP</td>
<td>$1615</td>
</tr>
<tr>
<td>Crystal Print Publisher II</td>
<td>$2299</td>
</tr>
<tr>
<td>QMS PS-410</td>
<td>$1989</td>
</tr>
<tr>
<td>Apple LaserWriter 11t</td>
<td>$2759</td>
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<tr>
<td>LaserWriter 11nx</td>
<td>$3415</td>
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<tr>
<td>Apple StyleWriter</td>
<td>$435</td>
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#### Hewlett-Packard

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Price</th>
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<tbody>
<tr>
<td>HP DeskWriter</td>
<td>$509</td>
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<tr>
<td>HPLaserJet IIP</td>
<td>$1459</td>
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<tr>
<td>HP LaserJet IIIP</td>
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#### Input Devices

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<td>Keytronic MacPro Plus</td>
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<td>DataDesk Switchboard</td>
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<td>DataDesk Mac 101E</td>
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<td>Kensington Turbo Mouse</td>
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#### Mac Classic Add-On

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<td>Radius Color Pivot Interface Call</td>
<td>Call</td>
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<tr>
<td>Radius Pivot-SI/CI</td>
<td>$769</td>
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<td>Radius Pivot (with card)</td>
<td>$979</td>
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<tr>
<td>Radius Portrait - SI/CI</td>
<td>$625</td>
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<td>Radius Portrait (with card)</td>
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<tr>
<td>Radius Color Pivot Call</td>
<td>$1399</td>
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<tr>
<td>Radius Color Pivot Interface</td>
<td>$549</td>
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<tr>
<td>Radius 19&quot; TPD</td>
<td>$1399</td>
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<tr>
<td>Radius 19&quot; TPD/GS</td>
<td>$1685</td>
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<tr>
<td>Radius 21&quot; Color Display</td>
<td>$3096</td>
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<tr>
<td>8 bit interface for above</td>
<td>$1265</td>
</tr>
<tr>
<td>24 bit interface for above</td>
<td>$2395</td>
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<tr>
<td>Radius Direct Color/GX</td>
<td>$550</td>
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<tr>
<td>Radius Rocket</td>
<td>$2415</td>
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#### ZOOM V.42 bis Modem

- Includes all cables, Software and Documentation  
  **Only...** $189

#### ZOOM 2400 Modem

- **Only...** $95

---

**Printers**

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Price</th>
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<tr>
<td>TI MicroLaser PS/35</td>
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<td>TI MicroLaser PS/17</td>
<td>$1335</td>
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<tr>
<td>TI MicroLaser 35XL</td>
<td>$2895</td>
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<td>NEC SilentWriter IMP</td>
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<td>$3415</td>
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<tr>
<td>Apple StyleWriter</td>
<td>$435</td>
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### Call for More Information
- **1-800-685-2622**
- **Free Technical Support 1-800-723-2622**

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**We Accept Visa and MasterCard with No Surcharge. Customers may deduct 1% for prepayment by Cashier's Check. Restocking fee on products purchased in error. Product availability may be limited. Prices Subject to Change without Notice. To Order or For Information call us toll free.**

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**MacSource**

7801 North Lamar, Suite E-190  
Austin, Texas 78752  
(512) 467-9652 • FAX (512) 467-2642

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**Circle 48 on reader service card**

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### Fujitsu 3.5" Drives

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Description</th>
<th>Warranty</th>
<th>MTBF</th>
<th>Internal Price</th>
<th>External Price</th>
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<tr>
<td>45 MB</td>
<td>3.5&quot; Low Profile/Low Power 3yr warranty</td>
<td>50,000 MTBF</td>
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<tr>
<td>90 MB</td>
<td>3.5&quot; 3yr warranty, 50,000 MTBF</td>
<td>$338</td>
<td>$398</td>
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<tr>
<td>135 MB</td>
<td>3.5&quot; 3yr warranty, 50,000 MTBF</td>
<td>$548</td>
<td>$648</td>
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<tr>
<td>330 MB</td>
<td>3.5&quot; 5yr warranty, 200,000 MTBF, 9ms access time</td>
<td>$1148</td>
<td>$1248</td>
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<td></td>
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<tr>
<td>425 MB</td>
<td>3.5&quot; 5yr warranty, 200,000 MTBF</td>
<td>$1448</td>
<td>$1548</td>
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<tr>
<td>520 MB</td>
<td>3.5&quot; 5yr warranty, 200,000 MTBF</td>
<td>$1748</td>
<td>$1948</td>
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</table>

*Mean Time Between Failure is the average life expectancy of a drive. In case of a 200,000 MTBF, this means a potential of 24 years of 40-hour weeks, 52 weeks per year."

### Fujitsu 5.25" Drives

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Description</th>
<th>Warranty</th>
<th>MTBF</th>
<th>Internal Price</th>
<th>External Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>185 MB</td>
<td>3.5&quot; Full Height 16ms</td>
<td>200,000 MTBF</td>
<td>$548</td>
<td>$648</td>
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<tr>
<td>249 MB</td>
<td>3.5&quot; Full Height 14ms</td>
<td>$648</td>
<td>$748</td>
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</table>

*Mean Time Between Failure is the average life expectancy of a drive. 24 hour factory replacement available for 5.25" drives for additional fee.*

### Archive DAT Tape Backup

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Description</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>600 MB</td>
<td>Optical</td>
<td>$2698</td>
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</tbody>
</table>

*Up to 10 mb per minute backup speed, Includes SoftBackup II for fast network and unattended backup capabilities.*

### SyQuest! 44MB & 88MB Removable drives

<table>
<thead>
<tr>
<th>Capacity</th>
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<tr>
<td>44MB</td>
<td>REMOVABLE</td>
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<tr>
<td>88MB</td>
<td>REMOVABLE</td>
<td>$9480</td>
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</table>

*15ms Access Time, Both Drives include Cartridge, Dual AC Outlets, 40 Watt power supply, SCSI Select and 2 Year Warranty.*

### Ricoh Optical

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Description</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>600 MB</td>
<td>Optical</td>
<td>$2698</td>
</tr>
</tbody>
</table>

*Read/write reliable storage, 66ms Access Time, Great for archiving, color scans etc.*

### Fujitsu 1.2 Gig Drive

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>1.2 GB</td>
<td>H/D</td>
<td>$2498</td>
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</tbody>
</table>

*11.5 MB access time, 2.8 mb transfer rate, 200,000 hours mean time between failure, 5 year warranty, incredibly fast! MacWorlds Fastest 1.2 Gig!*

### JX-9500PS Sharp Printer 35 Fonts

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Description</th>
<th>Price</th>
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<tr>
<td>JX-9500PS 35 Fonts</td>
<td>$1648.00</td>
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</table>

*2.5 MB Ram Memory, MacUser #1 printer 4.5 minute rating, 35 Fonts, 6 page per minute, Letter, legal and transparencies, Includes Appletalk interface! Sharp is the manufacturer of the TI Microlaser, this is the same printer!*

### Quantum Drives/Wren Drives

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Description</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>Q 62 MB 3.5&quot; LPS</td>
<td>$276</td>
<td>$349</td>
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<tr>
<td>Q 105 MB 3.5&quot; LPS</td>
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<td>$498</td>
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<td>Q 120 MB 3.5&quot;</td>
<td>$588</td>
<td>$658</td>
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<tr>
<td>Q 170 MB 3.5&quot;</td>
<td>$688</td>
<td>$758</td>
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<tr>
<td>Q 210 MB 3.5&quot;</td>
<td>$778</td>
<td>$848</td>
</tr>
<tr>
<td>Wren 337 MB RUNNER</td>
<td>$1398</td>
<td>$1498</td>
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<tr>
<td>Wren 600 MB F/H</td>
<td>$1598</td>
<td>$1698</td>
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<tr>
<td>Wren 630 MB RUNNER II</td>
<td>$2998</td>
<td>$3098</td>
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<tr>
<td>Wren 1.2 Gig</td>
<td>$2298</td>
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### 19" Color Monitors!

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Description</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>Ikekami Color System</td>
<td>8 Bit</td>
<td>$1098</td>
</tr>
<tr>
<td>DM-2060</td>
<td>24 Bit</td>
<td>$2098</td>
</tr>
<tr>
<td>Trinitron Color System</td>
<td>$2398</td>
<td></td>
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<tr>
<td>Ikekami CT-20</td>
<td>24 Bit</td>
<td>$3198</td>
</tr>
<tr>
<td>Sony Color System</td>
<td>8 Bit</td>
<td>$2398</td>
</tr>
<tr>
<td>Sony GDM 1954</td>
<td>24 Bit</td>
<td>$3198</td>
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</tbody>
</table>

All monitor systems include interface board and cable.*

### Fujitsu External Floppy Drives

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Description</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>800K Floppy Drive</td>
<td>$99.00</td>
<td></td>
</tr>
</tbody>
</table>

*These Fujitsu External floppy drives have a one year warranty. Completely compatible. These are brand new slimline drives and they look great! These drives retail for $259! Fujitsu 800k $99.00!*

### Quantum Drives/Wren Drives 19" Color Monitors!

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>19&quot; Ikekami Color System</td>
<td>8 Bit</td>
<td>$1098</td>
</tr>
<tr>
<td>DM-2060</td>
<td>24 Bit</td>
<td>$2098</td>
</tr>
<tr>
<td>19&quot; Trinitron Color System</td>
<td>$2398</td>
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</tr>
<tr>
<td>Ikekami CT-20</td>
<td>24 Bit</td>
<td>$3198</td>
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<tr>
<td>19&quot; Sony Color System</td>
<td>8 Bit</td>
<td>$2398</td>
</tr>
<tr>
<td>Sony GDM 1954</td>
<td>24 Bit</td>
<td>$3198</td>
</tr>
</tbody>
</table>

All monitor systems include interface board and cable.*

### Fujitsu Specials

- Fujitsu 330 Internal $1548
- Fujitsu 425 Internal $1648
- Fujitsu 525 Internal $1748

*5 Year Warranty, 200,000 hours MTBF, Incredibly Fast & Reliable! Perfect Internal for all Macs.*

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Hours: 8:30 - 7:00 CST, Saturdays 10:00 - 4:00

Technical Service and Order Tracking call: 312-664-8225

Circle 140 on reader service card
High performance drives available in internal configurations for most Macs.

<table>
<thead>
<tr>
<th>MB</th>
<th>INTL</th>
<th>EXTL</th>
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<td>105</td>
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<td>120</td>
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<td>170</td>
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<td>689</td>
</tr>
<tr>
<td>210</td>
<td>699</td>
<td>799</td>
</tr>
</tbody>
</table>

For a limited time, with any drive purchase, you can buy Redux, Init Picker or Rival by Microseeds Publishing. Any one, $20; any 2, $33.95; all three, $44.95. Retrospect Remote "10 Pack" available with tape drive purchase for $129.00.
WREN

**600MB**

$1499

| 128 | INTLEXTL | $999 |
| 73 | $999 |
| 100 | 1199 | 1349 |
| 100 | 1199 | 1299 |
| 125 | 1399 | 1549 |
| 125 | 1499 | 1599 |
| 100 | 1499 | 1649 |
| 125 | 1749 | 1899 |
| 100 | 1899 | 2949 |
| .2G | 2299 | 2449 |

**SyQuest-based sub-systems**

includes one cartridge

add'l cart. $69-129

| 4mb | $479 |
| SQ-555 | |
| SQ-5110 | 899 |
| SQ-555 | 899 |
| SQ-5110 | 1699 |

**Tape-based sub-systems**

includes one cass. & Retrospect

Add'l cass. $17-$24

| 155 | 599 |
| TEAC | |
| 600 | 899 |
| WangDAT | 1449 |
| WangDAT | 1999 |
| Python | 1499 |

**Affordable EtherNet**

$249

| 128 | Twp | $249 |
| TnT | |
| Dub'l-Bus | 329 |

Order Ethernet 6-pack and get 6-
User QuickMail by
CE Software - Free

$1349

(Dub'l-Bus add $75 ea.)

**Toshiba CD ROM**

$579

| 3301 | $579 |
| |
| Includes free "Nautilus" CD |

**2 Page Monitor**

$799

**Sampo**

$799

- **30 Day Money Back Guarantee**
  - All Drive products carry a 30 day Money-back guarantee. Your risk in the transaction is the cost of shipping.
- **Disk for Disk Replacement Warranty**
  - Quantum, Maxtor (excluding Panther 1.2G), Syquest and ARGAT Drives carry a two year "parts & labor" disk-for-disk replacement warranty. WREN, Teac, WangDAT, Conner drives and Syquest Cartridges carry a one year "parts & labor" disk-for-disk replacement warranty.
- **Brackets and Cables Included**
  - All Hard Drives include brackets, cables and cords required for operation in the specified Macintosh. All Hard Drives come pre-formatted with Apple's latest stable all-platform System software, 18.8 MB of Publicly Distributable software from the B'MUG Library, and the "ALLIANCE POWER TOOLS" SCSI formatter/hard partitioner.
- **30 Day Performance Guarantee**
  - If your drive fails to perform properly in the first 30 days and our technical support staff can't solve the problem over the phone, we'll ship you a replacement drive overnight and have your suspect drive picked up at our expense. Offer is subject to some limitations. Products being returned for credit and international orders do not apply.
- **Toll Free Technical Support**
  - Toll Free Technical Support, 8:30am to 7pm Monday thru Friday, Central Time. As often or for as long as you need.

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**VISA/MC, DISCOVER NO SURCHARGE**

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Circle 15 on reader service card

ALLIANCE PERIPHERAL SYSTEMS. 2900 S 291 HWAY. LOWER H. INDEPENDENCE MO 64057
## INDEX

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To purchase products advertised in this issue call the phone numbers below or use the reader service number for our Fast Facts Product Information Card located on the next page.

<table>
<thead>
<tr>
<th>Page No.</th>
<th>Advertiser</th>
<th>Reader Svc. No.</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>178·179</td>
<td>Iomega</td>
<td>800/777-6649</td>
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<tr>
<td>30·31</td>
<td>La Cie</td>
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<tr>
<td>10·11</td>
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<tr>
<td>69</td>
<td>LaserMaster</td>
<td>612/944-9696</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>Logicode</td>
<td>800/735-6442</td>
<td></td>
</tr>
<tr>
<td>266</td>
<td>Mac and More</td>
<td>850/600-MAC-0005</td>
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<tr>
<td>157·160</td>
<td>Mac Avenue</td>
<td>800/626-6221</td>
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<tr>
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<td>Mac Zone, The</td>
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<tr>
<td>215·225</td>
<td>Mac's Place</td>
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<tr>
<td>67</td>
<td>MacAdowner</td>
<td>800/627-1914</td>
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<td>MacCenter</td>
<td>800/950-3726</td>
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<tr>
<td>44·53</td>
<td>MacConnect</td>
<td>800/834-4444</td>
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<tr>
<td>26</td>
<td>MacFriends</td>
<td>800/626-8804</td>
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<tr>
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<td>MacFriends</td>
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<td></td>
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<tr>
<td>262·263</td>
<td>MacLand</td>
<td>800/833-3354</td>
<td></td>
</tr>
<tr>
<td>258·259</td>
<td>MacProducts USA</td>
<td>718/622-3475</td>
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</tr>
<tr>
<td>268</td>
<td>MacNow</td>
<td>800/766-2313</td>
<td></td>
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<tr>
<td>244</td>
<td>MacSource</td>
<td>800/726-2822</td>
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<td>256</td>
<td>MacTel Technology</td>
<td>800/760-9411</td>
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<td>104·113</td>
<td>MacWarehouse</td>
<td>800/465-9677</td>
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<tr>
<td>240·243</td>
<td>Macworld Expo</td>
<td>800/356-6014</td>
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<td>209</td>
<td>Mass Micro</td>
<td>800/522-7599</td>
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<td>183</td>
<td>Micro Planning</td>
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<tr>
<td>239</td>
<td>Micromic</td>
<td>917/343-9915</td>
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</tr>
<tr>
<td>289</td>
<td>Micronet Technology, Inc.</td>
<td>714/937-6033</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>Fifth Generation Systems</td>
<td>800/477·8212</td>
<td></td>
</tr>
<tr>
<td>226</td>
<td>Fractal Design Corp.</td>
<td>408/688·8800</td>
<td></td>
</tr>
<tr>
<td>6·7</td>
<td>Frame Technology</td>
<td>800/4FRAME</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>GDT Softworks</td>
<td>800/663·6222</td>
<td></td>
</tr>
<tr>
<td>216</td>
<td>Genstar Rental Electronics</td>
<td>800/42·3308</td>
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<tr>
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<td>Global Village</td>
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<tr>
<td>56</td>
<td>Graphsoft</td>
<td>401/61·9488</td>
<td></td>
</tr>
<tr>
<td>267</td>
<td>Hard Drives International</td>
<td>800/776·DISK</td>
<td></td>
</tr>
<tr>
<td>238</td>
<td>Hardware Express</td>
<td>800/622·7123</td>
<td></td>
</tr>
<tr>
<td>100·101</td>
<td>Hewlett Packard</td>
<td>213</td>
<td></td>
</tr>
<tr>
<td>408·40C</td>
<td>IBM/PC-2</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>232</td>
<td>IDG Books</td>
<td>227</td>
<td></td>
</tr>
<tr>
<td>94</td>
<td>Image Club</td>
<td>403/626·8000</td>
<td></td>
</tr>
<tr>
<td>170</td>
<td>In Focus Systems, Inc.</td>
<td>5·800/321·7221</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>Inline Design</td>
<td>211·203/650·9683</td>
<td></td>
</tr>
<tr>
<td>185</td>
<td>Intelligent Resources</td>
<td>708/705·9388</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Intuit</td>
<td>800/624·8742</td>
<td></td>
</tr>
</tbody>
</table>

### Fast Facts Product Information Card

100 Advertiser Svc. No. Phone

- Hewlett Packard: 800/848-8662
- IBM/PS-2: 213·4
- In Focus Systems, Inc.: 800/248-0800
- Image Club: 911·203/650·9683
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### Key Advertisers

- Apple
- Macworld Expo
- Macworld
- Macworld

### Advertisement Information

- Product Information Card
- Call for purchase information
- Advertiser service numbers

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- 800/735-6442
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- 800/626-8469
- 708/248-0800
- 800/248-0800
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- Advertisers
- Reader Service Numbers
- Advertisement Contact Information
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<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<td>45</td>
<td>46</td>
<td>47</td>
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MACWORLD

Free Catalog Info

<table>
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<tr>
<th>201</th>
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</tr>
</tbody>
</table>

MACWORLD

Please print or type all information

Name

Title

Co.

Address

City

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#### SOFTWARE

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>Entertainment</td>
<td>111</td>
<td>61</td>
<td>MULTIMEDIA</td>
<td>79</td>
<td>62</td>
<td>NETWORKING</td>
<td>91</td>
</tr>
<tr>
<td>32</td>
<td>InStyle Design</td>
<td>214</td>
<td>68</td>
<td>Passcomp</td>
<td>78</td>
<td>41</td>
<td>Ovtel Software</td>
<td>38</td>
</tr>
<tr>
<td>66</td>
<td>Spectrum Interbyte</td>
<td>179</td>
<td>30</td>
<td>RevueVision</td>
<td>38</td>
<td>192</td>
<td>226</td>
<td>103</td>
</tr>
<tr>
<td>192</td>
<td>Pacer Software</td>
<td>91</td>
<td>182</td>
<td>Bimilimunum Corp.</td>
<td>233</td>
<td>165</td>
<td>Symantec</td>
<td>154</td>
</tr>
<tr>
<td>92</td>
<td>Bimilimunum Corp.</td>
<td>233</td>
<td>192</td>
<td>Symantec</td>
<td>154</td>
<td>207</td>
<td>SSIS, Inc.</td>
<td>210</td>
</tr>
<tr>
<td>207</td>
<td>SoftSys/BC.OIC</td>
<td>367</td>
<td>12</td>
<td>T BSP</td>
<td>25</td>
<td>214</td>
<td>Terabyte</td>
<td>76</td>
</tr>
<tr>
<td>92</td>
<td>SoftSys/BC.OIC</td>
<td>367</td>
<td>12</td>
<td>T BSP</td>
<td>25</td>
<td>214</td>
<td>Terabyte</td>
<td>76</td>
</tr>
<tr>
<td>92</td>
<td>SoftSys/BC.OIC</td>
<td>367</td>
<td>12</td>
<td>T BSP</td>
<td>25</td>
<td>214</td>
<td>Terabyte</td>
<td>76</td>
</tr>
</tbody>
</table>

#### VERTICAL

| 1928 | Bimilimunum Corp. | 233       | 92 | SoftSys/BC.OIC | 367            | 12 | T BSP | 25              |

#### WORD PROCESSING

| 70 | Reference Software | —            | 36-37 | Wordperfect | —                           |

#### CAD/CAM

| 187 | Design CAD | 336/337       | 32 | Engineering Software | 12             | 56 | Grafton  | 46              |
| 235 | Virtuall Corp. | 219         | 208 | Quantum Leap | 82             |

#### CD-ROM

| 80 | Qatalish  | 36             | 217 | Panoramic Micro | 132            |

#### FONTS

| 28 | BlueSky Research | 14           | 94 | Image Club | —               |
| 66 | PostCard International, Inc. | 200        | 287 | TeleTypeSetting | 11           |

#### GRAPHICS/TPP

| 90 | Atius | —               | 84 | Atys | 35             | 28 | BlueSky Research | 14           |
| 27 | Denoda Software | 57           | 226 | Fractal Design Corp. | 56       | 6-7 | Frame Technology | 66             |
| 226 | PostCard International, Inc. | 200        | 181 | Quirk/Press | 295            | 43 | Supermax  | 118             |
| 85 | Temworks | 206            |

#### PERSONAL

| 34 | ChecklFe Technologies | —            | 19 | Multimac Friends | 58             | 199 | MacFriends | 109            |

#### MAIL ORDER

| 245-247 | APS | 15             | 236 | Aurora Industries | 18             |
| 206-205 | Bottomline | —            | 209 | Diskette Connection | 79             |
| 256-257 | Dr. Mac | 163           | 263 | Express Direct | 184            |
| 267 | Hard Drives International | —           | 230 | Hardware Express | 87             |
| 266 | Mac and More | 85            | 157-160 | Mac Avenue | 140          |
| 245 | Mac Direct | 140          | 83 | Mac Zone, The | 70             |
| 72-78 | Mac Zone, The | 70          | 218-225 | Mac's Place | 209          |
| 255 | MacTel Technology | 182        | 44-53 | MacConnection | —               |
| 282-263 | MacLand | 264          | 258-159 | MacProducts USA | 175         |
| 258 | MacSoft | 171          | 255 | MacTel Technology | 142         |
| 104-113 | MacWarehouse | 240          | 287 | Printer Connection | 202         |
| 260-261 | Thirdwave | 156          | 87-99 | Tiger Software | 139          |

#### HARDWARE

| 53 | COMPUTER SYSTEMS | 184            | 216 | Genstar Rental Electronics | —            |
| 238 | Hardware Express | 87             | 408-490 | IBM/PS/2 | —               |
| 270 | MacsFRIENDS | 109          | 255 | MacTel Technology | 142         |
| 215 | Pacific Data Products | 143     | 209-210 | TeleTimeX | 143         |
| 213 | Texas Instruments | 313          |

#### PRINTERS

| 5 | Abaton | 43             | 69 | LaserMaster | —               |
| 22-28 | Microtek | 63           | 40A | NEC Technologies | 257          |
| 33 | NewGen | 244/246      | 215 | Pacific Data Products | 143        |
| 215 | 142 | 30          | 209-210 | TeleTimeX | 143         |
| 213 | Texas Instruments | 313          |

#### BOARDS

| 64 | DAYSTAR Digital | 201          | 192A | Orange Micro | 31            |
| 400 | RasterOps | —            | 163 | Advanced Vision Research | 47           |
| 14-15 | CARE Corp. | 1             | 192 | CalComp | 3            |
| 174 | E-Machines | 363          | 180-189 | E-Machines | 158       |
| 181 | Ehrman | 144          |

#### DISPLAY

| 170 | iFocus Systems, Inc. | 5            | 258 | Micromac | 92           |
| 18C | Mirror Technologies | 243          | 16-17 | Radius | 178          |
| 38 | Global Village | 9            | 71 | Logocard | 93           |
| 29 | PSI Integration Inc. | —            |

#### MAIL ORDER

| 245-247 | APS | 15             |
| 236 | Aurora Industries | 18           |
| 206-205 | Bottomline | —            |
| 209 | Diskette Connection | 79           |
| 256-257 | Dr. Mac | 163           |
| 263 | Express Direct | 184          |
| 267 | Hard Drives International | —           |
| 230 | Hardware Express | 87           |
| 266 | Mac and More | 85            |
| 157-160 | Mac Avenue | 140          |
| 245 | Mac Direct | 140          |
| 83 | Mac Zone, The | 70           |
| 72-78 | Mac Zone, The | 70         |
| 218-225 | Mac's Place | 209        |
| 255 | MacTel Technology | 182         |
| 44-53 | MacConnection | —           |
| 282-263 | MacLand | 264          |
| 258-159 | MacProducts USA | 175         |
| 258 | MacSoft | 171          |
| 255 | MacTel Technology | 142         |
| 104-113 | MacWarehouse | 240          |
| 287 | Printer Connection | 202        |
| 260-261 | Thirdwave | 156        |
| 87-99 | Tiger Software | 139          |
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- 9ppm
- Weitek RISC Processor
- Postscript Level 2
- 2.5 meg RAM
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- Eagle 88

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- Infinity 40 Turbo
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- Canon TYPST
- Sharp JX-430, JX-600

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- E-Machines T16/XL24
- Ikegami CT20" Trinitron w/ 8 bit card
- Ikegami CT20" Trinitron w/ 24 bit card
- Saiko 14" & RasterOps 245

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- Eagle 144 V.32 bis
- Hayes Ultra 144 V.32 bis
- Hayes Ultra 9600

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- $895
- $995

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Mac LC, 5/60 $3,140
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T16, w/ XL8 $2,545
T19, w/ 8-bit card $3,595

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NEW COLORPAGE E16
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**VisionPro Color Monitor Systems**

VisionPro graphic cards are manufactured under license for MacTel. Our SP and SPS cards support multiple monitors, block mode transfer & acceleration, pan/zoom 2x & 4x and virtual desktop. With our monitors, they are an outstanding color solution.

<table>
<thead>
<tr>
<th>BusinessPRO</th>
<th>SystemPRO</th>
<th>SystemPRO Sony</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-bit ES card, 20&quot; Triniton, 75 Hz</td>
<td>8-bit SP card, 20&quot; Triniton, 75 Hz</td>
<td>8-bit SPS card, 20&quot; Sony Triniton (GDM-1950), 75 Hz</td>
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<tr>
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<td>$3544</td>
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<tr>
<td>24-bit SP card, 20&quot; Triniton, 75 Hz</td>
<td>24-bit SPS card, 19&quot; Sony Triniton (GDM-1950), 75 Hz</td>
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<td>$3349</td>
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**Storage Solutions**

MacTel offers you a number of storage and backup solutions, including their complete line of Index hard drives. The MacTel 45R and the Index 1.2 Gb drives have been rated 4 mice by MacUser Labs.

**Removable • Optical • Tape**

The Index HD formatter is System 7 compatible and supports partitioning, password protection and is A/RX compatible.

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- Index 88R w/1 cartridge: $999
- Index 45R and 88R are bundled with Backmatic® and AutoSavre®
- SyQuest cartridge SQ 400: $69
- SyQuest cartridge SQ 800: $149
- 2 GB DAT drive with Retrospect software and 1 tape: $1799

**Index Hard Drives**

<table>
<thead>
<tr>
<th>Storage Solution</th>
<th>52 Mb, 12 ms, Slimline</th>
<th>105 Mb, 12 ms, Slimline</th>
<th>210 Mb, 12 ms</th>
<th>425 Mb, 12 ms</th>
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<tbody>
<tr>
<td>Quantum drives Index 3.5&quot;</td>
<td>$249</td>
<td>$329</td>
<td>$699</td>
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<tr>
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<td>$469</td>
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<td>$859</td>
</tr>
<tr>
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<td>$779</td>
<td>$1179*</td>
<td>$1499*</td>
</tr>
<tr>
<td>425 Mb, 12 ms</td>
<td>$1599</td>
<td>$1679</td>
<td>$1999</td>
<td>$2299*</td>
</tr>
</tbody>
</table>

**Color Scanner**

VisionPro C300, 300 dpi w/Adobe PhotoShop: $1199

**macTel Technology Corporation**

800-950-8411

*Mac II, IIX and fx only
Index Memory modules

MacTel manufactures and tests their memory modules in-house to ensure the highest possible quality and reliability. All our SIMMs use gold traces and contacts and have a field test failure rate of less than 1%. We have so much confidence in our memory products that we back them with a lifetime warranty.

Prices are subject to change.

<table>
<thead>
<tr>
<th>Memory Module</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>1 Mb surface mounted/low profile 70/80 ns</td>
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<td>1 Mb fx &amp; LaserWriter II SIMM, 70/80 ns</td>
<td>$39.95</td>
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<tr>
<td>1 Mb x 9 SIMM 70/80 ns</td>
<td>$43.00</td>
</tr>
<tr>
<td>3 Mb Classic memory</td>
<td>$99.00</td>
</tr>
<tr>
<td>Mac LC V-RAM upgrade</td>
<td>$69.00</td>
</tr>
<tr>
<td>4 Mb surface mounted SIMMs/80 ns</td>
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</tr>
<tr>
<td>1 Mb TI microLaser PS 17/35 &amp; XL upgrade</td>
<td>$69.00</td>
</tr>
<tr>
<td>Maxima virtual memory management software</td>
<td>$40.00</td>
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</tbody>
</table>

Keyboards

MacTel's Index line of ADB extended keyboards have an 105-key layout, 15 function keys, cursor control keys and number pad. The French, German and Swiss keyboards come with system software.

Index extended keyboard
- English ......................................................... $99.00
- French, German, Swiss .............................. $119.00

Macintosh CPUs and Systems

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mac SE/30</td>
<td>$Call</td>
</tr>
<tr>
<td>Mac II SI</td>
<td>$Call</td>
</tr>
<tr>
<td>Mac II CI</td>
<td>$Call</td>
</tr>
<tr>
<td>Mac II FX</td>
<td>$Call</td>
</tr>
</tbody>
</table>

Accelerator Boards

Increase the speed of your Mac i up to 33% with MacTel's new CachePro card—offered at an amazingly low introductory price! Easy to install and DA controlled.

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WORKSTAR
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WORKING SOFTWARE
QUICK LETTER 84
ZECCOR
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WORKSTAR
WORKSTAR 48
WORKING SOFTWARE
QUICK LETTER 84
ZECCOR
ZECCOR 199
Graphics & Publishing

ABRADATA
DESIGN INTERIORS .................................... 66
DESIGN LANDSCAPE ................................ 66
DESIGN ARCHITECTURE ................................ 66
ADOBE
ENTIRE FONT LIBRARY AVAILABLE ........ CALL 
ILLUSTRATOR 3.0 W/ ATM ........................ 348
PHOTOSHOP ........................ ............................ 53

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ASD ............................................................... 137
AVENCY ........................................................... 47
MACLABEL PRO ........................................ 94
BASELINE PUBLISHING .............. $75
EXPOSURE PRO ........................................ 75
PERSONALITY .................................. 56
BESTDATA .............................................. 25
AFTER DARK ............................................ 28
MORE AFTER DARK ......................... 28
AFTER DARKMORE AFTER DARK BDL .... 48
CE SOFTWARE ................................. 64
QUICKSCROLL ........................................ 54

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NUVOILII ............................................ 319
TURBONET DIN-8 or DIN-9 ............................................ 319
TURBONET ST DIN-8 or DIN-9 ............................................ 319
TURBOSTAR ........................................... 329
STICKA MAC BUNDLE ................................ 185

Utilities/Programming

ADOBE
ADOBE TYPE MANAGER 2.0 ........ 62
ALARM SHORTCUT ................................. 45
STUFF IT DELUXE 2.0 ................. 62
ASD ............................................................... 137
AVENCY ........................................................... 47
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PERSONALITY .................................. 56
BESTDATA .............................................. 25
AFTER DARK ............................................ 28
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<th>Lease Price</th>
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<tbody>
<tr>
<td>1MB SIMMs 70/80/120ns</td>
<td>$35</td>
<td>$1</td>
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<tr>
<td>4MB SIMMs</td>
<td>$179</td>
<td>$6</td>
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<td>16MB SIMMs</td>
<td>$899</td>
<td>$27</td>
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<tr>
<td>Apple Video RAM Upgrade</td>
<td>$69</td>
<td>$2</td>
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<tr>
<td>Classic Upgrade 2MB</td>
<td>$59</td>
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<td>Classic Upgrade 4MB</td>
<td>$59</td>
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<td>GCC PLP I/II 1MB</td>
<td>$69</td>
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<tr>
<td>GCC BLP II/II 2MB</td>
<td>$139</td>
<td>$5</td>
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<tr>
<td>HP 1/2/4MB</td>
<td>$99/$179/$239</td>
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<td>MAC LC 8-bit Video RAM</td>
<td>$79</td>
<td>$3</td>
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<td>Portable RAM 1-8 MB</td>
<td>CALL CALL</td>
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<tr>
<td>QMS 2/3/4MB</td>
<td>$199/$279/$359</td>
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<td>TI 1MB RAM Upgrade</td>
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<tr>
<th>Accelerator</th>
<th>Buy Price</th>
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<tbody>
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<td>DayStar PowerCache ICi 40MHz</td>
<td>$1119</td>
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<tr>
<td>Radius Rocket 4040</td>
<td>$2599</td>
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<td>Mac Ici 64K Cache Card</td>
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<td>Mac Ici Cache Card</td>
<td>$259</td>
<td>$9</td>
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<tr>
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<th>Buy Price</th>
<th>Lease Price</th>
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<tbody>
<tr>
<td>Abaton 24/96 FaxModem</td>
<td>$295</td>
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<td>DoveFax 24/96</td>
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<td>DoveFax 24/96 Plus</td>
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<tr>
<td>Prometheus Ultima 96</td>
<td>$699</td>
<td>$21</td>
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<tr>
<td>US Robotics Courier HST14.4</td>
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<table>
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<th>Buy Price</th>
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<tbody>
<tr>
<td>Asante 10T Hub</td>
<td>$935</td>
<td>$28</td>
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<tr>
<td>DaynaPort E/LC, SI, SE</td>
<td>$285</td>
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<td>Nuvotek Nuvolink II</td>
<td>$279</td>
<td>$9</td>
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<tr>
<td>Shiva FastPath 4</td>
<td>$2089</td>
<td>$63</td>
</tr>
<tr>
<td>Sonic Ethernet Tft SE,LLC,II,ISS</td>
<td>$235</td>
<td>$7</td>
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### Video Solutions

<table>
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<tr>
<th>Video Device</th>
<th>Buy Price</th>
<th>Lease Price</th>
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<td>GoldStar 1450+ 14&quot; RGB</td>
<td>$369</td>
<td>$12</td>
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<tr>
<td>NEC MacSync 14&quot; RGB</td>
<td>$449</td>
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<td>Radius Direct Color</td>
<td>$2559</td>
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<td>RasterOps 24 STV</td>
<td>$1289</td>
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<td>Seiko CM-1445 14&quot; RGB</td>
<td>$619</td>
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<table>
<thead>
<tr>
<th>Printer Type</th>
<th>Buy Price</th>
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<tr>
<td>Apple StyleWriter</td>
<td>$469</td>
<td>$15</td>
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<tr>
<td>HP DeskWriter</td>
<td>$529</td>
<td>$16</td>
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<td>QMS PS 815</td>
<td>$3999</td>
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<tr>
<td>Dayna EtherPrint</td>
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<td>HP LaserJet III</td>
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<td>JetFill HP DeskWriter Refill</td>
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<td>NEC SilentWriter Model 90</td>
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<td>Seikosha SP2000 Dot Matrix</td>
<td>$209</td>
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### Scanners

<table>
<thead>
<tr>
<th>Scanner Type</th>
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<th>Lease Price</th>
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<tbody>
<tr>
<td>Caere Typist Hand Scanner</td>
<td>$479</td>
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<td>Microtek 1850 SlideScan</td>
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### Software

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<thead>
<tr>
<th>Software Title</th>
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<tbody>
<tr>
<td>Claris Resolve NEW!</td>
<td>$289</td>
<td>$8</td>
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<tr>
<td>FileMaker Pro</td>
<td>$199</td>
<td>$6</td>
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<td>Foxbase</td>
<td>$285</td>
<td>$8</td>
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<tr>
<td>Grolier Online CD ROM</td>
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<td>Kid Pix</td>
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<td>$1</td>
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<td>Liaison</td>
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<td>Microsoft Word</td>
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<td>MiniCAD</td>
<td>$499</td>
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<td>Mode32</td>
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<td>Norton Utilities</td>
<td>$87</td>
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<tr>
<td>PageMaker 4</td>
<td>$479</td>
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<td>PhotoShop 2.0</td>
<td>$569</td>
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<td>Quark XPress</td>
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<td>Radar Network Administrator</td>
<td>$435</td>
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<td>RoboSport</td>
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<tr>
<td>Soft PCAT EGA Bundle</td>
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<td>StrataVision 3DSRX Renderman</td>
<td>$1039</td>
<td>$31</td>
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<tr>
<td>Symantec Anti Virus</td>
<td>$64</td>
<td>$2</td>
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<tr>
<td>Symantec Utilities</td>
<td>$95</td>
<td>$3</td>
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<td>Warner Beethoven CD ROM</td>
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Ilisi Cache Card $199
Ilisi 030 Slot Adaptor 59
Ilisi FPU 75

Ilisi 64K Cache Card
Ilisi20MHz FPU

Ilisi 030 Adaptor—$59
Faster than Apple’s NuBus adapter—runs at 20MHz, not 10MHz.

Ilisi 64K Cache Card $199
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(800) 284-0486
(512) 832-8282
(512) 832-1533 (FAX)

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Free with all our drives.

Breathe a sigh of relief. Our drives come with a 2 or 5 year factory warranty.

To minimize hard drive failure, we use only high quality mechanisms that come with extended warranties. Our Quantum drives come with a two year revolving warranty. Micropolis drives are covered by a 5 year factory warranty. Since time is money, we'll do our best to get your system up within hours. If you experience a drive failure within the first year, we can replace your drive with an identical one within 24 to 48 hours.**

Break the $3,000 barrier on optical storage.

Take advantage of the Sony Optical 600 drive at only $2,995.

• Take a look at the new XAPSHOT still video camera from Canon. XAPSHOT allows you to import high quality still video images into your Mac using a frame grabber. It stores up to 50 images on 2" diskettes and can be connected to your TV for previewing. Great for video, slide graphics and print work. Demo Diskette shipped overnight for only $10. XAPSHOT $429 XAPSHOT Bundle w/24-bit frame grabber $749 2" video diskette $10

XAPSHOT.

The quickest way to bring 24-bit images to your Mac.

Take a look at the new XAPSHOT still video camera from Canon. XAPSHOT allows you to import high quality still video images to your Mac using a frame grabber. It stores up to 50 images on 2" diskettes and can be connected to your TV for previewing. Great for video, slide graphics and print work. Demo Diskette shipped overnight for only $10. XAPSHOT $429 XAPSHOT Bundle w/24-bit frame grabber $749 2" video diskette $10

When it comes to performance, noise level, price and speed, our drives are your best all-around choice. In fact, Macworld named our TSP's the fastest of all drives in its category.** Our drives were also the quietest tested*** Macworld also said Third Wave has "one of the best manuals" as well as "Third Wave has a solid track record."**** In the hard drive business, it's not just what you buy, but who you buy it from that makes the difference. So what are you waiting for?

Quietest and fastest drives.

Internal & External Disk Drives

<table>
<thead>
<tr>
<th>Drive Speed</th>
<th>Internal</th>
</tr>
</thead>
<tbody>
<tr>
<td>40** Special Offer!</td>
<td>$199</td>
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<tr>
<td>52L*</td>
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<tr>
<td>105L*</td>
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<td>1000</td>
<td>$199</td>
</tr>
<tr>
<td>1500</td>
<td>$199</td>
</tr>
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</table>

The most affordable DATAdrive™ on the market,—$1495.

Third Wave's DATAdrive™ with Retrospect—backup an entire network on a single DAT cartridge. Now available with 2 gigabytes of storage.

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tr>
<td>485R SyQuest, one cart</td>
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<td>885R SyQuest, one cart</td>
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<td>150L Teac Tape Backup</td>
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<td>DATAdrive™ 2.0 DAT Backup</td>
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<td>OptiDisk™ 600 Sony Optical Drive</td>
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<td>OptiDisk™ 1000 Taihiti Optical Drive</td>
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</table>

*Low power internal drives that meet Classic, 11x and LC power specifications. Premium enclosure with universal power supply available. All drives pictured are in premium enclosures.

Circle 156 on reader service card
### America's Largest Macintosh Hardware Source

#### Hard Disk Drives

**Internal Drives**

For the: MacClassic, Mac SE, Mac SE/30, Mac IICx, IIC, IIIs, Mac II, and Mac IIx.

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Warranty</th>
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<td>426 Megabytes</td>
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#### Removable Hard Drives

**SyQuest**

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<td>84 Megabyte Removable</td>
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*Cartridge Not Included

#### External Drives

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<td><strong>Seagate</strong></td>
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<tr>
<td>426 Megabytes</td>
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#### Printers

**PostScript® Laser Printers**

- NEC
  - SilentWriter Model 90 .......................... $1,599.99
- OKI
  - Model 840 ........................................... $1,799.99
- QMS
  - PS410 .................................................. $1,875.99
- Qume
  - CrystalPrint MacPublisher .................. $1,599.99
  - CrystalPrint Publisher II ................ $1,995.99
  - CrystalPrint Express ....................... $3,495.99
- Texas Instruments
  - PS17 Microlaser .................. $1,345.99
  - PS35 Microlaser .................. $1,645.99

**Ink Jet Printers**

- Apple
  - StyleWriter ........................................... $479.99
- Hewlett Packard
  - DeskWriter ........................................... $499.99

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Most major credit cards accepted. All shipments made by Airborne Express Standard Air which is 1-to 2 day service. Call for shipping costs. Products purchased in error are subject to 20% restocking fee. All prices subject to change without notice. All products subject to availability.
### Software

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<td>Adobe</td>
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<td>Ready, Set, Go</td>
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<tr>
<td>Quark</td>
<td>Quark Express</td>
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### Monitors

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<td>14&quot; Color Monitor</td>
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<td>14&quot; Color with 8 bit Video Card for Mac II</td>
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<td>14&quot; Color with 8 bit Video Card for Mac SE/30</td>
<td>$699.99</td>
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<td>14&quot; Color with 24 bit Video Card for Mac II</td>
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<td>NEC</td>
<td>MacSync 14&quot; Color</td>
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<td>Radius</td>
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<td>Color Pivot Iicl/Iiisi</td>
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<td>Seiko</td>
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### Video Cards

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<tr>
<td>Micron</td>
<td>8 bit SE/30 640x480</td>
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<td>8 bit II 640x480</td>
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<td>24 bit II 640x480</td>
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<td>RasterOps</td>
<td>24si Color Board</td>
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<td>24s Color Board</td>
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<td>264STV</td>
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<td>364 Color Board</td>
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### Scanners

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<tr>
<td>Cannon</td>
<td>XAPSHOT 24 bit Bundle</td>
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<td>Microtek</td>
<td>600ZS Color</td>
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<td>600GS Gray Scale</td>
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<td>Slidemaker Slide</td>
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### Keyboards

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<th>Company</th>
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<tr>
<td>Keytronic</td>
<td>MacPro Plus</td>
<td>$139.99</td>
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### Modems

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<td>Abaton</td>
<td>24/96 Send/Receive</td>
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### Memory

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<th>Company</th>
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<td>Mac Plus/SE 100ns</td>
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<td>Mac II, Ilx, Ilcx, Ili, Ili 80NS</td>
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<td>Mac Ilx 80NS</td>
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<td>4 Megabyte Module 80NS</td>
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<td>Apple LaserWriter INT, INTX</td>
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<td>QMS PS410 2 Megabyte</td>
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<td>Texas Instrument Microlaser 1 Megabyte Upgrade</td>
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### CD ROM

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<th>Company</th>
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<tbody>
<tr>
<td>RTM</td>
<td>RC 680M CD Player</td>
<td>$459.99</td>
</tr>
</tbody>
</table>

### CD Software Special

Get $600 worth of software programs for only $139 when you purchase an RC 680M CD player from MacLand. You get illustrated *Encyclopedia, World Atlas, and Time Table of Science & Innovation*. The bundled price of the RC 680 CD Player and software is only $598.99!

### Accelerators

<table>
<thead>
<tr>
<th>Company</th>
<th>Model Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>DayStar</td>
<td>Fast Cache Iicl</td>
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<tr>
<td>Micron</td>
<td>Iicl 128K Cache Card</td>
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</tr>
<tr>
<td>Radius</td>
<td>Rocket 040</td>
<td>$2,295.99</td>
</tr>
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TokaMac 040
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Macintosh LC
$1715

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3.0 $335
Adobe System Incorporated

NEW! Adobe
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Bottom Line Distribution 1800 Rio Grande, Austin, Texas 78701
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9 ppm output • Postscript Level 2 RISC processor
AppleTalk interface included on all models
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### Microtek 600GS $1118
600 DPI Gray-scale Scanner with Photoshop LE
Microtek ScanMaker 1950s Slides Scanner $990

### TI microLaser PS/17 $1245
TI microLaser PS/35 $1545
AppleTalk interface included on all models
1MB TI Upgrade $68 • Replacement Toner $55

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<th>SOFTWARE</th>
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<td>Microfot 8mb Removable</td>
<td>Aldus Design Team</td>
<td>Adobe Fonts from 64</td>
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<td>Aldus FreeHand 3.0</td>
<td>Adobe PhotoShop 2.9</td>
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<td>After Dark 2.0.2</td>
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<th>radius™</th>
<th>Mac LC Math CoProcessor</th>
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<tr>
<td>RasterOps 360... IT'S BACK!</td>
<td>Radius Rocket 60 Accelerator</td>
<td>Mac LC Math CoProcessor</td>
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<tr>
<td>RasterOps 28TV</td>
<td>Radius Pixel/Color Printer</td>
<td>or Mac LC VRAM Upgrade: Upgrade your Mac LC!</td>
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<td>RasterOps 240</td>
<td>Radius Color Printer Interface II, IL, SE/30</td>
<td>MS Excel 3.0</td>
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<tr>
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HARD DRIVES

<table>
<thead>
<tr>
<th>Mbytes</th>
<th>Mechanism</th>
<th>Access</th>
<th>Internal</th>
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REMOVABLE HARD DISK

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OPTICAL STORAGE

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TAPE BACKUP

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<td>150Mb Teac</td>
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<td>Extra 150Mb Tape</td>
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MEMORY

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<tr>
<td>1Mb (18x-80m)</td>
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<tr>
<td>4Mb (18x-80m)</td>
<td>$199</td>
</tr>
</tbody>
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Hardware

Bar Code ............................................. 271
Computer Systems ................................. 271
Memory Upgrade .................................... 274
Peripherals ........................................... 275
Printers .............................................. 276

Software

Architecture ......................................... 276
Astrology ............................................. 276
Bar Code .............................................. 276
Business .............................................. 276
CAD/CAM ............................................. 277
Clip Art ................................................ 277
CD-ROM .............................................. 278
Communications .................................... 279
Educational ......................................... 279
Engineering ......................................... 279
Entertainment ...................................... 280
Fonts .................................................... 280
Genealogy ............................................ 280
Graphics .............................................. 280
Graphics Translators .............................. 280
HyperCard Stacks .................................. 281
Import/Export ....................................... 281
Languages ............................................ 281
Medical ............................................... 281
Music/MIDI .......................................... 282

Nutrition ............................................... 282
Programming Tools ............................... 282
Property Management ............................. 282
Public Domain ...................................... 282
Real Estate .......................................... 283
Sales/Marketing .................................... 283
Scientific ............................................ 283
Sign Making ......................................... 283
Statistics ............................................ 283
Training ............................................... 283

Services

Computer Insurance ............................... 283
Computer Repair .................................... 283
Data Conversion ..................................... 284
Data Recovery ....................................... 284
Desktop Publishing ............................... 284
Laser Recharge ..................................... 284

Accessories

Diskettes ............................................. 284
Furniture ............................................. 284
Mouse Pads .......................................... 285
Supplies ............................................. 285

Miscellaneous

Clothing .............................................. 286

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**MacLC 4/80**

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**MacLC 4/105**

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**MacIIC 3/40**

658

**MacIIS 5/80**

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**MacIIS 5/120**

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**MacSE 30 2/40**

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**RADIIOUS FOR MAC II SI** 735
**MAC PORTRIT MONITOR** 739

**SHOP THE REST, AND THEN BUY FROM THE BEST... MacBest**

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<thead>
<tr>
<th>Model</th>
<th>Description</th>
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<tr>
<td>MACCLASSIC 2MB-4MB</td>
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<td>MAC II 16MB-32MB</td>
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- **IMAGEWRITER II** 389.00
- **PERSONAL LASER NT** 1790.00
- **PERSONAL LASER LS** 1899.00
- **LASERWRITER II NT** 2675.00
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- **Reduction**
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Macworld's circulation grew 16.1% during the same period.**

* IDC, July 1990
** BPA ConsumerTrac, December 1990

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Contains MacPassword Demo for security, and virus protection. INIT COEV to turn INITs on and off, SCSI Probe 3.0 which scans all SCSI ports are in use and more.

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Control all Mac sounds: startup, restart, shutdown, beep and more! This CDEV works with system 7.0.
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29 terrific startup screens for a change of pace.
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4034 Clip Art Extravaganza
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3431 Preschool Education
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100 high resolution EPS pictures.
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automatically generates source code in
Language Systems FORTRAN.
AppMaker, from Bewers Development, is
a software tool for creating Macintosh applications quickly, directly and
consistently with a minimum of programming.
FORTRAN Tools for AppMaker is the first product that pro-
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Source: 1990 Macworld Subscriber Study

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- Space Saving
- Strong
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The Macworld Catalog

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MacII
Mac
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Mac LC

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**Microsoft Word**
Microsoft Corporation

**Microsoft Excel**
Microsoft Corporation

**FileMaker Pro**
Claris Corporation

**Microsoft Works**
Microsoft Corporation

**Aldus PageMaker**
Aldus Corporation

**WordPerfect**
WordPerfect Corporation

**MacWrite II**
Claris Corporation

**QuarkXPress**
Quark

**QuickDraw**
Intuit

**Adobe Illustrator**
Adobe Systems

## MASS STORAGE

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**MacStack SD40**
CMS Enhancements

**Infinity 40 Turbo (Removable)**
PLI

**Platinum PI 40 (Internal)**
CMS Enhancements

**UltraDrive 80**
GCC Technologies

**UltraDrive 45**
GCC Technologies

## ADD-IN BOARDS

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**Pivot**
Radius

**FastCache IIc**
DayStar Digital

**Macintosh IIsi NuBus Adapter Card**
Apple Computer

**Apple Ile Card for Macintosh LC**
Apple Computer

**Radius TPD Interface**
Radius

## UTILITY SOFTWARE

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**SAM II**
Symantec Corporation

**The Norton Utilities for the Macintosh**
Symantec Corporation

**SUM II**
Symantec Corporation

**After Dark**
Berkeley Systems

**Pyro**
Fifth Generation Systems

## ENTERTAINMENT SOFTWARE

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**SimCity**
Maxis

**Tetris**
Spectrum HoloByte

**SimEarth**
Maxis

**RoboSport**
Maxis

**Welltris**
Spectrum HoloByte

## EDUCATION SOFTWARE

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**Kid Pix**
Broderbund Software

**Where in the USA Is Carmen Sandiego?**
Broderbund Software

**Reader Rabbit**
The Learning Company

**Math Blaster**
Davidson & Associates

**Where in the World Is Carmen Sandiego?**
Broderbund Software

## NETWORK/DATA COMMUNICATIONS

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**White Knight**
FreeSoft

**AppleShare**
Apple Computer

**TOPS**
Stika Corporation

**DataClub**
International Business Software

**MicroPhone II**
Software Ventures

## PRODUCT WATCH

Recent or forthcoming products of particular interest.

**Fair Witness**
Chen Software

Electronic blackboard for data and work management

**QuickTime**
Apple Computer

System software addition for including video, sound, and animation in applications

**ColorStudio 1.5**
Letraset

Color-manipulation program now includes ColorTalk language for programmable effects

Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order vendors. Covers sales during June 1991.

*Does not include hard drives installed at the factory.
There Are Very Few Things As Trustworthy...
ProView 20" Trinitron® color systems are half the price of Radius yet rated higher in MacUsers' Color Buyers' Guide (4.5 mice rating). Our PixelView full page and two page monochrome models are available for all Macs including the Plus and Classic.

And now, Mirror has a new troop of Mac peripherals including compact portable drives, a 14" Color Monitor for the LC, SI and CI and the Mirror 600 Color Scanner. All with the same trustworthy Mirror name.

Before you buy a Macintosh peripheral from a company that may expire before its warranty, give us a call at 1-800-654-5294.

No need to scout around anywhere else.

Mirror's 20" Trinitron Display
System is available in 8 bit for $2897
and 24 bit for $3897.

To Order Direct, Call 1-800-654-5294
Mirror has been a trusted name in Macintosh peripherals for almost as long as there has been a Mac. You see, we believe in treating customers the old fashioned way: offering a reliable product at a fair price, and backing it up with a 30-day, money-back guarantee.

The line-up begins with our dependable, hard-disk drives, designed to fit nearly every need and budget. From the affordable 40 MB drive to the versatile 45 MB removable to our top ranked CD-ROM, you'll get the best value in the industry. And a two-year warranty.

If you're looking for a big screen monitor, you can save literally thousands by buying direct from Mirror. Our critically acclaimed

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<td>88MB Rem.**</td>
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*(Q) Denotes Quantum mechanism  
** Price includes 1 cartridge

The new 14" Color Monitor for the LC, S1 and CI is now available for just $397.

Our flicker-free 15" Portrait Display allows you to view a full page. $497

The 24 bit Mirror 600 Color Scanner comes complete with a free copy of Adobe Photoshop LE. $1397

Portable 40 MB $297  
or 80MB for $397.
SPACE THAT WORKS

You’re tripping over your keyboard. Your CPU needs its own desk. Your monitor is too low. That report you’re working on has vanished. Paper is everywhere.

But don’t give up.
What you need is some help from Kensington. Increase valuable desk space with our new Keyboard Shelf for the compact Mac, or with Keyboard Slideaway® for the Mac II.

Both do more than just get your keyboard out of the way.

Keyboard Shelf’s recessed storage compartment is ideal for holding pens, disks and other desk items. And Keyboard Slideaway extends a narrow desktop into a wider workspace.

Another way to increase your workspace is our sturdy Mac II stand. The perfect addition for anyone who wants to get their CPU off their desk and onto the floor.

For the compact Mac, there’s Maccessories® Tilt/Swivel. With it, you can rotate your Mac up to 100° and tilt up to 16° for just the right viewing position. And unlike other tilt/swivels, we’ve combined heavy duty plastic and high density polyethylene for an ultrasmooth movement.

What’s more, Kensington’s products fit right in with the design of your Mac. The styling is complementary. The colors identical. Even the same materials are used.

Kensington.
Because you can’t work efficiently if your space doesn’t work.

For a free brochure and the dealer nearest you, call 800-535-4242, OR 415-572-2700.