We Asked Readers to Rate Over 1900 Products Find Out the Results in Macworld's Sixth Annual World-Class Awards, Page 120
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*The Microsotf Office contains software for a single Macintosh or PC workstation version of Mail. Microsoft Mail server software must be purchased separately and installed on a Macintosh workstation on the network. © 1992 Microsoft Corporation. All rights reserved. Mac are registered trademarks of Apple Computer, Inc.
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Our MultiSync FG monitors also feature FullScan™ capability, for edge-to-edge images. And our exclusive AccuColor® Control System lets you adjust your on-screen color to match your printed output. The MacFG™ Board is NuBus™ compatible and includes QuickDraw™ acceleration. And it’s available in two versions. The MacFG 8X supports 8-bit color and the MacFG 24X supports 24-bit color. So take a look at these display systems. We’re sure you’ll see things our way. For more information, call 1-800-NEC-INFO. (In Canada, 1-800-343-4418.) Or for information via fax, call 1-800-366-0476, request # 62234.

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10:12 Process

Canon digitizers allow still video images to be easily input to Macintosh®, PC, or NeXT® computers. Integrate graphic files into applications like DTP, Databases, Multimedia and Presentations. You can even record from your computer back to video floppy with our Electronic Still Presentation systems.

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<th>MODEL</th>
<th>OUTBOUND NOTEBOOK 2000</th>
<th>APPLE POWERBOOK 100</th>
<th>OUTBOUND NOTEBOOK 2030</th>
<th>APPLE POWERBOOK 140</th>
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<tr>
<td>Upgradeable CPU</td>
<td>YES</td>
<td>No</td>
<td>YES</td>
<td>No</td>
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<tr>
<td>Internal Floppy Standard</td>
<td>YES</td>
<td>No</td>
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<td>Processor Speed</td>
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<td>68000 MHz</td>
<td>68000 MHz</td>
<td>68000 MHz</td>
<td>68000 MHz</td>
</tr>
<tr>
<td>Maximum Hard Drive Available</td>
<td>120 MB</td>
<td>40 MB</td>
<td>120 MB</td>
<td>80 MB</td>
<td>120 MB</td>
</tr>
<tr>
<td>Full size silent keyboard and true notebook size</td>
<td>YES</td>
<td>No</td>
<td>YES</td>
<td>No</td>
<td>YES</td>
</tr>
<tr>
<td>Maximum RAM Available</td>
<td>4 MB</td>
<td>8 MB</td>
<td>4 MB</td>
<td>8 MB</td>
<td>14 MB</td>
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<tr>
<td>Math Coprocessor</td>
<td>No</td>
<td>No</td>
<td>Optional</td>
<td>No</td>
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</tr>
<tr>
<td>Price</td>
<td>$1999</td>
<td>$1959</td>
<td>$2999</td>
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<td>$2999</td>
</tr>
</tbody>
</table>

Notebook prices based on retail sales. PowerBook prices reflect published Apple retail pricing. Technical specifications and prices subject to change without notice.

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<td>MacWeek Target Award; ☀ ☀ ☀ ☀ ☀</td>
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<tr>
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Direct questions or tips on how to use Mac computers, peripherals, or software (by mail or electronically) to: Quick Tips, Los Angeles. Please include your name and address.

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Andrew Fliegelman 1983-1988
Snyder Newell, 1943-1983

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Number 8

18 August 1992

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4BAE0
New Lawsuit: Quorum is developing software for converting Mac applications to run under Unix (see “Better Than a Mac Clone?” News, Macworld, May 1992). Apple accused Quorum of infringing Apple patents; in response, Quorum has filed a preemptive suit against Apple. Stay tuned.

Apple-Approved Translator: Apple and AT&T-owned Echo Logic (908/946-1100) are working on tools similar to the Quorum product (see “New Lawsuit”) for translating Mac software to the IBM RISC platform that Apple plans to use in a future Macintosh.

A very fast optical drive from Pinnacle Micro (714/727-3300) uses a faster spin rate and an advanced read-write-head design to achieve average access times and data-transfer rates equivalent to those of hard drives at 19ms. The PMO-650 drive will list for $3995.

Portfolio Systems (408/252-0420) is working on a new version of the paperless-document utility Glue that won’t require using the Chooser and will be able to incorporate a viewer engine in files. Dynodex 3.0 will support Apple events and provide a text editor for memos and mail merges. Prices are not set.

Tiny removable-cartridge drives from SyQuest, the SQ2542A and the SQ3105, are, respectively, a 2.5-inch device that stores 42.8MB and a 3.5-inch device that stores 105MB. The 3.5-inch drives will be used in Mac products expected from third parties by the end of the year.

Centralized Communications: Start-up Atelier Systems (415/285-1233) is developing Hello, a $99 modular utility that will make a unified address book available in all telecom software. The first version will provide a text editor and will send fax numbers to a fax modem; later plans call for integration with E-mail and mail- or fax-merge.

The Future of PageMaker: Aldus (206/622-5500) hasn’t set a ship date or price, but the next big PageMaker upgrade will be able to rotate text and graphics by tenths of a degree; open multiple documents; and print color separations from within PageMaker.

The Color Pivot/LE from Radius (408/434-1010) is a lower-cost version of the company’s Color Pivot monitor, which swivels from portrait to landscape orientation. The Color Pivot/LE lists for $1199, versus $1549 for the Color Pivot, but the LE requires an adapter board, while the original works with the built-in video on some Mac models. The Color Pivot/LE is shipping now.

Mac to Tandem: Menlo Business Systems (415/948-7920) has released MacMenlo 4.0, a terminal emulator for Tandem systems running Guardian OS. It is System 7-compatible, provides macros, and supports copy and paste in both directions. MacMenlo lists for $395.

Dove Files Chapter 11: The company is attempting to reorganize and has filed for protection from its creditors.

SGI Supports QuickTime: The leader in 3-D color graphics systems and software, Silicon Graphics, will add QuickTime support to its applications, so they can play and exchange QuickTime movie files with Macs.
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Product Testing and Late Nights at the Lab: Part 2

By Jerry Borrell

Last month I raised several questions related to how Macworld deals with product-testing. In this column I discuss several more issues. Before going on, it may be helpful for you to understand how we organize our testing. Generally, for each issue we select two or more features that will contain product-testing data from our lab. Typically these are hardware stories. We cover main topics, in several features throughout the year.

Last month I raised several questions related to how Macworld deals with product-testing. In this column I discuss several more issues. Before going on, it may be helpful for you to understand how we organize our testing. Generally, for each issue we select two or more features that will contain product-testing data from our lab. Typically these are hardware stories. We cover main topics, in several features throughout the year.

With technology more complex than hard drives, the discussion may be more contentious. For example, an upcoming lab feature will cover slide scanners. Initially that article was to focus on color scanners, but we realized that the topic was too broad for a single feature. We agreed to focus on one subset of scanners (slide and transparency scanners) that we felt was, in terms of technology and reader interest, the one most in need of examination.

In that article was to focus on color scanners, but we realized that the topic was too broad for a single feature. We agreed to focus on one subset of scanners (slide and transparency scanners) that we felt was, in terms of technology and reader interest, the one most in need of examination.

Product Testing Cycles

The process of gathering product information for a feature is not precise, but the following approximates what happens. Once the topic and scope are decided, a staff member searches our database to produce a list of known products in that category. We also sort through files of articles, review press announcements, consult with one another, review online services, pull out notes from product demos, look at ads in magazines, and consult other sources of product information so we can produce as complete a list of products as possible. Frequently we call vendors and ask if they will be making product announcements that will affect the article, asking to sign nondisclosure agreements if necessary to gain advance access to product information.

Given the above as a starting point, assistant editor Suzanne Courteau calls companies and tells them that we would like to obtain products pertinent to an upcoming article. Just trying to get the products we want to review can be a harrowing procedure. It often takes several calls to obtain products from a single manufacturer. In the process of calling manufacturers, we often discover that products, or product families, are being discontinued or being replaced by new products. Thus begins a tango in which we might knowingly test products that may be in the market for only a short while; in which we might discover that a new product or product line is indeed not going to ship on time; or in which we might find that new products promised or already advertised by manufacturers are not ready to ship, let alone be tested.

Worst of all are the late-comers, products that arrive just after we have finished work on one article and begin work on another. Products that have to be dealt with for whatever reason—screws at the developer, parcels missing in transport, products misplaced, products that arrived broken and had to be exchanged for another, products from companies that no one on staff has heard of, or significant new products that just came through the door. Perhaps inevitably—given the number of products we look at, the complexity of our tests, and the fact that we ship a magazine once a month—some products may be missed. But we try to work closely with developers to ensure that the appropriate products in the market are included in the right articles.

Product Acquisition and Review

Having settled on a list of products appropriate for an article, we set about acquiring them from the manufacturers. We do not accept beta products for review, but the distinction between a just-about-to-be marketed product and a final prototype apparently isn't always clear to the manufacturers—and that sometimes causes us problems. Many companies tell us that it would be best if we purchased products for testing from sales channels used by all consumers. These companies point out that the loaner system allows companies to "cherry pick" the best units and send them to us, which doesn't fairly represent product lines.

That suggestion raises two issues for Macworld. The first is the economic consideration of product purchase. Like car magazines, all of today's computer magazines depend on hardware companies to provide them with review units. Given the number of products that Macworld reviews in a year (about 1200 this year alone), we couldn't purchase all of the products that we need to review. Unlike Consumer Reports magazine, all computer magazines are for-profit ventures. There is simply no way for us to purchase all the products that we have to test and remain profitable, unless we were to reduce the scope of our product testing drastically.

The second issue, whether...
er to allow manufacturers to select products they submit for testing, is equally tough. Cherry picking was best defined once by Mike Boich of Radius, who described going onto the manufacturing floor and asking his vice president of manufacturing to select the best product on the line at that time for a magazine. (The response of his VP was pick any one you want, they're all the same.) Over the last several years I've attempted to persuade developers and our staff that the process of developer-driven product submission allows us the opportunity to review the best products that the companies can produce—assuming that manufacturers are honest, that they do not intentionally send us products built to higher specifications than the ones they intend to sell to consumers.

To date, I'm glad to report, not once have we found a manufacturer attempting to do that. In fact, we sometimes find that manufacturers pay all too little attention to the review process, mistakenly sending us old products or products that don't work at all. We sometimes receive products from major manufacturers that are well below the quality of their average products. This happens because some companies create product loan pools for the exclusive purpose of supporting magazine product tests and reviews. We have on occasion received a product so beaten up by review at several magazines that we have to tell the manufacturer that the individual product we have is obviously below the quality of the products they sell.

**Product Tracking**

It may seem trivial to bring up shipment, receipt of boxes, visual inspection of newly received products, verification of receipt of proper products, logging products into a database, the requisite support tracking, and other issues involved in returning products to vendors—but it's not. These tasks that support our testing require nothing short of a sophisticated warehousing effort. The physical demands alone for a feature such as large color monitors involve a ton or more of products that require significant storage space. Pulling monitors out of their boxes and plugging them in, just to verify that we have a working product to test at a later date, is a time-consuming process. Such tasks are the hidden part of every test cycle that has slowly built up over the years as product categories have grown, in the case of color monitors, for example, from 8 to 17 to 26 products in an upcoming issue.

We always experience a few surprises in each test cycle. Consider that we may be testing two sets of products at one time, such as monitors and hard drives, that add up to between 60 and 200 products. Another group of products, having been tested, await return to developers; others await a photography session for inclusion in the feature article. And still more groups of products—for example, CD ROM drives and scanners—have begun to arrive for upcoming articles.

It gets a little crazy around here about then. Let's just say that the lab staff begin to look like characters from a grade B science fiction or teen slasher film. You have to wonder if one more product coming in late might just be the one that turns a normally sedate person into a murderous postal worker.

**When Do We Get Down to Testing?**

It's hard to believe, but eventually we get products lined up on lab benches and start connecting them to computers. Then what?

Well, we test products. But how do we decide what tests we should apply to each category of products? In each instance we develop written guidelines that we call test scripts. The process of development varies, but typically there are discussions among the editors, contributing writers, lab staff, and developers or other knowledgeable third parties. Because we look at similar products each year, we begin with our own experience, but changes in technology dictate that with each testing cycle we must consider changes in existing tests or adding new tests. The truth is, no magazine has enough expertise on all products and technologies to allow it to develop completely independent tests. So we look outside for knowledge. Professional associations such as the IEEE (Institute of Electrical and Electronics Engineers), ACM (Association for Computing Machinery), SID (Society for Information Displays), and others have subgroups in many areas of expertise that we learn from. And of course we seek out authors with hands-on experience and technical expertise. But for the most part, it is product developers who are the most helpful. Many of the larger companies have their own QA (quality assurance) groups that test products. There is much general contact between these engineers and Macworld staff. This year we're hosting four specific meetings: on hard drives, printers, networking, and desktop publishing.

**What Kinds of Tests?**

As I said in my column last month, we're attempting to de-emphasize the superficial parts of the lab process: testing for the sake of testing, considering aesthetic issues, trying to determine how many angels fit on the head of a pin. There is a lot of this sort of thing in computer magazines, and it looks great in three-dimensional charts, but it doesn't have much practical value to our readers when they purchase products.

We used to produce impressive charts that looked good on the page, but didn't give the reader much to take into the computer store. So we've made an effort to improve our charts. In the area of hard drives, for example, we have always focused on real-life or application testing: opening, saving, and closing documents. We added new tests that isolated products from the Mac OS and examined the actual performance of a drive, the physical limits of how quickly data could be written to or read from a hard drive. At that point our testing had become sophisticated enough to show distinctions between classes of technology—if manufacturers were using the same cathode-ray tube in a monitor or the same hard drive mechanism. When our hard drive performance tests show unimportant millisecond differences, we can determine if this reflects common drive mechanisms; when we find greater differences, we can determine whether they reflect different drive mechanisms or companies' varying effectiveness in developing software drivers or in dealing with the overhead of the operating system for the Macintosh. We can produce great engineering analyses of products these days, but the differences we find between many products may not actually be noticeable to the end user, or meaningful. We need to continue to examine these kinds of issues, tracking the differences in types of technology that manufacturers use. But more than ever we continue...
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COMMENTARY

question how much detail at that level is appropriate to include in the magazine.

Data Representation

A TOPIC OF FREQUENT DEBATE HERE IS how data should be presented in the magazine's tables and charts. Two years ago we agreed to a standard format for our test results; products run down the vertical axis of a chart and tests run across the horizontal axis. We decided against three-dimensional charts because of the difficulty in reading them. And we began to simplify our use of color to lessen the visual noise.

We continue to debate the issue of the use of color, both in the representation of data and in how to represent aspects of actual color. In a color-monitor feature, for example, how can we best show where the range of colors you see on a monitor falls within a three-dimensional color-space model using a table printed in a two-dimensional magazine based on a color system developed for printing, not monitors?

As tests became more complicated we made the decision to index test results, that is, to establish a benchmark for each test, a fixed data point against which we would show all the results. The result in the magazine was tables that technically oriented readers found useful, but that many readers considered uninterpretable. For readers who could wade into the charts and spend some time studying them, there was information to be gleaned. We questioned whether we were making the magazine too difficult. So we have returned to a simpler format for representing data that we believe is easier to understand. Still, we continue to debate and refine how we create data charts for your use.

Where Are We Headed?

WE WANT TO EMPHASIZE TESTS THAT give the consumer more than speed comparisons. We want to report on compatibility, functionality, reliability, and other issues that you don't typically find out about until you've spent a fortune and brought the product home; these are issues that don't normally show up in tables and charts of performance benchmarks.

And like all the testing issues mentioned above, reliability, compatibility, and related issues have their own sets of problems. For example, we want to report on how manufacturers handle technical support, so we are exploring how best to rate such service. For the story on low-capacity hard drives in this issue, we devised a rating system in which manufacturers gained or lost points based on the accuracy, helpfulness, and accessibility of their responses. The result appears on page 137.

Another solution we've come up with is the Lab Notes column, which we created to help our readers understand the issues behind the lab testing done each month by our editors and staff.

We have talked about a facility for long-term testing, environmental testing (shock, heat/cold, vibration), and even more sophisticated benchmarks. The reality is that we'll probably continue to refine our tests in every category, building on our expertise every year, adding scripts that will automate the testing process to the extent possible. We'll continue to debate the best ways to present our results in the magazine, and we'll err on the side of simplicity in the hope that you'll actually want to read our test articles. But don't stop there. Let us hear from you. We'd like to run a special supplement on this topic in the Letters section in an upcoming issue, so please write us with your comments.

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Experiencing System 7

STEVEN LEVY MADE ME HUNKER down even more about keeping my loyal System 6.0.7 running (The Konradat, May 1992). The 7.0 SWAT teams are outside my office right now, and all I can hope for is that software developers nationwide keep supporting their pre-7.0 software versions.

Mark Sieler
Java, South Dakota

AFTER MONTHS OF READING about the wonders and the absolute necessity of System 7 (read: God's gift to Mackind), it is heartening to finally read Steven Levy stating that System 7 may not be for everyone.

Of the many people I know who use the Macintosh, six of us upgraded. While there were some nice features, for the most part, these were features we were able to use with different INIT's before. The main problem is that System 7 took away capability—by making things slower and leaving far less room in RAM.

Matt Ball
Urbana, Illinois

MY MOVE TO SYSTEM 7 HAS BEEN relatively trouble-free, and it seems to me that Steven Levy's description of Randall Rothenberg's situation makes an unfair generalization from a case of poor planning.

System 7 did not cause unreasonable upgrade prices, but many software developers are taking advantage of the situation to boost sales. This stinks, but we can hardly blame Apple for it.

Craig Berry
Chicago, Illinois

I FEEL SORRY FOR RANDALL ROTHENBERG, but for someone who "takes computing seriously," he is not very computer wise.

Why would someone pay $99 for a system upgrade when he could have received it free from a dealer (with his own disks) or downloaded it for a few dollars online? What Steven Levy should be writing about is the dealer who charged Rothenberg $190 to buy and install 2MB of RAM.

Pam Goetsch
Eugene, Oregon

Up on Memory

WITH THE VERY THOROUGH TEXT and excellent supporting photos in "How to Keep Your Mac Current" (May 1992), I was motivated to upgrade my Mac le! with some more RAM. The article led me step-by-step through the process, which not only enabled me to save the installation cost of the SIMMs, but also gave me the confidence to install the memory myself so that I could order it directly at an additional savings.

My subscription for many years to come has been paid for in the savings on this undertaking. Keep up the good work.

K. R. Zieglerbner
Cran Plains, Wisconsin

The article makes no mention of the specific hazards of coming into contact with a charged CRT. To upgrade a compact Mac properly, you must first discharge the CRT following Apple's authorized procedures. This requires donning protective goggles, in case of CRT implosion; removing all jewelry; and while ungrounded, discharging the CRT with the discharge tool. Once the CRT is discharged, the red discharge cable should be disconnected from the CRT. If you do not want to disconnect the discharge cable, a wire with alligator clips at both ends should be used to keep the CRT from being recharged; one end should be clipped to the ground wire of the CRT and yoke assembly, and the other end should be attached to the hole in the CRT where the discharge cable is attached. Now it is time to continue.
I am currently running System 7.0.1 on a Macintosh Classic II. In your article “Taking Stock of System 7” (April 1992) you state repeatedly that Apple has available System 7.0.1 Tune-Up software. After talking to my dealer and to Apple, it seems that only System 7 Tune-Up is available. Please don’t add to my confusion! Apple already told me that I will receive no real benefit since I am already running System 7.0.1, except that I would get the latest versions of Chooser, File Sharing Extension, LaserWriter, and StyleWriter.

Patrick Gains via CompuServe

Taking Stock,
Some Confusion

I n regard to “Taking Stock of System 7,” it was an excellent study and a bit sympathetic, as are most articles about the new dog we’re all gearing up for. It’s not a tune-up, but turbocharging we need. Here’s my response:

Jay Babina
Branford, Connecticut

Simple SCSI

I n the review of Spectre 1.0, you say that this incredibly addictive game is incompatible with ATM (Review, May 1992). I run a Mac IIci 8/80 under System 7 with several extensions, ATM 2.03 among them, and I’ve encountered no problems running Spectre.

Also, in the same review, I feel that several items of interest were left out, such as the ability to play in three modes (first-person perspective, slot view as shown in the screen shot, and an overhead map-type view), the ability to play in various left- and right-handed keyboard combinations or with the mouse, and the ability to create your own tanks according to your specifications. Now you must excuse me... Spectre awaits!

Steven Gollan
Piscataway, New Jersey

Rash Barrier (Reviews, April 1992) was designed for nonprogrammers who want some options other than Restart. One of the major features your reviewer missed entirely was Rash Barrier’s ability to identify what the error message means. Before Crash Barrier, the user was left with a meaningless error-message dialog box. Crash Barrier identifies the problem, then makes an attempt to fix the problem. We are not promoting or claiming that Crash Barrier will save 100 percent of the time. No program or debugger can do that. We are offering an option where there was none in trying to reduce problems before they occur, save work at regular intervals, and—if disaster happens—offer the user the opportunity of saving.

Terry Kunye
Vice President, Sales & Marketing
Casady & Greene
Salinas, California

Readers on Reviews

Our review of Aldus PageMaker 4.2 was right on target and included many frustrating deficiencies other magazines don’t bother to report (Reviews, May 1992). As an avid PageMaker user (since version 1.2), I was extremely disap-
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More Radiation Studies

IN A RECENT LETTER, JAMES C. LIN of IEEE's Committee on Man and Radiation (COMAR) upbraided Macworld for mentioning possible linkages between electromagnetic-radiation exposure and miscarriages (Letters, April 1992). His argument was that most of the scientific research on whether VDT use increases miscarriage rates had not verified the many news reports of "miscarriage clusters" and the striking large-population statistical evaluations, such as the 1988 Kaiser Permanente survey of 1600 women, that had seemed to suggest that VDT and miscarriage links might exist.

If you’re looking in the wrong place, you won’t find what you’re looking for, but that doesn’t mean it doesn’t exist. Many of the ELF-radiation-exposure studies have looked at, say, 10 versus 40 hours a week of VDT use, and haven’t found a significant linkage to miscarriage; their premise was that any VDT and health link would be proportional to the exposure duration. But two new studies may finally have looked in the right place. In both of these new studies, the miscarriage effects appear to be proportional to the strength rather than to the duration of the ELF-radiation exposure; the weaker the radiation, the fewer the miscarriages.

Briefly, a new study of VDT-user radiation exposure at work reported to VDT News, an industry newsletter, by Dr. Maia Hietanen, a Finnish occupational health researcher, shows about three-and-one-half times the miscarriage risk between more-than-3.2 mG and less-than-1.4 mG exposures. Another new Finnish study, of similar ELF-magnetic-radiation exposure, but at home and from power lines rather than VDTs, reported a fivefold difference in miscarriage rates between more-than-2.5 mG and less-than-0.4 mG small exposures. Companies that help users understand and control their ELF exposure are perhaps doing a better job of serving the public interest than are big-business-backed organizations such as COMAR that deny any risks exist.

John Schaefer
President
Schaefer Applied Technology
Burton, Michigan

IN THE PAPER "OCCUPATIONAL EXPOSURE TO ELECTROMAGNETIC FIELDS AND BREAST CANCER IN MEN," the "exposure" was guestimated from the answers to questions about work history on a questionnaire filled in by cancer victims or their descendants. No indication is given...
If you think the only way to avoid running out of memory is to avoid running a couple of your favorite applications, think again. Think about all those memory-hogging fonts and sounds you've got stuffed into that bulging System File.

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| NEC | 6577 CDR-37 CD-ROM Portable Drive | $399. |
| 6626 General Reference CD-ROM Bundle | $529. |
| 6682 CDR-74 CD-ROM Drive | $599. |

Software Tools

4397 tTime Table of History (CD-ROM) | $77. |
3915 Grolier Encyclopedia (CD-ROM) | $249. |

Voyager | 30 day MBG
3917 A Silly, Noisy House CD | $39. |
3918 Baseball's Greatest Hits CD | $49. |

COMMUNICATIONS

MODEMS, MAIL, NETWORKS

Apple Computer
7073 Macintosh PC Exchange | $69. |
7101 AppleTalk Remote Access | $105. |
7102 AppleShare 3.0 | $199. |

Applied Engineering | 30 day MBG
8382 QuadrantLink (with AE Shadow) | $205. |

CE Software | 60 day MBG
8096 QuickMail (5 users) | $249. |
3867 QuickMail (10 users) | $375. |

CompuServe | 60 day MBG
1676 Macintosh Membership Kit 1.6 | $25. |
1673 CompuServe Navigator 3.1 | $49. |

Membership Kit/Navigator Bundle | 72 day MBG

| HaNey | 5101 HaNeyConnect 3.0 (modem sharing) | $75. |
| 2300 Smartcom II for the Mac 3.3B | $84. |
| 1454 OPTIMA 24 Modem 195. | $229. |

Insignia Solutions
7557 Access PC 2.0 | $60. |
9726 Entry Level SoftPC 2.5 | $125. |
4059 Universal SoftPC 2.6 | $195. |
3229 SoftAT 2.5 | $299. |

Logicode Technology
5122 QuickTel Xebra M962AX | $185. |
5524 QuickTel Xebra M963BX | $259. |
5523 QuickTel Xebra M1414XV | $329. |

Lotus Development | 30 day MBG
7121 check Mail Macintosh Platform Pack 2.0 | $449. |

MASS Microsystems
3955 Mass FM 24/36 (portable modem) | $185. |

Microcom | 30 day MBG
7459 CarbonCopy Mac 2.0 (single) | $59. |

Microsoft | 30 day MBG
9444 Microsoft Mail 3.0 | $269. |
3920 Practical Peripherals | 30 day MBG
9994 2400 V.42bis Modem | $125. |
7934 PM9600SA Modem 1.26 | $289. |
9849 SmartPack 9600 (with Smartcom ii) | $349. |

Prometheus | 30 day MBG
2590 ProModem 2400 Mini Plus | $129. |
4724 ProModem Home Office | $259. |
3920 ProModem Ultra Home Office | $489. |

| ASD Software | 30 day MBG
7065 FileGuard 2.7—Protect your hard drives, applications, files/folders (including System folder) from unauthorized access, deletion, and/or illegal copying | $138. |
7422 (5 user) | $799. |

DataViz | 60 day MBG
1823 MacLink Plus/PC 6.0 | $129. |
4842 MacLink Plus/Translator 0.6 | $109. |

Daysn | 60 day MBG
DaysnPORT TRX (BNC or 10 BASE-T) ea. $67. |
DaisyPORT E (10BASE-T) ea. | $149. |
DaisyPORT E: SE, SE/30 II, Lsi, LC. ea. | $149. |

Printer 345, 9998 (10BASE-T) ea. | $239. |
DaisyPORT SCSI (BNC or 10 BASE-T) 269. |
3664 NotMounter | $57. |

Dove Computer
6758 DoveFax 2.0 | $199. |
3352 NuBus 229. |
9654 DoveFax Plus | $265. |
4111 NuBus 299. |

Farallon Computing | 30 day MBG
3893 Full line of EtherMac Cards available | $269. |

3942 Practical Peripherals | 30 day MBG
9994 2400 V.42bis Modem | $125. |
7934 PM9600SA Modem 1.26 | $289. |
9849 SmartPack 9600 (with Smartcom ii) | $349. |

Prometheus | 30 day MBG
2590 ProModem 2400 Mini Plus | $129. |
4724 ProModem Home Office | $259. |
3920 ProModem Ultra Home Office | $489. |

| Virtus Corporation | 30 day MBG
4488 Walkthrough 1.1—Award-winning 3D drawing program. Includes real-time 3D presentations, QuickTime and PICS animation movies, and perspective pictures as well as data exchange capabilities | $309. |
LETTERS

that exposure to VDTs was considered. The statistics in this paper aptly illustrate the computing truism: "Garbage in, garbage out."

The readers of Macworld would receive more accurate information about electromagnetic theory and safety if you would follow the methods of archival journals and have properly educated reviewers, such as Dr. Lin, review manuscripts from entertainment writers of educational background, such as Paul Brodeur, before publication.

J. Robert Ashley
Tampa, Florida

"Occupational Exposure to Electromagnetic Fields and Breast Cancer in Men" appeared in The American Journal of Epidemiology's August 15, 1991, issue. Paul Brodeur specializes in medical and science writing and has won many national awards for his reporting on the dangers of asbestos, the hazards of enzymes in household detergents, the destruction of the ozone layer, and the effects of electromagnetic emissions.—Ed.

Toaster Image

I found the article "3-D: Structure, Surfaces, and Movement" in the February 1992 issue to be most informative. I did note a moderately surprising omission from the list of programs covered—LightWave 3D. For those not familiar with LightWave, it is the 3-D modeling, rendering, and animation package bundled with NewTek's Video Toaster. While I understand that the Toaster may be considered an Amiga product (after all, the original stand-alone Toaster for the Macintosh was an Amiga in disguise), it is an extremely popular Mac peripheral and hence of great interest to many Mac enthusiasts. I myself use the Toaster-based LightWave. Consequently, when I saw the test scene rendered by nine of the reviewed packages, I felt compelled to duplicate it in LightWave to show off its capabilities:

Mark Thompson
Merrimack, New Hampshire

Soon personal communication will be easy as saying:

HELLO

Say Hello
Macworld Expo Booth 354

Circle 216 on reader service card
### INPUT/OUTPUT

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<th>KEYBOARDS, MICE, TRACKBALLS, PRINTERS &amp; SCANNERS</th>
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### UPGRADES & DRIVES

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| 8136 | 1 MB SIMMs (80ns, set of 2) | 69. |
| 9437 | 2 MB SIMMs for Ill, Illc, etc. | 65. |
| 7437 | 4 MB SIMMs (80ns) 125, 7600 (set of 4) | 479. |

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<th>Applied Engineering... 30 day MBG</th>
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### Insignia Solutions

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### EMMY Awards

| 6722 | DaytimeFile II 1.2 5/8" Drive | 429. |
| 6782 | DayStar Digital... 30 day MBG |

### Diamond Days

| 3564 | DualPort Ill with 20 MHz 68862 | 165. |
| 8556 | FastCache for Mac Illc | 265. |
| 3401 | FastCache Illc | 53. 3389 with FPU 399. |
| 1613 | FastCache 040 (for Quadra) | 539. |
| 1971 | FastMath II with (w/Retrospec) | 479. |
| 3401 | PowerCache for SE/30, Tt, Illx, Illcx, Illci, Illc, LC | 40 MHz | 1349. |
| 2329 | PocketHammer 100 699. 2314 PH 200.1 1199. |

### Logicode Technology

| 5525 | QuickSet Xela M9624XV—Send and receive fax at 9600 bps. Add 2400 bps modem communication and throughput to 9600 with V.42bis. Great styling, lighted icons, cables and lifetime warranty... | 185. |

### Mouse Systems... 30 day MBG

| 7520 | Little Mouse or 6001 Little Mouse Plus $69. |
| 9471 | A+ Mouse... | 74. |
| 5377 | SilentWriter Model 95 | 1599. |
| 3036 | *Grapher 2.0 92. 3652 Map 119. |
| 8009 | PowerKey 2.01 76 8006 ROM Remote... 32. |
| 4964 | Thunderware 400 359. 3107 Pro 256 499. |

### Synergy... 30 day MBG

| 6618 | VersaTerm 4.5 419. 6619 PRO 3.6 177. |

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### White Pine Software... 30 day MBG

| 6618 | O VersaTerm 4.5 419. 6619 PRO 3.6 177. |

### PowerCache for SE/30, Tt, Illx, Illcx, Illci, Illc, Illc, LC |

| 40 MHz | 859. 50 MHz | 1349. |

### FastMath II with (w/Retrospec) |

| 1971 | FastMath II with (w/Retrospec) | 479. |

### FastCache for SE/30, Tt, Illx, Illcx, Illci, Illc, LC |

| 40 MHz | 859. 50 MHz | 1349. |

### Dayna... 60 day MBG

| 6722 | DaytimeFile II 1.2 5/8" Drive | 429. |

### DayStar Digital... 30 day MBG |

| 3564 | DualPort Ill with 20 MHz 68862 | 165. |
| 8556 | FastCache for Mac Illc | 265. |
| 3401 | FastCache Illc | 53. 3389 with FPU 399. |
| 1613 | FastCache 040 (for Quadra) | 539. |
| 1971 | FastMath II with (w/Retrospec) | 479. |
| 3401 | PowerCache for SE/30, Tt, Illx, Illcx, Illci, Illc, LC | 40 MHz | 1349. |
| 2329 | PocketHammer 100 699. 2314 PH 200.1 1199. |

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| 1971 | FastMath II with (w/Retrospec) | 479. |
| 3401 | PowerCache for SE/30, Tt, Illx, Illcx, Illci, Illc, LC | 40 MHz | 1349. |
| 2329 | PocketHammer 100 699. 2314 PH 200.1 1199. |
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- Apple 12" Anti-Glare Filter ..... 63.
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1-800-541-7680. (In 408 area: 524-4797.)
Behind Macworld's Graphics

BY CATHY ABES

Artists: Macworld senior designer Arne Hurty worked closely with San Francisco photographer Alex Varnes to create a photo-illustration showing the internal workings of a film recorder for this month’s feature “Slides while You Wait.”

Hardware: Mac Quadra 700 with 8MB of RAM and a 160MB internal hard drive; RasterOps 19-inch color monitor and 24-bit graphics board; BarneyScan CIS 4520 RS Scanner.

Software: Adobe Photoshop 2.0.

How It Was Done:
The process began with Varnes taking two pictures of the Agfa PCR II film recorder—one with the external case on and the camera showing, and another with the case off so the internal parts were exposed—keeping both Varnes’s camera and the film recorder in exactly the same positions to ensure perfect registration between the two shots.

For the photograph showing the camera, Varnes double-exposed his film to make the roll of film inside the film recorder camera visible (as if the camera back were transparent). To do this he shot the film recorder with the camera back closed and then reexposed the frame with the camera back open, this time lighting just the film in the film recorder’s camera. The double-exposure technique worked well because the shininess of the film in the second exposure stood out against the black of the camera in the first exposure.

Varnes also photographed a color wheel provided by Agfa, making sure he had the wheel angled correctly to simulate its position inside the film recorder.

The photos were scanned using the BarneyScan scanner. Hurty used Photoshop to superimpose the scanned image of the color wheel over the image of the film recorder, positioning the wheel where it would normally be. In order to expose more of the wheel, he drew a cutaway by removing part of the housing with Photoshop’s lasso tool and using the clone tool and the copy and paste commands to reveal what would normally be hidden behind the color wheel. Hurty first cloned the background color, then copied and pasted background details, and touched them up with the pencil tool. Then he opened the image of the color wheel and selected all the background areas (everything but the color wheel itself), made these white, and copied the whole file. After selecting the area where the color wheel was supposed to go, including the cutaway area, he pasted in the color wheel image. Then using Paste Controls (under the Edit menu), he set the opacity of the pasted color wheel to 50 percent so that the colors in the wheel would be translucent (as they are in actuality). Still in Paste Controls, he clipped out the white, which eliminated the background around the color wheel, leaving only the wheel itself.

Next Hurty opened the original color wheel file, selected all the color circles in the wheel, and made them white. Then he copied the color wheel again and pasted it directly over the previous paste but this time at 100 percent opacity. That made the color wheel opaque, but because he continues
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The three original photos of the film recorder’s internal parts, the film recorder, and the color wheel.

The selection made with the elliptical marquee and laso (top); the mask created by the selection (saved in the alpha channel), which Hurly used for pasting in the film recorder’s internal parts (bottom).

The selection made with the elliptical marquee and laso (top); the mask created by the selection (saved in the alpha channel), which Hurly used for pasting in the film recorder’s internal parts (bottom).

The pasted color wheel at 100 percent opacity (top); after Hurly made it translucent (50 percent opacity) and clipped out the white background (middle); pasted again at 100 percent opacity with the white circles clipped out so the translucent color circles show through (bottom).

clipped out the white, the color circles stayed translucent.

Then, using the airbrush tool, he drew a beam of light from the CRT through the red color circle and up to the camera. Now Hurly was ready to paste the internal parts of the film recorder into the image of the outside of the film recorder. First he used the elliptical marquee to select a large oval-shape area into which he planned to paste the internal parts, and set the selection’s feather edge to 64 pixels, to create a very soft edge. But he wanted a hard edge around the top of the casing, so holding down the # key and using the lasso tool, he deselected the top of the oval. After selecting the entire image of the internal parts, Hurly pasted it into this selection. The result is that in the center of the oval, the pasted-in image—at 100 percent opacity—looks sharp, but closer to the fuzzy edges, the internal image gradually loses its opacity until it completely blends into its surroundings—the film recorder’s casing.
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Circle 203 on reader service card
Fighting the Code War

BY STEVEN LEVY

IN MARCH, AT A CALIFORNIA CONFERENCE CENTER CALLED SLIVERADO, Apple Computer revealed its grand plan for system software. One of the key architects was networking wizard Gursharan Sidhu. He explained that in the new world of computing, all roads lead to digital collaboration, but that to date, the technology for true collaboration has been deficient. He contended that several key components have yet to be provided, and none is more important than the implementation of trust. If people are to participate in what Apple calls a truly Open Collaborative Environment (O.C.E.) - if they are to take advantage of the fruits of being connected to their fellow workers, their banks and merchants, and even the world at large - the privacy of their data must be protected.

"Privacy is concerned with wiretapping," he explained. "Many of you have heard in the news about how various people are listening in to cellular phone conversations..." Well, the same thing happens and can happen pretty easily on networks," Sidhu explained that Apple would prevent this from occurring by implementing an easy-to-use form of encryption. This would automatically encode all communications sent into the world by users. The recipients would have the means to decode this data. Anyone trying to intercept it would get nothing but gibberish. Letters, messages, and documents would be wiretap proof. Or so Sidhu implied. Then came the question-and-answer session. And suddenly things were not so simple.

First, someone asked whether Apple would be allowed by the U.S. government to export such a product. Sidhu acknowledged that this was "a very sophisticated and complex area," but expressed confidence that Apple would be able to obtain a license for export. He reported that the National Security Agency (NSA), the arm of government that oversees encryption schemes, cracking codes, and international surveillance, had reviewed Apple's encryption scheme and said it was fine. This led to a question concerning the strength of the coding technique with which Apple was planning to protect its users' privacy. Could the NSA pluck the encrypted code - the gibberish - off the wires and switch it back to its original form? Sidhu claimed he did not know. He said, however, "I can assure you that if they can decrypt, it's at enormous cost. And only people who have access to the taxpayers' till can afford it. I think a commercial venture would have a very difficult time cracking this."

Listening to this exchange, it would be understandable for someone unfamiliar with these issues to think he or she had wandered through some sort of tear in the fabric of logical discourse. What do export requirements have to do with Apple's system software? Why did Apple submit O.C.E. to a government agency in charge of monitoring overseas surveillance? If the codes that Apple used were supposed to guarantee privacy, why couldn't Sidhu guarantee that no one could break them?

You can't blame Sidhu or Apple for these contradictions. The so-called technologies of trust have become a battleground for privacy conflicts in the 1990s. These skirmishes are accelerating at a drastic pace. Companies like Apple - and, ultimately, we as their customers - are caught in the cross fire.

At stake is our privacy. "The need for encryption has increased dramatically in the last couple of years," confirms Karen Casser, director of public policy and legal affairs for the Software Publishers Association (SPA). Everything from trade secrets to personal financial transactions to confidential medical records will be dispatched by keyboard and flung into the data void, susceptible to interception and tampering - unless they are protected.

The problem is that the U.S. government believes that granting us the security of encryption will favor our enemies and foster crime and terrorism. The feds are pursuing a different ideal. In this vision, the entire system of communications will be redesigned explicitly to accommodate the government's desire to crack our codes and wiretap our communications.

**Tales from the Crypt**

ULTIMATELY, THIS IS A CONFLICT BORN OF THE MARCH OF TECHNOLOGY. For centuries, encryption has been an esoteric subject, the domain of armies, spies, and amateur cryptographers who drew on wormholed pipes while deciphering puzzles. Until recently all cryptographic roads led to the NSA, which in 1952 was created by secret order to encrypt government secrets and break the codes of other nations.

The NSA's Fort Meade, Maryland, headquarters house the world's most extensive bank of computers, devoted to cracking codes. The NSA is the "blackest" of all agencies; for years no one in government ever admitted its very existence, and the Beltway joke was that its acronym really stood for No Such Agency. The NSA still operates under extreme secrecy, on the assumption that our enemies would glean useful insights from the release of even seemingly innocuous information about NSA activities. It is, however, widely understood that the NSA routinely monitors all international communications - phone calls, cables, radio messages. Everything from a shortwave broadcast in Siberia to a Mother's Day call to Aunt Tillie in Australia is likely to come under the scrutiny of NSA's net. The NSA is limited to foreign intelligence, though according to James Bamford's "The Puzzle Palace," the agency overstepped those boundaries during the sixties, maintaining "watch lists" of antiauthority protesters and alleged mobsters and drug dealers.

It has been long assumed that the NSA's ability to crack codes and monitor international communications was unparalleled. But the computer revolution changed the ground rules. With access to heavy processing power, a new breed of cryptographers emerged; they were able to research and develop new coding techniques that, for the first time, were not under direct government control. They developed powerful scrambling and decoding algorithms, encryption technologies that could be licensed by businesses and individuals. There are two important encryption technologies: Data Encryption Standard (DES) and RSA (named after the initials of its three inventors) - continues...
algorithms. Both depend on using mathematical keys to encode and decode the plaintext messages. The strength of the system depends on the size of the keys, that is, the number of bits. The bigger the key, the harder it is to crack the code. In 1977, the government declared DES a national standard. Some cryptographers claim that the NSA intentionally weakened the standard so that it could more easily crack the codes itself.

The wave of the future seems to be the RSA codes, developed in academia and now administered by a private company, RSA Data Security, of Redwood City, California. Some RSA codes use what is called public key encryption: this provides all users with two different strings of numbers—a private key and a public key. The private key is known only to the user, but the public key is freely distributed. Someone sending a message to the user scrambles it by way of the user’s public key—but the user can read the message only by unscrambling it with the private key. This scheme eliminates the messy problem of distributing one’s secret key to the recipient of a message. And when a message is scrambled by the combination of the two keys, it is devilishly hard for an outsider to unscramble—when the key is a large one, say, of 512 bits, experts deem it virtually uncrackable.

**Against the Wind**

Obviously, widespread implementation of RSA codes with large key sizes would provide terrific privacy. The ideal—and it is quite feasible—would be a universally accepted standard in which cryptography is smoothly integrated into system software so that one has virtually perfect protection—without computer users even knowing it’s there.

But consider this from the NSA point of view. Its job, as privacy expert John Gilmore puts it, is “wiretapping the world.” Instead of a flow of words and numbers from which the agency could identify messages of compelling interest, the data traffic would all be a hellish thatch of jargon. Even when the agency isolated a string of nonsense it wanted to decipher, it would have to devote many hours or days to cracking the code. The NSA’s job is to conduct surveillance, “to look for needles in a haystack,” explains Jim Bidzos, president of RSA Data Security. Encryption schemes “make the haystack bigger—they might not find the needle.”

Considering this, it is no surprise that the government, apparently spurred by the NSA, is trying to slow down the march of encryption. It does this by use of export restrictions. Encryption technologies are classified as munitions—military weapons. Like nuclear bomb casings and F-16s, software that includes encryption cannot be exported unless the government specifically approves.

Currently, to export any software that uses encryption techniques, a company like Apple, Lotus, or Microsoft has to submit its encryption schemes to the State Department, which in turn consults the NSA to see if release of the product into foreign hands will result in “a threat to national security.” Anything with particularly strong security—which seems to mean a level of encryption that requires the NSA’s computers to break a sweat—gets the Big Nix.

The catch is that by limiting what goes overseas, the Feds are really limiting all software, even what I use for sending a column to my editor—from Massachusetts to California. “Almost every one of the large computer companies get more
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than half their revenues from overseas," says Jim Bidzos. "Most companies will not maintain two different products just to have different levels of security for domestic and overseas customers. The net effect of the policies of the NSA is to very consciously encourage use of the, quote, 'export' standard—for everyone."

This is problematic enough. But the worst of it is that the export standards don't seem to do what they are intended to do—keep encryption away from our enemies. The encryption technology that the NSA is trying to contain is already in widespread circulation. On the streets of Moscow, for instance, one can buy Cryptos, shrink-wrapped encryption software that uses both DES and RSA algorithms—at a strength that U.S. companies cannot export abroad! As John Perry Barlow of the Electronic Frontier Foundation has noted, attempts to restrict encryption algorithms "are like trying to legislate against wind."

Compromising Positions
YET THE NSA CONTINUES ITS CRUSADE TO LIMIT the level of security offered by companies like Apple and Microsoft. When developing software with encryption technologies, companies must appear at the State Department, hat in hand, and agree on the level of privacy the software will provide. Of course, this level is watered down from the more secure standard the company would use if the export requirements did not exist. In short, the software becomes less effective. The process is also expensive and time-consuming. But if a company doesn’t go through it, it can't sell its product overseas.

Unhappy with the situation, the SPA hoped to overturn the export restrictions by legislation, and found sympathetic ears in Congress. But the Bush administration has stated its intention to veto any such action. So the SPA has been negotiating a compromise with the NSA that will allow expedited export approval—but will also essentially formalize a standard for all software, whether domestic or international. One of the NSA’s demands is that the technical details of the agreement not be published in the Federal Register, as is customary when such standards are set, but sent to Congress as classified information. This would prevent independent cryptologists from verifying precisely how much effort it would require to break the codes. But since the memo was widely leaked, it is now known that the SPA compromise mandates no more than a 40-bit key for the RSA algorithm approved for export. (At press time, the compromise was still not finalized.)

The shiny side of the coin is that the NSA is willing to compromise as far as it has—the very act of negotiation is a departure for the top-secret agency. And the level of security we’re talking about here goes far beyond Captain America’s decoder ring. Apple, for instance, has licensed several algorithms from RSA for its encryption scheme. Though the scheme it chose to use was by no means RSA’s most secure system—which would never stand a chance of export approval—it is still considered fairly strong encryption. Yet cryptographers have alleged that using a brute-force approach (akin to a pickpocket with your ATM card trying every possible four-digit code to withdraw money), supercomputers can crack the SPA codes within hours.

Apple’s proposed O.C.E. standard, which reportedly uses a 64-bit key, is slightly stronger, but clearly it can be broken. “It’s false security,” contends David Banisar of the Computer Professionals for Social Responsibility. “If the NSA can
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crack you, you know that other people can." And so, privacy is ours—but it is not so private that we can be assured that no one has violated it.

**Tap Dancing**

**THE ISSUES IN THIS BROUHAHA ARE ILLUMINATED BY AN OUTBREAK ON ANOTHER FRONT IN THE PRIVACY WARS. THIS IS DIGITAL TELEPHONEY, THE FUTURE OF THE TELEPHONE WIRES.**

Over the next few years, the phone companies will convert to complicated digital communications technologies. The FBI claims that the switch will make it more difficult to conduct legal wiretaps. The problem, according to a government document, "endangers the safety of the American public." It would seem that the solution lies in developing technology that allows phone companies to provide law enforcement access to the lines selected for wiretaps. But the government has another idea—redesign the whole system! The Justice Department, with the vociferous support of FBI Chief William Sessions, has proposed to Congress a bill that, at an estimated cost of $300 million, would cripple the technology so that government could wiretap in the future as easily as it does today. The cost would be borne by telephone ratepayers.

Furthermore, the FBI's proposed amendment to the Communications Act of 1934 provides that any new communications system—whether a telephone system or a computer network—would also have to be designed with easy wiretapping in mind. Critics have noted that by designing our technology to accommodate surveillance in a relatively infinitesimal number of cases—1990, there were only 872 court-approved wiretaps in the United States—we would be making the entire system more vulnerable to illegal eavesdropping and sabotage. (As in the current case of cellular phones, which can be monitored by any dolt with a scanning radio.) It would not only be the FBI who found our messages easier to wiretap, but also illegal eavesdroppers like foreign governments, industrial spies, white-collar criminals, and high-tech stringers from sleazy tabloids.

Under the proposed Digital Telephone amendment, it would literally be a crime for a company to produce technology that provides people more privacy than the Justice Department considers appropriate. All communications technologies, from online services to handheld personal data assistants, would have to be designed specifically to accommodate surveillance. As one critic put it, it is as if the government required furniture makers to install microphones in their lamps and sofas so that, upon obtaining a court order, the FBI could switch them on and listen.

**Whom Do You Trust?**

THE IRONY OF ALL THIS IS THAT ANYONE CONSCIOUSLY TRYING TO ELUDE THE NSA OR FBI EAVESDROPPING—SPIES, TERRORISTS, OR OLIVER STONE BRAINSTORMING HIS NEXT MOVIE—WILL HAVE NO TROUBLE FINDING ENCRYPTION ALGORITHMS THAT FAR EXCEED THE LEVEL OF PRIVACY OFFERED BY THE SPA COMPROMISE. However, I suspect that the rest of us, the vast mass of users, will meekly settle for whatever level of security we are given. Though we will read and hear a lot about encryption in the next few months and years, the subject will always be a bit too abstract for most people. Who's going to know or care what the difference is between a 40-bit encryption key or a 512-bit key, or the meaning of an RC-4 algorithm? As long as companies like Apple offer some sort of protection, users will assume that their messages are safe. Just as networkers are lax in changing their passwords, only a very few will be strident in demanding heavy-duty algorithms. The result will be a variation on the gun-control chestnut: When true privacy is outlawed, only outlaws will have privacy.

When it comes to entrusting our secrets to digital technology, we've only dipped our toe into the surf. Over the next few years, we will be pushed full-body into the water. We will conduct our business affairs online, access the private information in our computers by wireless personal digital assistants, and swap our voices and even our images through the successors to the telephone. Under the circumstances, it does not seem unreasonable to ask for the best protection available.

Finally, there is the question of the degree of access to our communications to which the government is entitled. In 1928, Supreme Court Justice Louis Brandeis presciently predicted that "the progress of science in furnishing the government with means of invading privacy is not likely to stop with wiretapping. Ways may some day be developed by which the government, without removing papers from secret drawers... will be enabled to expose to a jury the most intimate occurrences of the home... Can it be that the Constitution affords no protection against such invasions of individual security?"

Until that question is answered, an unsettling ambiguity will haunt the technologies of trust. Does it mean that we can trust that our communications are safe—or that we have no choice but to trust that no one is listening? m

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Circle 60 on reader service card
Inside Ehman Inc.

BY DEBORAH BRANSCUM

As Michael Ehman tells the story, he was upbeat about the future of his troubled Macintosh peripherals company until December 14, 1991. On that date, Ehman says, he realized the company was fulfilling backlogged orders but not winning new sales. Or at least, not as many as the company needed to stay afloat. So early this year he put Ehman Inc. up for sale—but no one bought it. In March, Michael Ehman incorporated a new Macintosh company called Bridgette, located in San Clemente, California. In April he bid farewell to the state of Wyoming by closing Ehman Inc.'s Evanston headquarters, changing the locks, and handing the keys to his banker for access to the remaining inventory as collateral for a half-million-dollar, state-guaranteed loan.

Exactly why Ehman Inc. failed to stay in the peripherals business is fodder for another column. For now, readers should know that Ehman Inc. no longer sells peripherals and has sold the marketing rights to its Ehman Inc. and Cutting Edge product lines to Bridgette. It's a distinction that may be lost on some customers, since Michael Ehman is active in the company and Bridgette has kept Ehman Inc.'s 800 sales line, where employees answer the phone by saying "Ehman."

It is confusing. Ehman Inc., for example, isn't actually out of business and has no plans to file for bankruptcy, according to its founder, who told me that the company—which has estimated debts of some $4 million—retains memory and consulting divisions. Meanwhile, Michael Ehman is managing Bridgette with two other executives and stressing that Bridgette will support Ehman Inc. customers as it markets Ehman and Cutting Edge products. (A press release from Bridgette says "the transition was smooth and at no time were Ehman customers left without service support.")

"I feel a moral responsibility to the customers to make sure they don't get screwed like the Jasmine customers did, and I think Bridgette is going to be able to do that," he says. "What I hope to accomplish, and I think I pretty much did, is that customers are going to get serviced and people are going to answer the phone, and the name isn't just going to go on a garbage heap." Ehman says a royalty agreement between Bridgette and Ehman Inc. will help pay off the latter's creditors. When asked what his relationship is with Bridgette, he says, "I don't really have one. I'm just here trying to make sure that all the Ehman customers who believed in me don't get left in the dust."

In a later interview, Ehman says he is working as an unpaid consultant to Bridgette because the company can't afford to pay him. "I created Bridgette; Bridgette was my idea," Ehman says. "I got some people to put in some money, sold them an idea—hey, these [Ehman customers] deserve to be taken care of and this company can be viable. I'm part of the management team, but I'm not an employee, nor do I have ownership, because the investors have ownership—they put the money in."

Defining Support

As Ehman explains it, Bridgette is going to honor warranties, with the following caveats. "If it's something we can fix, we will fix it free. If it's a subunit, the actual hard drive that fails, we'll fix it if the manufacturer honors the warranty, and they've told us they will." But don't get out your party hats yet. The warranties on some drives will have run out while they were sitting at Ehman, and later at Bridgette, waiting to be returned to the manufacturers for repair. Those drives will not be fixed for free, but Ehman says his company is willing to have them repaired at cost. Some customers, like C. David Hunt, will be out of luck altogether. In February Hunt returned a drive still under warranty to Ehman Inc., where it was lost. "Are there people who are going to get burned on this? You bet there are, but a very damn few, probably less than a couple dozen, and out of a hundred thousand customers, that ain't bad," Ehman says. "I wish it was none, but there's only so much that can be done."

Recycled Drives

Ehman's stated concern about his old customers is admirable, but I found myself wondering if he was sincere. Because I had recently returned from Evanston, Wyoming, where I'd interviewed former employees about their experiences at Ehman Inc. During an earlier trip I took in the fall, workers shook my hand firmly, looked me in the eye, and assured me the worst was over (see Conspicuous Consumer, February 1992). But this time Ehman's office was closed, and no one had much to lose by telling me what really went on at Ehman. What they had to say wasn't very reassuring for consumers.

Take used drives. Michael Ehman denies his company sold used-drives as new. "If we had old inventory, sometimes we would have sales of used equipment where we would offer used-drive specials with a 90-day warranty," he says. "But it wasn't the policy of Ehman Incorporated to ever sell used products as new."

That's not how several former employees remember it. John Sannito started as production foreman in January 1990 and was production manager when he was laid off in July 1991. According to Sannito, used drive mechanisms removed from drives sent in for repair were often put in new cases and sold as new. "It didn't matter how old they were," says Sannito. "There were numerous instances where drives were a year or two years old."

In fairness to the company, customers sometimes received new mechanisms to repair their bad drives. And the used mechanisms were repaired and tested before they went out as new. Still, the workers I spoke to weren't very happy about the deception. "That was one of the things that really bothered me," says Helen Hodgins, who was production manager after Sannito and also worked in the formatting and integration areas between January 1988 and July 1991. "I was having to go through those drives and fix the ones that didn't work and then put them out as new drives."

Used drive mechanisms were sold as new, according to former employees.

Used drive mechanisms were sold as new, according to former employees.

Used drive mechanisms were sold as new, according to former employees.
One time parts were salvaged from several old drive mechanisms to make working hybrids that were sold as new, according to Tina Laughlin, a former Ehman employee who returned mechanisms to manufacturers for repair in the summer of 1991. “These drives were out of warranty and we couldn’t get Seagate to take them back,” says Laughlin. A co-worker “took them apart and he kind of mishmashed parts to get one drive to work.” Some of the pieced-together mechanisms were added to the repair pool, but some were sent out as brand-new drives, according to Laughlin.

Did Michael Ehman know about the practice? Yes, according to several employees I spoke to. Laughlin says she asked Ehman what to do with the old drives that Seagate wouldn’t accept. “I wanted to know if I should sell them to companies that buy old drives,” Laughlin says. “He said no, he wanted [us] to find parts that would work for one drive and put them in a chassis and sell them.”

It’s an issue employees brought up to Michael Ehman a number of times, according to John Sannito. “It was my responsibility to put out the door a product that met all of our quality-control standards, that we knew was going to work,” he says. “Because I knew that we didn’t have real skilled, well-trained people in the repair department—the people who looked at returned drives—I wasn’t totally confident that they knew there was no problem, that they had thoroughly checked it out, that they could guarantee that it was 100 percent operational. So I felt uncomfortable about putting [used mechanisms] through the line again because the problems that would develop would then be reflected as though we were putting out a poor product in the assembly area.”

And how did Michael Ehman respond? “Mike’s answer was basically that people paid for a drive that would do a job and we guaranteed them that it would work for a certain period of time,” says Sannito. “He didn’t think that was deceitful or dishonest to the customers.”

Mary Christensen was materials manager between May and September 1990, responsible for product ordering. She suspected used drives were being recycled “because if I am ordering new parts in, and they come into my inventory, and the production is still high and they are not utilizing the parts out of inventory, where did the parts come from that were going into the production floor? And that was my question to Mike.” Ehman, she says, laughed and told her not to worry about it.

So apparently, recycling used drives and selling them as new wasn’t a brief, emergency response in difficult times. “It was always that way. It was status quo,” says Sannito.

Alas, used drives sold as new weren’t the only problem consumers might have encountered when dealing with the chaos that was Ehman Inc. Former executives say the company did not charge credit cards until the day after a product shipped, but some people fell through the cracks.

“We would promise [customers] dates when their drives were going to be shipped, and we would bill their credit cards, and they would wait for months and finally get fed up with it and want a refund,” says Shirl Ashworth. “And we didn’t have the money to refund them.” Ashworth worked at Ehman Inc. between October 1990 and October 1991 in many areas, including customer service, receiving, and as Michael Ehman’s assistant for a time. “I would always handle the people that would get really irate,” she says. “Just basically lie to them. Just to get them paci-
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fied until we had the funds to give them their money back." Unfortunately, "I tried to get their money but we just didn't have it. We'd already used it. It was gone."

Misty Johnson worked in customer service, technical support, and sales between 1989 and 1992. "People would ask, are you going under, and we knew [the product], that it wasn't something we've seen since 1989. "People would ask, was important to sell, sell, sell, and if anything refurbished, that it was brand new or high quality.

Once the customers had bought a product, technical support could be spotty. "There were times where there were hours or even days before you could reach our tech support," says Anne DeClercq, who worked in marketing. "It was important to sell, sell, sell, and if anything was wrong, there was nobody there" for the customers.

Bridgette's Future
MICHAEL EHMAN DENIES THAT USED drive mechanisms were recycled and sold as new. Michael Ehman denies that he has any ownership in Bridgette—like a friendly uncle, he's just in the neighborhood to help. Heaven knows, Bridgette may need help. John Cox, the company's short-tenured president, resigned in mid-May. Before he left, he told me that most of Bridgette's customers, like Ehman's before it, are corporations and schools. Such customers buy on net-30 terms—that is, they pay for their orders within 30 days of receipt, and often, more like 60 days. That could be a problem if the company needs operating capital. Michael Ehman claims cash flow is not a problem—"I built a business to $30 million with an initial investment of $5000," he says. "So that's not really a consideration."

Perhaps not, but at least one wary supplier is treating Bridgette the way it treated Ehman Inc.—by demanding prepayment for parts. Bridgette is currently operating out of the offices of Questronex, which began manufacturing and shipping Ehman- and Cutting Edge-labeled drives to customers last October in an arrangement with Ehman Inc. Now Questronex is doing the same for Bridgette.

When I visited Bridgette in May, I counted six employees, not including Michael Ehman, unpaid consultant. The company was incorporated in Nevada, and although a list of officers was due to be filed with the secretary of state's office on May 4, none had been as of May 29.

At press time, Michael Ehman's financial dealings are being investigated by the Uinta County, Wyoming, county attorney; Ehman says he has done nothing wrong. And there may be no legal reason, really, why a man can't start a company, run up debts, and start a new company somewhere else—some successful businesspeople have exactly that track record. But the people of Evanston, population 12,177, are angry. Anne DeClercq left Ehman Inc. to become county clerk for Uinta County and says the State of Wyoming is facing employee cutbacks. "We're in real financial straits. And then someone like Michael Ehman comes along and says sorry, my company went under and I don't have to pay it. I just don't think it's fair."

Fair or not, Michael Ehman is starting over with Bridgette. It's up to you to decide if you trust him, and are willing to give him and Bridgette a chance. m

Research assistance by CAROLYN BICKFORD.

Send nominees for sainthood to Service Heroes, Macworld, 501 Second St., San Francisco, CA 94107, or via Appelink (Macworld) or America Online (Branscum). Conversely, drop Conspicuous Consumer a line if a company is ignoring you.
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The ProColor 32 dramatically reduces the time and memory required to convert images from CMYK to RGB format by eliminating the need for time-consuming software conversions. Images in cyan, magenta, yellow and black (CMYK), the color space used for color separations and printing, are converted to red, green and blue (RGB) for display on your monitor using VLSI chip technology. By performing the CMYK-to-RGB conversions on-board, the ProColor 32 accelerates the conversion and eliminates the need for software to store both CMYK and RGB data in system or hard-disk memory.

In a CMYK image, the magenta channel is stored here. When working with an RGB image, the blue data is stored here.

In a CMYK image, the yellow channel is stored here. When working with an RGB image, the green data is stored here.

In a CMYK image, the cyan channel is stored here. When working with an RGB image, the red data is stored here.

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After much trial and error, we managed to produce some nice-looking presentation slides from some of the film recorders we tested for this month's comparative feature, "Slides While You Wait." But before you rush out to buy one of the recommended film recorders and prepare to become a successful presentation slide-maker, read on for some insights on the numerous obstacles we encountered during our testing, plus a number of techniques that should help you overcome the many pitfalls of making slides on the Mac.

Speed Bumps

The first lesson we learned from our speed tests was to avoid images with left-to-right gradients, since they take much longer to print than do top-to-bottom gradients.

That's because most film-recorder applications encode data for printing by using run-length encoding, or RLE (a technique for compressing data and speeding file transfer from the CPU to the film recorder). The RLE algorithm scans the original file line by line from left to right, counting the number of contiguous like-colored pixels and encoding these pixel strips with the number of pixels they contain and their color value. In a left-to-right gradient few pixels in any given line are the same color; the number of strips of like-colored pixels is high, and the amount of compression is small. The same is true for radial shading. An image with a top-to-bottom gradient can be compressed and decompressed easily, since there is a single pixel value for each line.

Switching to a top-to-bottom gradient can improve speed dramatically; for example, the Agfa ProColor Premier shaved the time it took to print a slide from 164 to 107 seconds.

If you must use a left-to-right gradient and you're not in a hurry, print the slide in the background (Lasergraphics' film recorders and Presentation Technologies' Montage FR2 both support background printing), or print it at a time when you don't need to use the Mac.

Similar problems often apply to processing slides of scanned images, since most of them have many pixels of different values and few sequences of identical colors. As a result, files take longer to compress, send, and decompress.

One way to cut down the print time on large scanned files is to print them in 2K resolution, which is one-quarter the data file size that is required for 4K resolution (2048 by 1300 lines per inch versus 4096 by 2732 lpi). We found very little difference in quality between files of 2K and 4K resolution. If you have a TIFF file smaller than 8MB, you can probably image it at 2K without sacrificing image quality, since its horizontal resolution is probably less than 2048 lpi. If your film recorder supports TIFF format, choose that over PICT. Agfa's PCR II imaged a TIFF file at one third the time required to image the same file in PICT. Because TIFF images contain only pixel data, the software can read the data, enlarge it to the appropriate resolutions, and send it directly to the film recorder. But film recorder software must decompress PICT files before feeding the data to the film recorder, which slows the slide making.

Another method of speeding the imaging process is to use a RISC-based hardware rasterizer (not available for some film recorders). Using a RISC Rascol rasterizer with the Lasergraphics LFR continues...
Mark II often cut the time in half. Using a faster CPU and allocating more memory to the film-recorder application also help. Since some film recorders use a three-pass process for images that contain more than 256 colors, cutting down the number of colors in your presentation slide (such as replacing a graduated background with one that contains fewer than 256 colors) also helps speed the process.

Image Is Almost Everything

APART FROM SPEED, OUR OTHER PROBLEMS INVOLVED OUTPUT QUALITY. The first problem we noticed in our quality test was banding, a clustering of shades in a gradient—caused either by the software's inability to generate enough transition colors, or by flaws in the film recorder's color lookup table, such as using some colors twice and skipping others.

To minimize banding, limit the number of gradient steps by reducing the range of colors. For example, replace a background that gradates from dark to light blue with one that gradates from dark to medium blue. Avoid extreme opposites like black and white (at least half the film recorders we tested exhibited banding with this type of background). Set the maximum number of gradation steps, to generate the smoothest possible sweep.

For a PostScript film recorder like General Parametrics' SlideMaker or Agfa's ChromaScript PostScript rasterizer (for Agfa film recorders), use ReEdit to modify your presentation software to support a 256-shade gradient instead of a 33-shade one. We reduced banding on the SlideMaker by modifying Aldus Persuasion.

We also encountered difficulty in predicting color output, since monitors and film recorders do not use the same color space. Colors can also vary among film recorders and among different manufacturers' film. For example, using the recommended color film, the GCC ColorFast produced a much yellower white than the Lasergraphics LFR series did. And one manufacturer's film may have a bluish cast, while another's might have a yellowish cast.

For better predictability of slide color, let the film recorder warm up for at least 10 minutes. Create your own color charts and label them for future reference. If possible, experiment with color adjustment and brightness settings.

Make sure all your film is from the same batch, or use professional film, which has stricter color precision than regular film does. To maintain professional film's optimal color balance, keep the film refrigerated, have it developed as soon as possible, and use a professional processing lab—these usually maintain tighter control over processing chemicals.

Another problem we ran up against was blooming, or fringing—caused by overlapping pixels, which film recorder manufacturers use to avoid gaps between pixels. However, overlapping pixels of different colors invariably form a third color, producing, for example, a thin yellow line between a red and a green object. Film recorders with a smaller spot size (the size of the beam of light used to expose the image) exhibit less blooming; while those with a larger spot size, especially when coupled with a smaller screen (since the spot is larger in relation to the overall image size), produce more noticeable blooming. Some film recorders have blooming-reduction features (such as the GCC ColorFast's Improve Color Edges feature and the Agfa ProColor Premier's and PCR II's Repeat Function); you can also minimize blooming by selecting different color combinations; adding a thin black line between transition colors; and keeping certain colors—particularly primary colors—away from each other.

When we began mounting our slides, we discovered that slide mounts cover the slides' edges, hiding approximately 5 percent of the image. Some film recorders, such as General Parametrics' SlideMaker, exacerbate the problem by automatically enlarging slides by 5 percent. Make sure you select the right Page Setup setting, including page size and orientation. When you're creating an image, place text and graphics at least 1/2 inch from the edge. Preview before printing; most film recorders support on-screen previewing, and some even allow minimal image processing like cropping or magnifying before printing. The SlideMaker even provides preview color printouts.

The Final Touch

USE GLASS MOUNTS TO PREVENT FILM CURVATURE, which causes distortion when slides are projected. Specify anti-Newton glass to avoid Newton rings (rings of color produced by moisture trapped between the film and the glass mount). Also specify non-pin-registered mounts if your camera back doesn't support pin registers (check your manual).

Use a slide projector with a high-quality projection lens. Some lenses are prone to chromatic aberration—blue and red tingeing around white objects.

Finally, get a projection screen with high reflectivity, such as a glass-beaded screen (never use a wall), and make sure the room you use for your presentation is dark enough. After all, once you've invested all that time and money in producing the best possible slides, why ruin your presentation with poor projection?
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Infotek

04230 Quicken 3.0 Mac

Lotus Corp

00518 123 - Mac Competitive Upgrade

00537 123 Mac Prerelease Price

Microsoft Corporation

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04545 Excel 4.0 Upgrade Mac

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00402 Office V2.5

00367 Works 2.0C

04161 Project for the Mac

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00399 Nissus Compact

03406 Nissus 3.06

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GET CONNECTED WITH MAC TURBO

Best Buy!

MacTurbo 2400 Mini Modem
$89

Our MacTurbo modem has all the features you would expect to find on modems twice the price—and at 6” by 4” it’s compact enough to easily tuck away in a briefcase. An eight-light status panel keeps you informed as to the status, nonvolatile memory stores phone numbers even when the modem is turned off.

MacTurbo #07040

MacTurbo 24/96 Mini Fax/Modem
$149

Send faxes without leaving your desk! Our MacTurbo 24/96 Group III Fax Modem gives you both fax and modem for the price of most data-only modems. The 24/96 features 9600bps send and receive rate, full-featured 2400bps data modem, full Hayes compatibility and compact design. Includes all the necessary communications and fax software. MacTurbo #03977

MacTurbo 44/96 Mini Fax/Modem
$149

Need more power for graphics? Power up to 20MB by ordering 4x4MB FX SIMMs. DPI #03585 16MB upgrade kit ................ 759
Mac Zone Means Business
Call Today and Open Your Corporate Account

CAD/DREGIN

DesignCAD 2D/3D

DesignCAD 2D/3D provides the speed and accuracy necessary to manipulate complex two- and three-dimensional designs. It's designed for engineering, animation, desktop publishing and multimedia. Provides file support for DXF, IGE, XYZ, PICT, RIB. DesignCAD, Inc. #04180

Infini-D

$646

3D Modeler

Communicate and sell your ideas with stunning 3D graphics and animations—at a cost that will keep you ahead of the competition. Infini-D is a fully integrated 3D modeling, rendering and animation package for the Macintosh which allows you to generate photo-realistic images and animations with the easy-to-use interface you've come to expect from your Mac.

FaxMania

$28

FaxMania includes 80 business fax cover sheet templates that can be personalized and used right out of the box. Simply:

- Choose the template you want
- Type in "to" and "from" information and your message
- Send via fax modem or print and insert into a standard fax machine. T/Maker #05063

$67

Clippets: Volume 3-Sports

Put 228 fantastic sports images at your fingertips. Includes lots of men and women athletes and a rich collection of other outstanding sports graphics, symbols, icons and more. Dream Maker Software #04000

$159

DesignCAD

$159

2D/3D

PACo

$148

With PACo Producer you can add sound and accelerate playback multimedia productions while eliminating annoying start-up delays and memory constraints. PACo Producer, the next generation of QuickPICS, lets you create movies from any program that outputs PICS, PICT or QuickTime™ files. It also provides such post-processing capabilities as scaling, dithering, control over frame rate and selection of sampling rate. PACo movies play on all Macs, PCs running Windows and UNIX work stations. CoSA #00653
Do It In-House, And Save!
We Carry All the Hardware You Need to Do Your Own Graphics and Layout

Multi Sync 4FG
$778

Completely redesigned from the inside out, the new MultiSync FG monitors give your Mac a brighter, sharper, more accurate images. The 4FG, 5FG and 6FG monitors feature the AccuColor Control System which provides unprecedented color accuracy, nothing short of dazzling. Packed with state-of-the-art extras like FullScan capapilities for 35% more screen display. NEC Technologies #07143

Mac IG 8-bit Interface Card #00578 $768
Mac IG 24-bit Interface Card #04985 $1568

DrawingPad 7.5"x7.5"
$298

Improve the quality and productivity of your graphics with DrawingPad™, the unique drafting tool that combines the capabilities of a digitizer, a graphics tablet and a mouse. This low-cost, versatile, high-performance tablet complete with pressure sensitive pen, is the perfect graphics solution for graphic design, illustration, desktop publishing, drawing, tracing, drafting, mapping, and other computer graphics applications.

DrawingBoard II 12"x12" #05087 $438

ScanMan Model 32 w/ Digital Darkroom & CatchWord Pro
$294

ScanMan and Atlas Digital Darkroom together provide high-level functionality at a great price. Scanning has never been this easy. In minutes, you can insert a picture (b&w or gray) into any word processing file or page layout. Some of the ScanMan Model 32’s many features are: 32 gray scale and advanced halftone for superior image quality; true 400dpi scanning resolution; half-page scanning width; advanced output controls for adjustable size, resolution, and rendering of image for optimal quality on any screen or printer; tear-off tool palette for easy editing at any zoom level; works with all applications, including HyperCard. With CatchWord OCR software you’ll capture text with high-level accuracy. ScanMan makes quality scanning affordable. Logitech #02561

Logitech Scan Pad #00513 $12

UMAX UC630 Scanner w/ Photoshop
$1389

State-of-the-art resolution and sharp, brilliant color, that’s what the UMAX UC630 offers. It merges art with 600dpi high-resolution technology, so your pictures, photos and graphics can be reproduced on the screen with remarkable accuracy. The UC630 recognizes up to 16.8 million colors. UMAX Technologies #00599

Logitech TrackMan For Macintosh #05067 $54

UMAX UC630 Scanner...$1389
Optional Slide Scanner...#05314...$78

Umax UC630 Scanner...$1389

Optical Scanner...#05314...$78
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PowerPrint
$94

PowerPrint is a collection of Chooser-level printer drivers which will enable your Macintosh to print to over 850 printers. It produces LaserWriter-like output from your dot matrix, ink jet, or laser printer. The flexible, friendly user interface, fast printing, enhanced gray-scale patterns, better labels and forms printing and more communications options make this a must have printer utility. Comes with everything you need, including the cable. GDT.

Microcom Value Pak
$158

Microcom Value Pak™ (MVP) is a collection of the complete Microcom family of essential utilities for the Macintosh. All the utilities a Macintosh user needs are now available in MVP at one great price. MVP includes Virex, 911 Utilities, Complete Undelete, Citadel with Shredder and Carbon Copy for the Mac. Microcom.

MasterJuggler
$25

If you want access to more fonts, DAs, FKeys and sounds than your system can hold, you need MasterJuggler. With MasterJuggler you can easily use your files containing fonts, DAs and more, even if they are being shared across most networks. System 7.0 compatible. AISoft, Inc.

Kaboom!
$28

Coughs, croaks, crickets and car alarms—using a Macintosh was never this much fun. With Kaboom! you can add more than 150 wild and wacky, professional-quality sound effects to your Macintosh—no more of those mundane factory-issue Macintosh beeps and bells. "Twilight Zone." "I Love Lucy," Ronald Reagan and more. There are no commands to learn, no complicated instructions, and no 10-pound user manual to throw against the wall. Seems like a heck of a lot of fun for just a little money, don't you think? Nova Development.
SNOOPER

LETS YOU FIND THE
PROBLEM

$124 Snooper #05025

Snooper w/NubusCard #05026

DIAGNOSTIC SOFTWARE FOR MACINTOSH

The next time you see a 'sad Mac' on your screen or your Mac's performance isn't up to par, DIAGNOSE FROM YOUR DESK with SNOOPER, the revolutionary new standard for Mac diagnostic and testing tools. SNOOPER performs a comprehensive suite of tests, CHECKS ALL YOUR HARDWARE and identifies any problems. And the same SNOOPER software runs on all Macs.

SNOOPER is easy to use and saves time and money. If you already own Norton Utilities, complete your Mac utilities with the hardware diagnostic.

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RAM TEST • SYSTEM TESTING • SCSI TESTS • I/O TESTING
AUDIO TESTS • ERROR LOGGING

DIAGNOSE FROM YOUR DESK WITH SNOOPER

LET'S YOU FIND THE PROBLEM
Keep In Touch
With Quality Communications Hardware and Software

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$28
Begin exploring the world of CompuServe, the largest on-line interactive database service available. You’ll get instant access to more than 400 databases, fax capabilities, on-line support for major hardware/software products, airline reservations, stock and financial data and much more. Order your CompuServe kit today and pay only $7.95 per month flat service fee!

CompuServe Navigator Kit
$48
On CompuServe, time is money. CompuServe Navigator can help you save both. Navigator gives your investment portfolio review capabilities, terminal mode operation option, error-free file transfers, Multilinder compatibility and much more! Pay only $7.95 per month flat service fee!

MicroPhone II 4.0
$209
MicroPhone II V.4.0 delivers communications without the hassle. Ideal for international telecommunications. Praised for ease of use and advanced scripting language, MicroPhone II 4.0 now contains faster script execution, screen speed, file transfers and new interface design tools. Supports ZMODEM transfer protocol and can operate modems at any speed from 50 to 57,600 baud. It includes predesigned front-ends that put you in touch with MCI Mail, CompuServe, Dow Jones, and other info services. Software Ventures #01902

Mac Zone Means Modems...

At the Mac Zone we know that when it comes to modems, you want options. That’s why we carry a full line of quality modems—everything from thrifty meat-and-potatoes models like our dependable workhorse Mac Turbo Plus 2400 to full-scale, multi-function communications powerhouses like the Prometheus Home Office Ultima which combines Group III fax, data, voice and more. Call us today and see just how easy and inexpensive purchasing from the Zone can be. We’ll do all the work. All you have to do is pick up the telephone.

Mac Turbo Plus 2400 Modem #00408
Home Office Ultima Exterior #00877
Quicktel Xeba 14.4 S/R Logicode #06308
PSI Power Modem 24/96 PSI #04948

CODE # 20802
Take Your Mac To Warp Speed!  
Work Faster Than You Ever Dreamed Possible

**Infinity 40 Turbo**

$649

PLI's Infinity 40 Turbo provides you with all the storage flexibility you need, and the transfer speed you are looking for. With PLI's TurboCache disk accelerator software, you can quadruple the processing speed of your standard Mac Classic! This 16MHz 68030 accelerator upgrade for the Macintosh Classic will change the way you see your machine. The TurboCache Classic is also available with optional 68882 math chip (FPU) and optional support for up to 16Mb of memory. Applied Engineering #05363

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<th>Accelerators</th>
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**Networking**

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<td>00919 16MB Intnl HD w/univ mgk kit</td>
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**DPI**

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<td>04888 DPI 50MB Q Ext. Quantum</td>
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<td>00555 FWB Hard Disk Toolkit</td>
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<td>00505 FWB PocketHammer 50</td>
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<td>00506 FWB PocketHammer 100</td>
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<td>04964 hammerDisk 65MB Removable</td>
<td>864</td>
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<tr>
<td>04965 hammerDisk 4MB Removable</td>
<td>754</td>
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**Transwarp Classic**

$548

Quadruple the processing speed of your standard Mac Classic! This 16MHz 68030 accelerator upgrade for the Macintosh Classic will change the way you see your machine. The Transwarp Classic is also available with optional 68882 math chip (FPU) and optional support for up to 16Mb of memory. Applied Engineering #05363

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<th>Applied Engineering</th>
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<td>02677 Fast Cache ICI 64K Ram</td>
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<td>04323 Univel Powercache 33MHz</td>
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<td>04322 Universal Powercache 55MHz</td>
<td>1638</td>
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**Combo Cache IISi w/Math Chip**

$334

Acceleration, speed and expansion, all in one chip! The ComboCache IISi is more than a fast card... It's a 4-in-1 upgrade that speeds up your Mac IISi by up to 40%! The ComboCache IISi also gives you two PDS expansion slots. Plus, you get a 20MHz math chip for flying through spreadsheets and crunching numbers. DayStar Digital #05004 #05005 ComboCache IISi......$258

**AE Plus Drive 1.44/800K FD**

$298

AE Plus Drive 1.44/800K FD

It's one of the finest drives available for the Mac. The Plus Drive is a 100% FDHD-compatible drive for the Macintosh Plus, SE and Mac II. It installs through the floppy connector and requires no SWIM chip upgrade. You also get a two color read/write activity light, auto, touch and paper clip eject; one year warranty and more. Comes with special connector cable for the Mac II. Applied Engineering #04956

**PocketHammer50**

$524

PocketHammer50 costs a little more than the average 50Mb hard drive because it's in a class by itself for performance, security and reliability. The PocketHammer50 includes external SCSI termination, push-button SCSI-ID selection, external fuse and software. FWB #00505

Circle 70 on reader service card
Now there's a Doubler for every single Mac.

Data compression is an essential tool for Macintosh®. But different users need different functions. That’s why Salient offers a choice. Whether you want hard disk compression that’s completely automatic, or a hands-on utility with a variety of functions—or both—Salient has the “Doubler” for you.

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AutoDoubler is the effortless way to save hard disk space. You just double click to install and AutoDoubler does the rest. It compresses everything you want compressed, increasing disk space up to 100% or more.

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AutoDoubler, the solution to your hard disk space problems, is now available in a 10-pack.

“The true beauty of AutoDoubler is its complete invisibility.”

**DiskDoubler™, the hands-on compression tool.**

DiskDoubler makes it easy to copy large files to diskette, speed modem transmission, archive data, or simply free disk space.

DiskDoubler shrinks files an average of 50%, so it saves you time and money when sending via modem. It also creates self-expanding archives, so files can be opened without DiskDoubler. “Split” and “combine” functions give you extra flexibility in archiving and copying.

DiskDoubler is fast and easy—use it for all your hands-on compression needs.

“No only is it DiskDoubler among the top speed and efficiency performers, but it’s utterly safe for your data.”

—David Pogue, Macworld, 3/92

**Two Doublers are better than one.**

For complete flexibility, use AutoDoubler and DiskDoubler together. They’re 100% compatible, 100% safe.

**Free Offer!**

Buy AutoDoubler or DiskDoubler between 6/15/92 and 7/31/92, send us your registration card with proof of purchase, and we’ll send you CopyDoubler™ free. It’s the utility that copies files in about 1/4 the time—a $49 value!

---

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Circle 39 on reader service card
MacWorld

THIS MONTH:
FileMaker's New Look • New Drawing Tools • Real-Time QuickTime • The Return of AutoCAD • Mac Supercomputer

Fast 24-Bit Color under $1000
RasterOps has brought out the PaintBoard Li, a large-screen, 24-bit color graphics adapter that offers accelerated performance for $999. The board supports 1024 by 768 resolution on monitors measuring up to 20 inches diagonally. It uses a RasterOps-designed accelerator chip to achieve QuickDraw acceleration that boosts graphics performance up to 600 percent, according to the company.

The PaintBoard Li includes RasterOps' standard pan-and-zoom and extended desktop capability. The acceleration can be toggled on and off through software. The graphics board began shipping in May. RasterOps, 408/562-4200—T.M.

Kyocera Printer Reduces Waste
Ever had a pang of ecological guilt when throwing away a toner cartridge or other printer consumable? Well, Kyocera's EcoSys aSi page printer uses new technology that means you never have to replace the print drum or fuser, and you add toner to a toner reservoir instead of throwing out a cartridge. (You do have to dispose of the container the toner comes in, but Kyocera says it's designed to be burned, giving off only water and carbon dioxide.) The main new technology is an amorphous silicon (hence the aSi) coating on the printer drum that makes it more durable.

The EcoSys aSi uses an LED array for imaging and runs at 10ppm. Its resolution can be 300 by 300 dpi or up to 1200 dpi. The device comes with one 250-sheet paper tray and can be stacked on top of one or two optional 500-sheet trays or an optional collator. The printer has an operating cost of about 71/2 cents per page, considerably less than most laser printers. It includes two slots for removable PCMCIA cards, a relatively new standard for adding RAM, ROM, fonts, or other features. Kyocera expected to begin shipping the printer in late June at a list price of $2395. The cost of a PostScript-emulation upgrade for the EcoSys aSi had not been set at press time. Kyocera said it will sell the printer and a Mac upgrade kit direct as well as through distribution. Kyocera, 908/560-3400—T.M.

Motorola Boosts Modem Speed
Motorola Codex has introduced a family of modems that use new technology to boost transmission speeds to as fast as 115.2 Kbps over ordinary phone lines. An extension to the existing Codex 326X series, the new line is called the Codex 908/560-3400—T.M.

A New Way of Drawing
Aldus's Silicon Beach group has a new product in the works that may redefine drawing software.

Aldus IntelliDraw adds intelligence to objects. For example, create an object called a symmetrigon, stretch one of its points, and all of its points stretch in the same way. Or create a connection (a group of objects that all move appropriately if one is moved) that looks like an organization chart, add a new box, and the other boxes make room for it. Numbers accessed through publish and subscribe can control the length of rectangles, providing an ad hoc bar-charting capability. And by clicking on a button, you can flip through multiple versions of an object stacked up on layers. IntelliDraw also has many conventional drawing features such as color blends, text with editable outlines, and binding objects to a path.

IntelliDraw will list for $299. Silicon Beach Software, 619/695-6956—D.L.

MacWorld August 1992 93
Transforming files between Macintosh and PC formats can be a real beast. But there is an amazingly simple way to make PC files totally at home in a Mac environment. And vice versa.

MacLinkPlus. The world’s leading data translation package, and the only choice for complete, effortless file conversion.

MacLinkPlus is a vast resource of over 400 translator combinations for the most popular programs running under Macintosh, MS-DOS or Windows. Including Microsoft Word, WordPerfect, Excel, Ami Professional, MultiMate and dozens of other word processing, spreadsheet, database and graphics applications.

File translations are automatic with “point-and-click” simplicity, and we include DOS Mounter software so MS-DOS disks show up right on your Macintosh desktop. We even offer complete compatibility with XTND file conversion.

No matter what version of System you’re running, MacLinkPlus sets the standard in ease of use. And our new version 6.0 is packed with features that exploit System 7 innovations.

For file translations when you’re connected via a network, file server, or SuperDrive, all you need is MacLinkPlus/Translators. And for the added capability of file transfer using a cable or modem, MacLinkPlus/PC includes the same full array of translators as well as a serial cable and communications software.

Get MacLinkPlus 6.0 today. And watch all your PC files transform themselves before your very eyes. For more information, call DataViz at (800) 733-0030.

All product names are trademarks or registered trademarks of their respective holders. DataViz, Inc., 55 Corporate Drive, Trumbull, CT 06611 (203) 268-0030

Circle 36 on reader service card
326XFast series.

The new technology actively determines the optimal frequency for data transmission on any given phone line. It is the basis of a proposed standard, given the temporary name VFast, now under study by the CCITT standards committee. Motorola Codex says it will offer free upgrades if the final standard differs from the version incorporated in the modems.

The two modems in the series that are most likely to be of interest to Macintosh users are the 3260Fast, a small desktop dial-up modem that operates in synchronous or asynchronous modes, and the 3261Fast, which has the same features as the 3260Fast but adds the capability of working with leased lines. The 3260Fast lists for $1395, while the 3261Fast goes for $1695. Both products began shipping in May. Motorola Codex, 508/261-4000.—T.M.

Foolproof Gesture

Electronic composer and performer Paul DeMarinis wants his glove to send foolproof commands to his synthesizer while he's performing. "No one would notice if the machine misinterpreted a gesture for gradual change in elements like pitch or loudness, but if I made a dramatic gesture—to stop the music, for example—and nothing happened, I'd feel like I'd been caught with my pants down." To make sure nothing of the kind occurs, he's writing software in MaxNet, a neural-network simulator that allows for marginal variation, so his gestures won't have to be inhumanly precise. MaxNet, an object for Opcode's object-oriented Max programming environment, was written by Michael Lee of UC Berkeley's Center for New Music and Audio Technology. (Max lists for $395; MaxNet is not yet commercially available.)

To make the glove, DeMarinis removed the controls that are most likely to be inhumanly precise. MaxNet, an object for Opcode's object-oriented Max programming environment, was written by Michael Lee of UC Berkeley's Center for New Music and Audio Technology. (Max lists for $395; MaxNet is not yet commercially available.)

The Return of AutoCAD

After shipping AutoCAD Release 10 in 1989, Autodesk seemed to forget the Mac. Now the company is shipping Release 11 for the Mac, amid signs that it intends to stick around.

Release 11 replaces the DOS-like interface with Mac windows, tear-off menus, and other interface standards (it also retains full keyboard support). It can work "noun-verb" (that is, select an object and then a command), like most Mac programs. Add-on programs written in AutoCAD's interpreted LISP-like language can run on the Mac.

Release 11 also adds many features, including support for sharing parts of a file on a network and a layout facility for annotating and presenting drawings.

Autodesk is also developing Mac versions of its solid-modeler add-on and its RenderMan implementation AutoShade. AutoCAD is $3500 and is not copy-protected. Pricing and ship date on other products were not set at press time. Autodesk, 415/332-2344.—D.T.

FileMaker's New Look

FileMaker Pro has been upgraded to version 2.0 and ported to Windows. The Mac and Windows versions can share data files, database structures, and even scripts; FileMaker translates incompatible fonts, image formats, and other operating system-specific details.

Other changes include host data access through Data Access Manager and support for the database suite of Apple events, which opens FileMaker to control by other applications. It offers enhanced scripting features but no real procedural language; new field types can store sounds and QuickTime movies, as well as scrolling text; FileMaker can perform wild-card searches; user can specify tab order; and a new text engine provides enhanced text features.

Pricing was not set at press time, but FileMaker Pro 2.0 will probably list for $395. Claris, 408/727-8227.—D.T.

Low-Cost 68040

Acceleration for the LC

Fusion Data Systems has unveiled the TokaMac ELC, a low-cost 68040 accelerator for the Macintosh LC. The TokaMac ELC achieves its list price of $1295 by using a version of the 68040 that does not include a built-in math coprocessor or memory management unit. However, the accelerator will still speed up most applications, including graphics, by 160 percent to 250 percent, according to Fusion. The TokaMac ELC requires System 7. Users can switch to the LC's native 68020 processor in software without restarting the Mac. The accelerator is shipping now. Fusion, 512/338-5326.—T.M.

INTERIOR DECORATING IN AUTOCAD—WITH WINDOWS, HIERARCHICAL MENUS, AND ACCESS TO EXTERNAL LIBRARIES.
Best Cards for the Apple 16-Inch Display!

Only E-Machines, the 16-inch company, brings you a complete family of color cards for the Apple 16-inch. And the only cards with Ethernet networking built-in. All feature acceleration, video-out, pan and zoom, multiple display support, and of course, the best prices in the industry! Call now for the dealer nearest you.

| 16-Inch Display Interface Cards | E-Machines          | Radius       | RasterOps  | SuperMac
|---------------------------------|--------------------|--------------|------------|-----------
| 8-bit color                     | DoubleColor SX     | PrecisionColor BX | RasterOps EXL | Spectrum B
|                                 | $499               | $899         | $699       | $599      |
| 24-bit color                    | Futura SX          | PrecisionColor 24Kp | Pointboard Li | SuperMax B-24 P0Q
|                                 | $599               | $599         | $999       | $999      |
| 8-bit color with Ethernet       | ColaLink DC/1      | None         | None       | None      |
| networking built-in             | $639               |              |            |           |
| 24-bit color with Ethernet      | ColaLink SX/T      | None         | None       | None      |
| networking built-in             | $789               |              |            |           |

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Prices reflect manufacturers suggested retail price at the time of printing and are subject to change.
French Models

After years of searching, French developer Abvent has arranged for U.S. distribution of its 3-D solid modeler Zoom, just in time for version 3.

Unlike most 3-D solid models, Zoom supports Boolean operations such as cutting holes through walls or converting the intersection of two objects into a separate object. (Other Boolean-capable modelers include autodesys's form Z, and Turbo 3-D, another French product, which is not available here.)

Zoom's rendering capabilities include shadow-casting, Phong and Gouraud shading, and tight RenderMan integration. Version 3 does RenderMan rendering internally, avoiding the need to export RIB files. It also gives a great deal of control over texture maps. Fly-throughs can be recorded as QuickTime movies. Zoom doesn't support entering and extruding text. Abvent is developing a slide-show utility for displaying multiple images that lets a user control where images appear on screen and in what order. Zoom is available for $2495 from Rebus Technology at 617/354-3896 or ASYM Technologies, 510/943-6157; autodesys is at 614/488-9777.—D.L.

The Instant Executive

A group of in-house Wingz developers at Du Pont went their own way and founded MicroStrategy, a consulting firm that designs custom executive information systems (EISs). Now MicroStrategy is marketing EIS Toolkit version 1.1, a Wingz-based shell to help nonprogrammers create custom EISs.

EIS Toolkit provides functioning objects, such as lists and buttons, that can be incorporated into an interface template and assigned tasks by pointing and clicking. For example, a button can be defined to log on to a host database and run a SQL query (EIS Toolkit works with Informix's DataLink and similar products). Once the data is in the EIS, other buttons can drill down to reveal more detail or create a graph.

EIS Toolkit Designer is $995 including Wingz and $895 without; a ten-pack run-time version is $3995 with the Wingz run-time or $2995 without. MicroStrategy, 302/427-8800.—D.L.

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DESKTOP LIBRARIAN

General Books on the Mac

This month we page through four general-purpose Mac books.


* The Apple Macintosh Book, Fourth Edition, by Cary Lu (1992, $24.95). This 514-page tome is extremely thorough, beginning with an almost philosophical discussion of whether you need a computer at all and whether the Mac is right for you. Its 24 chapters explain in detail how the Mac works, the various hardware components, system software, common applications, communications, LANs, multimedia, and future directions for personal computers. Microsoft Press, 800/677-7377.


AN ARCHITRION MODEL OF A PROJECT TO REDEVELOP THE WATERFRONT IN VANCOUVER, BRITISH COLUMBIA.

ARCHITRION'S NEW LINE

Gimize went out of business, and its architectural modeling package, Architrion II, was adopted by Unic, a French CAD services company. Unic has limited Architrion to distribution by a few VARs and is introducing several Architrion products.

Architrion II has three modules: ArchiDesign for roughing out ideas; ArchiDraw, a 2-D environment for detail work like hatching and creating blueprints; and ArchiList, for generating a bill of materials, checking square footage, and so on. This summer Unic is releasing the pared-down Architrion I; Tech 2-D, a stand-alone drafting package; and a high-end rendering system tentatively called Syntrion. Architrion II is $4000; Architrion I is $2000; Tech 2-D is $1000; Syntrion pricing was not set at press time. In the United States and Canada call BearFox Technologies, 415/558-9615, or BAGH Consultants, 514/273-0522.—D.L.

AN AUTOMOBILE MODELED IN ZOOM AND RENDERED WITH A COMBINATION OF SHADERS AND TEXTURE MAPS.

TREND

Supercomputer as Toaster

Wavetracer is touting its Zephyr line of massively parallel supercomputers as a cozy Mac add-on. The top-of-the-line Zephyr 8 packs 8192 processors in a Quadra 950-size box for $150,000. Wavetracer claims Zephyr, which requires no special cooling or power and can be attached to a network or SCSI bus, is about half as fast as a $10 million Cray XMP.

Zephyr is not a stand-alone computer but, in effect, an accelerator board, slave to a desktop computer. (For techies: Zephyr is a single-instruction multiple-data system, with a 3-D processor mesh.)

For application developers, Wavetracer provides MultiC, a multiprocessor version of C. So far, Wavetracer's MultiC is for Unix, but a Mac OS version is coming. At least two companies are working on Mac Zephyr software: Global Communications is developing rendering software for Stratavislon and RIB files; and Gene Codes is developing molecular biology applications. Wavetracer, 508/635-9000; Global Communications, 303/674-9784; Gene Codes, 313/769-7249.—D.L.

AN EXECUTIVE INFORMATION SYSTEM, CREATED IN EIS TOOLKIT, THAT PROVIDES INSTANT ACCESS TO MANY VIEWS OF A DATABASE.
THE SOFTWARE.
We could tell you that year after year, Aldus' PageMaker has set the standard for page layout programs—for both Macintosh and Windows.

- We could tell you that our latest version, Aldus PageMaker 4.2, is better than ever. It now has a Control palette to numerically position, move, and resize objects. Plus “nudge” buttons for precise adjustments.

We could tell you that PageMaker 4.2's enhancements give you the power you need to express your ideas. Or we could simply point above, and show you what the experts have to say. (We might add that PageMaker is also MACWORLD's 1992 choice for best all-around page layout program.) For information, call 1-800-685-3623. And see why our software is attracting so much hardware.

THE HARDWARE.

THE ART OF POWERFUL IDEAS

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The floppy has finally grown up with the arrival of the Floptical disk drive. Floptical drives provide a combination of the best qualities of both magnetic and optical technology. Each Floptical disk holds 21MB of text (or graphics, or spreadsheets, or anything). And because the Floptical disk drive reads and writes ordinary 720K and 1.44MB floppy disks, you can renew your system instead of redoing it.

Though the outside looks like an ordinary 3.5" floppy, the inside is a highly refined super floppy. Unique stamped optical servo tracks give the Floptical drive very accurate positioning of the read/write head, allowing track densities of 1245 tracks per inch, almost ten times the track densities of ordinary floppies. Even better, these embossed servo tracks can't be erased or damaged, making Floptical disks safer than any other servo-based media.

But the Floptical drive is more than just a better floppy; it's a whole new standard. The media are from Hitachi Maxell and 3M, two world-class companies providing a world-class product. Their commitment to excellence is your assurance that Floptical disks are safe enough for your most valuable data.

Floptical's high density storage and low cost, ultra-high reliability and convenience are features you'll never outgrow.

PLI Floptical storage products are also available for the PC, Atari & NeXT platforms.

Wingz Flies Again
After Informix sold off the code that became Claris Resolve, we thought Wingz was a dead-end product. But Informix has proven us wrong. Wingz 2.0 will offer speed enhancements, System 7 compatibility, and some System 7 features such as publish and subscribe; and Wingz's Hyper-Script programming language is getting a major overhaul.

Wingz 2.0 will have Hyper-Script functions appropriate for a spreadsheet, while the full Hyper-Script product will be marketed to developers, probably as Informix-HyperScript (see "The Instant Executive" elsewhere in News). Informix-HyperScript will have strong database features such as embedded SQL and will contain the spreadsheet as one of its functions.

Informix-HyperScript programs will run on Macintosh, Windows, and Unix systems with no modification; a runtime version for use with Wingz templates will also be available. Pricing was not set at press time. Informix, 913/599-7100. —Charles Seiter

Anti-Gravity Mac
The Atlantis space shuttle mission scheduled for July will carry a Mac LC with a National Instruments board to study minute changes in gravitational attraction that occur when a satellite on a tether several kilometers long is released from the satellite. The tethered-satellite release is the first test of an idea that may eliminate a great obstacle to putting up a permanent inhabited space station: lifting supplies into outer space without rockets. Eventually, payloads may be attached to an enormous spinning tether as it sweeps past the earth, and then unloaded as the tether sweeps by the space station.

The gravity-measurement experiment is being conducted by Jan Bijvoet, John Blakely, Jeff Randolf, and Dennis Wingo of the University of Alabama at Huntsville's Consortium for Materials Development in Space. —D.L.

Thinking Snow
It may not be the universal solvent, but for database users it might as well be: the Snow Report Writer (SRW) reads data in about 200 formats (database-savvy users can add new formats) and provides tools for incorporating the data into reports.

Great Plains, Softsync, and other Macintosh accounting vendors use the SRW technology; Snow Software is now marketing the engine, with an accessible interface, to end-users as version 4. In addition to tools for designing how a report will look, SRW can sort and select data and perform calculations.

Snow is developing a new version that can combine data from multiple databases in one report and supports SQL; Apple events; and O.C.E., Apple's future e-mail backbone. Version 4 is $795 from Snow Software, 813/784-8899. —D.L.

Oxford Goes Online
Oxford University Press is demonstrating a Windows version of The Oxford English Dictionary (second edition) on CD ROM, which it plans to produce for the Mac by late 1992 or early 1993. The CD ROM version of the OED is not just a way to look up the definitions of words. Each definition is broken up into fields as well as a database, so its software can perform such tasks as searching for the etymology of all words beginning with quo, or finding all words derived from a common Sanskrit root, or gathering all the French-derived words whose definitions contain literary quotations from the eighteenth century. It also has a sophisticated query language for very complex tasks. It will list for $895. Oxford University Press, 212/679-7300. —D.L.

Speedy Erasable Optical Drives
Rodime Systems has introduced the Condor 650e and the Condor 130e, high-speed erasable optical drives for the Mac that offer 652MB and 128MB of formatted capacity, respectively. The 3 1/2-inch Condor 650e has an average access time of 37ms and a sustained data-transfer rate of 640K per second. Both drives are external units that work with either the SCSI I or SCSI II interface.

The Condor 650e has a suggested list price of $4679, with cartridges listing for $269; the Condor 130e's suggested list price is $2498, with cartridges going for $99. Both drives began shipping in April. Rodime Systems, 407/391-7333. —T.M.

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TURKEY SHOOT

DESIGN FLAWS NOTED

Claris Resolve Inserting some cells in a worksheet? Good thing you wanted to push everything over to the right—because Resolve doesn’t give you the option of moving it all down.

Correct Grammar WordStar claims this grammar checker works with QuarkXPress and PageMaker, but that really means you copy text to the Clipboard, grammar-check it, and paste it back in—minus all formatting.

Adobe Photoshop Yes, Photoshop’s duotone (and tritone and quadtone) feature eliminates guesswork and can save lots of money. Too bad it doesn’t support editing colors on a portion of a duotone file.

Macworld will send you a Turkey Shoot T-shirt if we shoot your turkey in this column. See How to Contact Macworld.

ZEPPO IS A 3-D MODELER THAT FEELS LIKE A DRAWING TOOL THIS MODEL WAS RENDERED IN MACROMIND THREE-D.

Macromedia’s Splines

Macromedia (formerly MacroMind Paracomp) is developing a spline-based 3-D modeler, code-named Zeppo, that challenges the impressive Alias Sketch. Zeppo objects’ lines can be modified with Bézier-curve handles as in Adobe Illustrator (which Zeppo imitates), but Zeppo’s handles appear in the x, y, and z dimensions, permitting almost any kind of deformation. Zeppo has CAD-like snapping tools; lets the user define working planes anywhere in space; and supports PostScript Type 1 and TrueType fonts, though text must be modified one letter at a time. Zeppo doesn’t do Boolean operations—solid objects cannot be cut or merged. It has the same alignment tools, linking capabilities, and surface materials as Swivel 3D Professional and can interpolate a skin across a series of differently shaped ribs. Zeppo lacks animation and high-end rendering, but MacroMind Three-D, which has both but no modeler, is being upgraded to directly read Zeppo files. Zeppo can import and export Swivel files. Pricing, final name, and ship date were not set at press time. Macromedia, 415/442-0200.—D.L.

ONE OF SEVERAL PORTRAITS OF THE MASTER THAT APPEAR ON SHAKESPEARE AND THE GLOBE THEATRE.

The Bard on Disk

To click or not to click.... You can decide as you make your way through Shakespeare and the Globe Theatre. One section is devoted to Shakespeare, the man; another to the social hierarchy, religious beliefs, and living conditions of his time. Other sections describe Shakespeare’s colleagues at the Globe, illustrate the theater’s interior and exterior, and detail the setting and source of Shakespeare’s plays. Shakespeare and the Globe Theatre includes the text of A Midsummer Night’s Dream and has a teacher’s guide. It costs $129 from Shakespeare on Disk, 914/266-5705.—ANN GARRISON

TREND

Adapter Does Color and Ethernet

E-Machines has introduced the ColorLink DC/T, an 8-bit color graphics adapter that has Ethernet Phase II on the same board. Designed for users who have filled their Mac’s NuBus slots, or who own a IIsi, the board uses only one slot to provide both functions. It is compatible with Novell Netware for the Mac. The DC/T supports monitors as large as 19 inches. It is available now at a list price of $695.

E-Machines has also introduced the DoubleColor LX, a two-page display adapter for 21-inch monitors. The 8-bit DoubleColor LX, also available, lists for $895. E-Machines, 503/646-6699.—T.M.

Fishing for Ideas

Who brainstorms with Idea Fisher? Writers, advertisers, TV producers—and Bill Rutledge of the Texas Parks and Wildlife Department. To plan a show promoting hunting in Texas, Rutledge chose the Idea Fisher menu item for generating product ideas and then answered the program’s questions about his purpose, intended audience, and essential ideas. The result? On October 2 and 3 in Austin, the department will sponsor a celebrity banquet, a celebrity shotgun match, turkey-calling contests, and hunter education about safety and what not to shoot—eagles, falcons, and other protected species. Idea Fisher 2.0 is $595 from Fisher Idea Systems, 714/474-8111.—ANN GARRISON

Real-Time Video for QuickTime

RasterOps has introduced the QuickPak, an expansion board that provides full-screen, QuickTime-compatible video at the maximum video rate of 30 frames per second. The QuickPak fits into the expansion connector on the company’s 245TV video board and on later video boards from RasterOps.

Users drop a QuickTime driver into QuickTime’s Component Manager folder, and the board operates transparently to increase the maximum size of the video window and its frame rate. Users must reercord each QuickTime movie once. The QuickPak uses a compression/decompression chipset from LSI Logic. Expected to ship in June, the QuickPak will have a suggested list price of $999. RasterOps, 408/562-4200.—T.M.

Projection Panel Adds Digital Video

Proxima Corporation has added digital video capability to its Proxima Ovation LCD projection panel and increased the device’s colors from about 24,000 to about 227,000. The new controller in the panel supports the NTSC, PAL, and SECAM and offers better color-locking, definition, and fidelity.

The new version of the Ovation is shipping, at $8495. Proxima, 619/457-5500.—T.M.
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—Joseph Schorr, Macworld, April '92

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Speed through large files at rates from 14.4K bps up to 57.6K bps when connected to a similar modem. 14.4K send/receive fax capability, software and cable. List: $589
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Note: We're adding two exciting new capabilities, concurrent voice communication and caller identification. These features are not yet available from any modem manufacturer, but as soon as the technology permits (estimated to be third quarter of '92), we will offer it in an easy upgrade to our Xeba line. Caller identification may not be allowed in all states.

Circle 93 on reader service card
Family Scrapbook

Immigrants to America were often too busy surviving to record family histories, but many seniors now have more leisure time than their ancestors had. SeniorNet—an organization of computer-using seniors with an online network and learning centers across the country—has designed a videodisk prototype, the Electronic Scrapbook, for teaching and inspiring seniors to record their personal histories electronically. The disk explains how they can scan pictures of themselves and their momentous into HyperCard, then use MacRecorder to record stories that go with them. The Electronic Scrapbook was produced by Bay Area Video Coalition's Interact Project working with SeniorNet in San Francisco. SeniorNet is at 415/750-5030.
——ANN GARRISON

030 Accelerator for LCs

DayStar Digital has introduced the PowerCache Adapter LC, an adapter that allows its 68030-based PowerCache accelerator to work with the Mac LC and LC II. The slowest version of the accelerator essentially doubles the speed of the LC or LC II, according to DayStar. The PowerCache Adapter LC lists for $499 for the 33MHz version, $1249 for the 40MHz version, and $1499 for the 50MHz version. Math coprocessors add $300 to the list price, except for the coprocessor for the 50MHz version, which adds $400. All are shipping now. DayStar Digital, 404/967-2077.

Cancer Education Project

The AMC Cancer Research Center of Denver has joined forces with Warner New Media to create Cancer Information Guide kiosks using MacOS with touch screens and CD ROM drives. The kiosks will inform users about cancer prevention, early detection, treatment, rehabilitation, and resources. Users will be able to choose English or Spanish; the kiosks combine pictures, sound, and text, for people of all literacy levels. AMC's goal is to put 500 kiosks around the country, in health clinics, government buildings, and shopping malls. AMC Cancer Research, 303/239-3343.

External Color for PowerBooks

Computer Care has introduced BookView Imperial, an internal add-in board for the PowerBook 140 and 170 that supports 8-bit color on external monitors with screens as large as 21 inches. BookView supports virtual memory, color palette changes, the Apple Color Picker, and presentation mode. BookView Imperial displays resolutions up to 1152 by 870 on an Apple 21-inch monitor. The board also has a power-down mode for conserving battery power.

On the Grid

Fifth Generation's new Public Utilities file- and disk-recovery package includes an INIT that runs in the background to look for potential problems. It can be configured to repair problems immediately or to stop and inform the user. Public Utilities can undelete files, and its disk-defragmenter moves deleted files to safe sectors of the disk, where they may still be recoverable after a disk is defragmented. Public Utilities lists for $149.

Public Utilities also includes Launch Pad, a bare-bones application-launch utility to which Fifth Generation plans to add intelligence. For example, when Public Utilities is launched, it might pass a message to the user that it is time to defragment the Mac's hard drive. Fifth Generation Systems, 504/291-7221.

B U G  R E P O R T

Aldus FreeHand 3.1 Graduated fills print with severe banding on high-end devices such as image setters and slide recorders. Aldus will explain to users who call how to modify the User Pref file to eliminate the problem.

Aldus Persuasion 2.1 Does not display colors correctly on 4-bit (16-color) systems. Problem fixed in version 2.12, which Aldus says was sent to all registered users at no charge.

Timbuktu 4.0 Does not work correctly with Quadtors or with AppleTalk Remote Access. Version 4.03 fixes Quadra problems and most Remote Access problems; available at no charge to registered users who request it from Farallon.

GreatWorks 2.0 Y value axis sometimes displays nonsense numbers when data points are close to zero. Symantec recently shipped version 2.01 but it does not fix this bug.

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Only PSI Integration's internal PowerModem allows you to send and receive faxes anywhere in the world with your Macintosh® PowerBook®. And it's the only completely internal send/receive, fax/data modem you can buy. So, you have no external parts to lose, break or forget.
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For more information, please call 1-800-598-0998 East coast, 1-800-643-0666 West coast.

"...The Tamarack ArtiScan exhibited excellent color accuracy, and it's fast...it's hardware is impressive..." MacUser, 12/91

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More External Color for PowerBooks
Also designed to support external color monitors for the PowerBook 140 and 170, the SuperView from SuperMac Technology is an external box similar to the PowerView from Radius. Both devices use SCSI to connect to the PowerBook. Unlike the PowerView, the SuperView transfers Quick-Draw primitives instead of bitmaps, making it much faster, according to SuperMac. The SuperView includes an internal power supply and does not require the user to carry an external power adapter.

The SuperView supports up to 19-inch color monitors at a maximum resolution of 1024 by 768. It is expected to ship sometime in July at a suggested list price of $799. SuperMac, 408/245-2202.—T.M.

Mirror Cracks 16-Inch Color Price Barrier
Mirror Technologies has broken new ground in the price of 16-inch color monitors with its Mirror 16-Inch Color Display, which sells for $899. The monitor has a resolution of 832 by 624 at 72 dpi, a refresh rate of 71 Hz, and an antiglare screen.

The Mirror 16-Inch Color Display works with the built-in video on Quadras at 24 bits and 72 dpi, or with the LC, the IIsi, and the LC at the lower resolution of 640 by 480. Mirror is also offering the monitor bundled with an 8-bit adapter for $1299, with a 16-bit adapter for $1499, and with a 24-bit adapter for $1699. All the products are shipping now. Mirror, 612/633-4450.—T.M.

La Cie Offers Tiny Drives
La Cie has added two higher-capacity devices to its PocketDrive series of very small portable hard drives. The 60MB PocketDrive and the 120MB PocketDrive both use 2½-inch Quantum mechanisms and weigh less than a pound each. Both drives have 19ms average access times. The drives should begin shipping by the end of June at an introductory list price of $579 and $899 (120MB).

La Cie also said it has begun shipping its Cirrus Optical, a 128MB, 3½-inch erasable optical drive. The Cirrus Optical uses a Panasonic mechanism with a 48ms average access time. The device lists for $1699, and the 128MB cartridges list for $99. La Cie, 503/520-9000.—T.M.

Down in the Word Mines
Most organizations' day-to-day operations run on a database of members, customers, or financial accounts. But over time most organizations also accumulate a vast store of knowledge in the form of memos, letters, contracts, reports, and operations manuals. To extract meaning from such a mass of text requires special tools such as Fulcrum Technologies' Ful/Text, a developer's toolkit for creating full-text databases. Ful/Text can index huge amounts of raw text and partially structured data (such as journal abstracts) and perform complex searches using proximity, wild cards, and so on.

One use of Ful/Text is Nautilus, a computer magazine published on CD ROM by Metatec/Discovery Systems. Metatec developed its own interface for Nautilus and uses the Ful/Text engine to let readers search the CD's contents (Metatec also designs, produces, and manufactures CD ROMs for other companies).

The Ful/Text toolkit starts at $50,000. Fulcrum is at 613/238-1761. Metatec is at 614/761-2000.—D.L.

Survey: Mac Hardware Used
Hardware products used by subscribers with Macs

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Communications Products</td>
<td>52%</td>
</tr>
<tr>
<td>Modem</td>
<td>50%</td>
</tr>
<tr>
<td>Fax</td>
<td>12%</td>
</tr>
<tr>
<td>All Add-On Boards</td>
<td></td>
</tr>
<tr>
<td>Graphics board</td>
<td>46%</td>
</tr>
<tr>
<td>Scanner</td>
<td>26%</td>
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<tr>
<td>All Input Devices</td>
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<td>Color Monitor</td>
<td>46%</td>
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<tr>
<td>Monochrome monitor</td>
<td>49%</td>
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<td>All Output Devices</td>
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<tr>
<td>Color Monitor</td>
<td>86%</td>
</tr>
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<td>62%</td>
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<tr>
<td>All Storage Devices</td>
<td></td>
</tr>
<tr>
<td>Hard Disk Drive</td>
<td>88%</td>
</tr>
<tr>
<td>Hard Disk Drive</td>
<td>85%</td>
</tr>
</tbody>
</table>

Based on 1450 respondents to a 1992 Macworld mail-in subscriber survey. Multiple responses were allowed.

To order a copy of Beyond Cyberpunk, contact Gareth Branwyn, 703/527-6032.—T.M.
**MacWareHouse**

**1-800-255-6227**

**MacGlobe or MacUSA**
- **MacGlobe**, the extraordinary geography tool for the Macintosh, provides vibrant maps, extensive graphs and an annually updated database for all countries and dependencies at your fingertips. It delivers a wealth of maps, including each country's major cities, geography and major geographical features as well as regional maps. Perfect for planning projects such as presentations. 
- **MacUSA**, every Mac user wants fast, accurate information on 50 states and Puerto Rico. Contained within are superb maps and graphics, will love MacUSA. Provides you with an instant profile of each state that includes: city locations, elevations and natural features; demographic, economic, political, climate and health data; state flags and entire state songs.

**WristSaver/ WristSaver MousePad**
- The WristSaver cradles your wrist with a contoured memory rubber pad and a cushioned foam core to support your wrist at the proper angle to help avoid the pain associated with Carpal Tunnel Syndrome. The WristSaver MousePad provides a comfortable rest for your wrist, plus a conventional mouse pad. Simple finger movements replace sliding the entire arm or hand.

**Retrospect or Retrospect Remote**
- **Retrospect**, the award-winning backup software, automatically protects your computer and its files from loss due to hardware failure, accidental deletion, or system failure. It backs up to any type of storage media (including CD-ROM) and can be scheduled to run at specified times. It's cross-platform, compatible with both Macintosh and Windows operating systems.
- **Retrospect Remote**, a powerful and flexible backup tool, allows you to schedule backups from any computer on your network. It's compatible with all versions of Mac OS and Windows, and can be configured to use a variety of storage devices, including networked drives, USB drives, and CD burners.

**FileGuard 2.7**
- **FileGuard** is the ultimate protection for your important files. It's designed to protect your files from unauthorized access, deletion, and/or illegal copying. It offers a comprehensive solution for protecting your files, folders, and entire system from unauthorized access.

**TrueLaser printer or ScanMaker 600ZS**
- **TrueLaser**, a versatile laser printer, offers 300 dpi resolution, with 35 built-in True Type fonts, and is PostScript and PCL compatible. It also offers exceptional color quality, with 24-bit color and 64-bit grayscale, making it ideal for producing high-quality prints.
- **ScanMaker 600ZS**, a powerful and flexible scanner, offers high-quality scans at resolutions up to 600 dpi. It supports color, grayscale, and black-and-white images, and can be used to scan documents, photos, and other media to create digital files for storage or sharing.

---

**JAG or Ray Dream Designer 2.0**
- **JAG** or **Ray Dream Designer 2.0**, a powerful tool for creating stunning digital graphics and illustrations. It offers a wide range of features, including support for 3D modeling, animation, and rendering. It's ideal for artists, designers, and hobbyists who want to create professional-quality graphics.

**WindoWatch**
- **WindoWatch**, a powerful and flexible software tool, allows you to track the time you spend on projects and bill your clients accordingly. It's designed to work with any project management software, making it easy to integrate into your workflow.

**Active Memory 2.0**
- **Active Memory 2.0**, a powerful tool for enhancing the performance of your Macintosh, allows you to turn your PowerBook into a powerhouse organizer. It allows you to manage and track your time more efficiently, helping you stay on top of your projects and deadlines.

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System 7 Personal Upgrade Kit - SYS0001 ............. $79

System 7 brings new capabilities and ease of use to everyone who uses a Mac... System 7 builds on the Mac basics you already love, and paves the way for a whole generation of powerful new software. A simple click of the mouse installs the software. Then advanced features take over, letting you work faster, easier, and more productively. Now it's easier than ever to get System 7 up and running on your Mac, because you can get it right from MacWAREHOUSE! Join the generation of System 7 power users!

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City: __________________________ State: __________________________ Zip: ____________

Offer good for new first-time orders only within U.S. market.
DiskTop goes System 7!

- Find faster, launch lots and manage more with DiskTop, the System 7-compatible file management utility from CE Software. Find files faster, as you can search based on file name (or part), size, type, creator, when created or modified. If DiskTop can't find it, it also searches other directories. Once you've found what you're looking for, use the powerful copy, move, delete or rename functions to keep everything organized and up-to-date. All done in one window and without leaving your current application! And, when it's time to launch another program, don't quit or go to the Finder—launch any application from your DA menu with DiskTop. If you have a hard drive, DiskTop is a must!

**$63**

Intouch 1.1 or DocuComp II*

- Intouch 1.1 is an easy-to-use Deck accessory that stores unlimited names, addresses, and notes, prints envelopes and labels, dialed phone numbers and more! Share your contact information with Infoworx Network. Send in your registration card to Advanced Software for a FREE upgrade to version 2.0. UTID98 $59.

- DocuComp II now offers dozens of new features and is run System 7 Savvy! Reporting changes in a breeze! Perfect for government, law, aerospace, or any documentation change over time. Version Control has never been easier! Considers any two document versions, and reports changes in minor as an identical event, and as major in a complete rearrangement of text. Save or print a marked-up file, including a separate list of changes. Publisher: Advanced Software. UTID99 $21.

**$299**

**$109**

ExpertWriter, ExpertColor Paint or Expert Astronomer

- ExpertWriter lets you create letters, faxes, menus—all your written communications quickly and professionally. Print letters, mailing envelopes, perfectly formatted with your own letterhead, return address, address block, and postal barcode.

- ExpertColor Paint is a simple to use yet powerful color paint program with many extras including 32 bit color, fully loaded and customizable tool palettes, multiple undo, undo history, and Painter support. Paint like a pro! UTID99 $29.

- Expert Astronomer is the astronomy program for novices and experts alike. Colorful, clear and precise graphics bring the sky to life. Learn useful information about the stars, planets and constellations just by clicking (over 20,000 celestial objects). You can even track eclipses!

**$299 ea.**

Azimuth 2.1

- Azimuth 2.1 draws perspective maps of any country in the world, all 50 states, and the Canadian provinces. It now includes the new independent states formed after the break up of the USSR. It imports text files to add detail to your maps, and plots true great circles. Azimuth uses data files to draw maps from any angle or distance, at any scale you desire. Use the drawing tools to customize the maps with symbols, graphics, layers, and notations. Exports maps in EPS or PICT format. Publisher: GraphSoft. BU50184.

**$299**

**$139**

OPTIMA™ 96

- OPTIMA™ 96 is affordable. V.32, V.32bis, V.42bis and V.42 bis standards make this modem ideal for anyone who needs to transmit data without a local area network. It features a built-in 300 bps modem for slower connection in hard to reach areas. Publisher: Hayes. WID9977.

**$399**

**M.Y.O.B. 3.0**


**$79.99 ea.**
### MacPrint 1.3
- Use a Macintosh with non-Apple printers. Print Mac applications on HP Laserjet, Deskjet or compatible printers including all Series IIs, IIs, and the Deskjet 500. Prints text and graphics at the printer's maximum resolution. Does not require PostScript. Cable is included. Publisher: Insight Development

**$95**

### FontBank PostScript Display Typefaces
The FontBank PostScript Display typefaces give you a library of 250 top PostScript display typefaces. Build a versatile type library with designs ranging from the simple sans serif to the extreme ultra bold. Use them to create attention-getting headlines, subheadings, titles, logos and special text effects. Included in the package are traditional, decorative, novelty, script, brush and calligraphic faces. Use these faces as a counterpart to regular text or with design programs. With FontBank fonts, you get full-featured screen and printer fonts at an affordable price.

**$95**

### AccuText 3.0
- AccuText 3.0 is intelligent Character Recognition (OCR) software that allows scanned documents to be recognized and captured to electronic files on the Macintosh, for output to word processing, spreadshre and desktop publishing applications. AccuText now features an interactive Verifier. This feature increases speed and accuracy by allowing user intervention before processing. AccuText also features System 7 compatibility and support for the HP LaserJet II and Apple OneScanner, background processing, format retention, automatic halftone removal, on-screen zooming, support for true languages, and compatibility with the most popular scanners and software applications for the Macintosh.

**$_639_**

### Virtus WalkThrough 1.11
- The latest version of this award winning 3-D drawing program provides everything you need to quickly capture and explore your ideas in 3-D. Multiple windows and extensive drawing ability provide an interactive environment for editing and viewing your ideas. Interactive 3-D presentations, QuickTime® and VR animates modes and perspective views dazzle your audiences. Enhanced importers of 3-D DIF, PCT, GeomCAD and MacDraw, and Exporters of 3-D DIF, 2-D DIF, Claris/CAD, MacDraw, PICT and EPS. Winner of MacUser Breakthrough Product of the Year Award 1990.

**$_309_**

### White Knight V.11
- The perfect low-cost solution to almost any Mac telecommuter's needs. Offers the kind of power associated with products costing hundreds of dollars more, but at a lower price. A 270+ page user manual is geared to all levels of expertise. Winner of 11 awards including MacWorld's World Class Software Award 1987-1991. Publisher: FreeSoft

**$_85_**

### MacDraft 2.1
- Designed specifically for architectural/engineering drawing and drafting technical illustration. MacDraft provides a fully scaled drafting environment that closely emulates the way you work and think when using a drafting table. Offers a full complement of drawing tools that are designed to provide easy control over the creation and editing of objects. Tools include lines, circles, rectangles, arcs, polygons, ellipses, splines or Bezier curves, and freehand shapes. MacDraft provides a number of options that allow you to customize tools to meet your drawing needs. Users can create multi-layered scaled drawings in English or metric units, while MacDraft's dimensioning and tool calculations are displayed units of the drawing. MacDraft can even read MacDraw® II files.

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

**MORE BRAIN POWER FOR YOUR MAC**

Never again will you have to quit your word processor just to answer a question about a spreadsheet. Install extra memory and you can leave a letter open while you refer to last month's sales figures.

You can edit those monstrous scanner files with advanced graphics applications or develop your own custom HyperCard stacks. More memory means more power at your fingertips.

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Adding memory doesn't require technicians in lab coats. You'll find installation at home easy when you follow our FREE** step-by-step installation video instructions. Just open your Mac, slide out the main circuit board and plug in your SIMMs.

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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 — $2.00 ($3.00 ea.)

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

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

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

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Please call for the very latest prices and availability. Our sales staff will tell you what you need and help you make your choice an easy one.

**SPEED**

Do you need 80, 100 or 120 Nanosecond (ns) chips? Nanoseconds are billions of a second, so an 80 ns chip responds faster than a 100 ns chip. The original Mac used relatively slow 100ns memory chips. The 68020 processor needs 80ns (or faster) chip, and the 68040 Macs like the specter model.

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CHP 0012 120ns SIMMs .................................................. $39

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

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With AccessPC 2.0, your Macintosh can make MS-DOS files look just like Mac files, instantly. Pop any DOS floppy in your drive, and in a couple of clicks, the PC files are on your Mac desktop, looking and acting perfectly Mac-like. Edit, copy, save, print, move, copy and delete documents just as if they were Mac files! Customizes the program for even faster access. Requires Apple SuperDrive or compatible. PUB 1026
Publisher: Apple Computer, Inc.

**Macintosh PC Exchange**
Open PC files on 3.5" MS-DOS and Windows-formatted floppy disks. Read DOS files on your Mac desktop. Open, save, rename, move, copy and delete documents just as if they were Mac files! Requires Apple SuperDrive or compatible. PUB 1026
Publisher: Apple Computer, Inc.

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With AccessPC 2.0, your Macintosh can make MS-DOS files look just like Mac files, instantly. Pop any DOS floppy in your drive, and in a couple of clicks, the PC files are on your Mac desktop, looking and acting perfectly Mac-like. Edit, copy, save, print, move, copy and delete documents just as if they were Mac files! Requires Apple SuperDrive or compatible. PUB 1024
Publisher: Insignia Solutions

**QuickTime Starter Kit**
Play QuickTime movies right on your Mac. Pause, fast-forward, rewind, advance frame by frame. Copy video and animation clips and paste them together. Transform still images and information into a single movie. Use a video capture card and sound digitalizer to record movies with the touch of a button. QuickTime brings Multimedia to the Mac! PUB 1027
Publisher: Apple Computer, Inc.

**Fonts in System 7**
Apple's new advanced font technology gives you clear, crisp type on screen in any size plus the ability to print to many different kinds of printers. No more struggle with font compatibility.

**Multitasking**
With System 7 Multitasking is always optional. Now you can run multiple applications at the same time, and switch from one to another with a click of the mouse. System 7 also supports background processing, so that while you're working in your word processor, you can print a document and have your spreadsheet recalculating.

**System Folder Simplicity**
Apple has completely redesigned and improved the System Folder, making it much easier to organize. Predefined subfolders are created automatically, to reduce clutter. The new System Folder includes a Control Panel Folder, Extension Folder, Apple Menu Folder, Preference Folder and Startup Folder.

**Publish and Subscribe**
You can "publish" any part of your document (a graphic, chart or piece of text), to another document even in another application - which "subscribes" to the original. Any changes you make to the original document will automatically appear in the other, even across a network. Now that's live copy and paste!

**Fonts in System 7**
Apple's new advanced font technology gives you clear, crisp type on screen in any size plus the ability to print to many different kinds of printers. No more struggle with font compatibility.

**Jetstream**
Neat, trim, and perfect for printing and viewing your folders, documents and applications faster and easier with the new improved finder.

**Balloon Help**
Use the new Balloon Help for interactive help while you work. Turn this feature on and point to anything on your screen - a menu item, icon, or tool - and a "balloon" appears, telling you what it is and what it does.

**File Sharing**
With the new File Sharing features you can share hard drives, folders, and files, with others on your network; it has never been easier. You can even set passwords so that only specific individuals or groups can see your files and work with them.

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You can "publish" any part of your document (a graphic, chart or piece of text), to another document even in another application - which "subscribes" to the original. Any changes you make to the original document will automatically appear in the other, even across a network. Now that's live copy and paste!
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QuickTime Starter Kit

Play QuickTime movies right on your Mac! Pause, fast-forward, rewind, advance frame by frame. Copy video and animation clips and paste them together. Transform still images and information into a single movie. Use a video-capture card and sound digitizer to record movies with the touch of a button. QuickTime brings Multimedia to the Mac! GR00037 Publisher: Apple Computer, Inc. ........................................................ $169

AppleTalk Remote Access

Gain direct access to information and resources from your AppleTalk network. Simple to set up and use. High performance is optimized for a broad range of modems. Provides multiple security levels and requires no special hardware required. COM0124 Publisher: Apple Computer, Inc. ........................................................ $75

AppleShare 3.0

Connect up to 120 users using a variety of cabling choices. New version offers faster server start up, improved integrity and error handling, plus the ability to mount and unmount removable media while the server is running. NET0028 Publisher: Apple Computer, Inc. ........................................................ $1059

ADVANTAGE OF THE POWER OF SYSTEM 7!

System 7 brings dynamic new capabilities and ease of use to everyone who uses a Mac...

System 7 builds on the Mac basics you already love, and paves the way for a whole generation of powerful new software. A simple click of the mouse installs the software. Then, advanced features take over, letting you work faster, easier, and more productively.

Multitasking provides effortless switching between applications

Finder 7 lets you customize your desktop to the way you work

File Sharing allows access to any folder and its contents among workgroups

Publish & Subscribe lets you update several documents by only changing one

TrueType gives you crisp, clear type of any size

And that's just for starters!

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Order System 7 today!

System 7 Personal Upgrade Kit

SYS0001 Publisher: Apple Computer, Inc.

System 7 Group Upgrade Kit

SYS0002 .................. $279

System requirements: 2MB RAM; hard disk drive.

AppleShare 3.0

Connect up to 120 users using a variety of cabling choices. New version offers faster server start up, improved integrity and error handling, plus the ability to mount and unmount removable media while the server is running. RET0028 Publisher: Apple Computer, Inc. ........................................................ $1059

Appletalk Remote Access

Gain direct access to information and resources from your AppleTalk network. Simple to set up and use. High performance is optimized for a broad range of modems. Provides multiple security levels and requires no special hardware required. COM0124 Publisher: Apple Computer, Inc. ........................................................ $75

AppleShare 3.0

Connect up to 120 users using a variety of cabling choices. New version offers faster server start up, improved integrity and error handling, plus the ability to mount and unmount removable media while the server is running. NET0028 Publisher: Apple Computer, Inc. ........................................................ $1059

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You want all your documents to look polished and professional. You've seen how graphics and charts can jazz up those otherwise dull memos and reports. But trying to do page layout with your word processor is almost impossible. And high-end page layout programs take too much time and effort. Introducing Personal Press 2.0 — the first page layout software that does it all for you — automatically!

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Personal Press does the work, so you don't have to.

Use the Copy Fit command and Personal Press will reformat your text to fit in the space you designate. AutoFlow eliminates the guesswork because it adds pages to your document as necessary. Interactive Graphic Previews show you what will happen before it happens, and provide constant, interactive feedback so you can avoid mistakes and work more efficiently. Text Wrap automatically wraps text around text and graphics of any size or shape. And with the incredible Aldus Additions, performing special tasks, such as creating drop-cap letters, pull quotes or bullet text, is fast and automatic.
Aldus Personal Press 2.0 is the first page layout software to automatically design and assemble your text and graphics. The result is a quick-to-create, professionally-designed publication. Personal Press puts it all together so you look like an expert.

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Personal Press 2.0 gives you powerful tools and advanced features that are easy to learn and use. There's a full-featured word processor with a 100,000 word spelling checker and 680,000 synonym thesaurus. Import text and graphics and rotate them freely for just the right look. Create various line styles, including hairline and custom widths. Adjust the brightness and contrast of your grayscale images. Preview, crop, scale, and place frames from QuickTime movies right into your document. And much, much more.

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With Personal Press, your documents will really look great in print! Output to the most popular Mac printers, including high-resolution black and white and color QuickDraw and PostScript printers. Rotated text prints at the highest resolution possible, and your grayscale images will come out looking clean and crisp. Personal Press will even print spot color separations.

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Personal Press 2.0 —
Makes you look like an expert!

DTP 9800 PacFACTS 2502
Publishers: Aldus
Suggested Retail: $99
System requirements: Mac Plus or higher (including PowerBook family and Quadra); System 6.0.3 or later (6.0.5 or later recommended); 1 MB RAM (2 MB recommended); hard drive disk drive.

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Each month, you turn to Macworld to find out which hardware and software—from hard drives and monitors to spreadsheets and page-layout programs—we deem the best on the market. But once a year, we stand back and give you a chance to champion your favorites—the Macintosh products you consider world-class winners.

Early this year, we sent surveys to a randomly selected group of 4000 Macworld subscribers who were asked to vote in as many—or as few—categories as they wished, depending on their knowledge and experience in each area. In all but five write-in categories, survey respondents were given a list of products—1950 in all—from which to choose; they could also write in a candidate if it did not appear on the list.

The balloting process was the same as last year's, with one major exception: all Apple-label products were eliminated from the lists and disqualified from the write-in categories. Apple certainly makes good products. But the built-in advantage of the Apple logo unfairly pushed many deserving vendors out of contention in prior years. We wanted to recognize third-party developers for their hard work and pioneering spirit in creating high-quality products for the Mac.

Survey results were tabulated by an independent research firm, Wilson Associates. On the following pages, we showcase this year's 74 award winners.

Some things never change. At least it seems that way for companies that had winning product lines for the sixth consecutive year. In the hardware categories, Hayes Microcomputer Products again won for its 2400-baud and 9600-baud series of modems. Radius took the honors in the monochrome monitor category—this year, as last, for the popular Pivot. In software, Microsoft Excel and Word easily beat the competition in the spreadsheet and word processing arenas, Claris's FileMaker Pro and MacProject took the end-user database and project-management awards, and Aldus PageMaker dominated the page-layout category.

BY CATHY ABE S
Stepping into the Spotlight

ROUGHLY HALF OF THIS YEAR'S TOP vote-getters were repeat winners from last year, though many found themselves sharing honors with one or two competitors. A newcomer in the hardware arena catapulted straight to the top, however. Radius's Color Pivot matched the quick success of its older monochrome sibling, winning best color monitor. And Hewlett-Packard products took unprecedented top honors in every printer and scanner category—five in all.

On the software side, Kid Pix, Broderbund Software's innovative new color-print program for children won the education category, CE Software's QuickMail narrowly upset Microsoft Mail in electronic mail. Symantec's More II (a winner in previous years) and CE Software's Calendar-Maker tied for first place in a new category, organization/productivity tool.

Adobe Type Manager, a winner for the third year in a row, eclipsed its competitors in a new category, utility—font/print management, with 76 percent of votes. Although HyperCard managed to hang on to the top spot among authoring tools, that lead slipped compared to last year—from 70 to 55 percent—while Macromind Director moved into second place. Despite Adobe Illustrator's having to share the top award in the drawing/illustration arena with its main competitor, Aldus FreeHand, Adobe has to be pleased with its rising star in the image processing category; taking a decisive 74 percent of votes, Adobe Photoshop's ascendancy is indisputable. And close on the heels of this year's modeling/rendering winner, Macromedia's Swivel 3D Pro, were two new contenders, Pixar's MacRenderMan and Macromedia's Three-D.

No Clear Winners

APPLE'S ELIMINATION FROM THE COMPETITION gave some third parties deserved recognition, but in a few cases—MIDI interface, tape drive, best newcomer (hardware and software), and best hardware support—none of the remaining contenders emerged with a significant lead. And in a few other areas where Apple has never competed, no company could muster a decisive electoral margin. In categories where four or five products were deadlocked, we gave no awards but wish to recognize the top vote-getters. La Cie, MicroNet Technology, Hewlett-Packard, and Pinnacle Micro tied for best optical drive; Technology Works' GraceLAN, Novell's LANalyzer Network Analyzer, and TrafficWatch and CheckNet (both from Farallon Computing) tied for network management; Mark of the Unicorn's MIDI Time Piece, Opcode Systems' Studio 3 and Studio 5, Passport Designs' MIDI Transport, and Altech Systems' MidiFace series tied for MIDI interface; MicroNet, La Cie, GCC Technologies, PLI, and Tecmar tied for tape drive; and RasterOps' Video ColorBoard 364 and 24STV/2XLTV, Truevision's NuVista+, Koala Acquisitions' MacVision, and Radius's RadiusTV tied for video capture/output.

Finally, we'd like to acknowledge the winning vendors, who so generously donated products for the World-Class product giveaway. Thanks to them, each of the following 12 lucky subscribers randomly chosen from the returned ballots will receive a selection of this year's World-Class products:

T. Kevin Coker of San Francisco, California; Douglas Diedrick of Minneapolis, Minnesota; Jim Grasley of Tacoma, Washington; Marie Kleinrock of Berkeley, California; Richard W. Martin of Mount Clemens, Michigan; David Pierce of La Mesa, California; Joy Shiman of Housatonic, Massachusetts; M. S. Smith of Annandale, Virginia; John Steringer of Lake Villa, Illinois; Marianne I. Tramp of Madison, Wisconsin; Arden R. Varney of Brookline, Massachusetts; and Jeff Wilbur of Oakland, California.

**HARDWARE**

<table>
<thead>
<tr>
<th>Product</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Color Graphics Board—24-Bit</strong></td>
<td></td>
</tr>
<tr>
<td>Radius DirectColor series; Radius</td>
<td>29</td>
</tr>
<tr>
<td>RasterOps ColorBoard 24 series; RasterOps</td>
<td>26</td>
</tr>
<tr>
<td>Spectrum/24 series; SuperMac Technology</td>
<td>12</td>
</tr>
<tr>
<td>Thunder/24; SuperMac Technology</td>
<td>11</td>
</tr>
<tr>
<td>Futura EX; E-Machines</td>
<td>6</td>
</tr>
<tr>
<td>Others</td>
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<tr>
<td>(23% of respondents voted in this category)</td>
<td></td>
</tr>
<tr>
<td><strong>Color Graphics Board—8-Bit</strong></td>
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</tr>
<tr>
<td>RasterOps B series; RasterOps</td>
<td>21</td>
</tr>
<tr>
<td>Radius PrecisionColor series; Radius</td>
<td>16</td>
</tr>
<tr>
<td>Spectrum/B series; SuperMac Technology</td>
<td>15</td>
</tr>
<tr>
<td>Radius DirectColor series; Radius</td>
<td>10</td>
</tr>
<tr>
<td>Thunder/B; SuperMac Technology</td>
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<td>Others</td>
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<tr>
<td>(19% of respondents voted in this category)</td>
<td></td>
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<tr>
<td><strong>CPU/Accelerator Upgrade</strong></td>
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<tr>
<td>Radius Rocket (68040 upgrade); Radius</td>
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<tr>
<td>Fast Cache II; DayStar Digital</td>
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<tr>
<td>PowerCard 800 series; DayStar Digital</td>
<td>8</td>
</tr>
<tr>
<td>Radius Accelerator series; Radius</td>
<td>8</td>
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<tr>
<td>PowerCache series; DayStar Digital</td>
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<td>Others</td>
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<tr>
<td>(25% of respondents voted in this category)</td>
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</table>
## Hardware

### Digital Audio/Music Hardware

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<thead>
<tr>
<th>Product; Manufacturer</th>
<th>% of votes</th>
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<tbody>
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<td>MacRecorder Sound System; Macromedia</td>
<td>60</td>
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<tr>
<td>Audismedia; Digidesign</td>
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<tr>
<td>Voice Impact Pro; Articulate Systems</td>
<td>9</td>
</tr>
<tr>
<td>MacProteus; Digidesign</td>
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<tr>
<td>Pro Tools; Digidesign</td>
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</tr>
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<td>Others</td>
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(20% of respondents voted in this category)

### Ethernet Hardware

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<thead>
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<th>% of votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhoneNet Card for Ethernet; Farallon Computing</td>
<td>15</td>
</tr>
<tr>
<td>GatorBox; Cayman Systems</td>
<td>15</td>
</tr>
<tr>
<td>Asanté 10T Hub series; Asanté Technologies</td>
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<tr>
<td>PhoneNet StarController EN, Series 500; Farallon</td>
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<tr>
<td>FastPath 5; Shiva</td>
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<td>Others</td>
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(18% of respondents voted in this category)

### LocalTalk Hardware

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<td>PhoneNet Connector; Farallon Computing</td>
<td>61</td>
</tr>
<tr>
<td>PhoneNet StarController, Series 300; Farallon Computing</td>
<td>12</td>
</tr>
<tr>
<td>NetBridge; Shiva</td>
<td>6</td>
</tr>
<tr>
<td>NetSerial; Shiva</td>
<td>4</td>
</tr>
<tr>
<td>TurboNet series; Nuretech</td>
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<td>Others</td>
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(26% of respondents voted in this category)

### Hard Drive—Under 80MB

<table>
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<tbody>
<tr>
<td>LaCie</td>
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<tr>
<td>GCC Technologies</td>
<td>8</td>
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<tr>
<td>Mirror Technologies</td>
<td>6</td>
</tr>
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<td>Ehman*</td>
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<tr>
<td>Others</td>
<td>58</td>
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</table>

(64% of respondents voted in this category)

*Has recently sold its product line; see Consumer, this issue, for details

### Hard Drive—80MB to 200MB

<table>
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<th>% of votes</th>
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<tbody>
<tr>
<td>LaCie</td>
<td>17</td>
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<tr>
<td>GCC Technologies</td>
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<tr>
<td>APS</td>
<td>7</td>
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<tr>
<td>MicroNet Technology</td>
<td>6</td>
</tr>
<tr>
<td>Mirror Technologies</td>
<td>6</td>
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<tr>
<td>Others</td>
<td>57</td>
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(38% of respondents voted in this category)

### Hard Drive—Over 200MB

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<td>MicroNet Technology</td>
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<tr>
<td>LaCie</td>
<td>10</td>
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<td>FWB</td>
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<td>APS</td>
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<td>GCC Technologies</td>
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<td>Others</td>
<td>57</td>
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(23% of respondents voted in this category)

### Modem—2400-Baud

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<th>% of votes</th>
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<tbody>
<tr>
<td>Hayes Microcomputer Products</td>
<td>31</td>
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<tr>
<td>Zoom Telephonics</td>
<td>16</td>
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<tr>
<td>Practical Peripherals</td>
<td>10</td>
</tr>
<tr>
<td>Supra</td>
<td>6</td>
</tr>
<tr>
<td>Global Village Communication</td>
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<td>Others</td>
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(45% of respondents voted in this category)

### Modem—9600-Baud

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<th>% of votes</th>
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<tbody>
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<td>Hayes Microcomputer Products</td>
<td>33</td>
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<tr>
<td>U.S. Robotics</td>
<td>10</td>
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<td>Zoom Telephonics</td>
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<td>Telebit</td>
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<td>Shiva</td>
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(25% of respondents voted in this category)
### Hardware

#### Modem—Fax

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<th>Product/Manufacturer</th>
<th>% of votes</th>
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</thead>
<tbody>
<tr>
<td>DoveFax series; Dove Computer</td>
<td>30</td>
</tr>
<tr>
<td>Zoom Modems; Zoom Telephonics</td>
<td>25</td>
</tr>
<tr>
<td>InterFax 24/96; Abaton</td>
<td>9</td>
</tr>
<tr>
<td>Teleport/Fax 9600; Global Village Communication</td>
<td>9</td>
</tr>
<tr>
<td>ProModem series; Promethes Products</td>
<td>9</td>
</tr>
<tr>
<td>Others</td>
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</table>

(26% of respondents voted in this category)

*Company reorganizing under Chapter 11.*

#### Printer—Other

<table>
<thead>
<tr>
<th>Product/Manufacturer</th>
<th>% of votes</th>
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</thead>
<tbody>
<tr>
<td>HP DeskWriter; Hewlett-Packard</td>
<td>58</td>
</tr>
<tr>
<td>KX-PT124; Panasonic</td>
<td>5</td>
</tr>
<tr>
<td>Diconic M150 Plus; Eastman Kodak</td>
<td>5</td>
</tr>
<tr>
<td>WriteImpact; GCC Technologies</td>
<td>4</td>
</tr>
<tr>
<td>WriteMove; GCC Technologies</td>
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<tr>
<td>Others</td>
<td>24</td>
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(35% of respondents voted in this category)

#### Monitor—Color

<table>
<thead>
<tr>
<th>Product/Manufacturer</th>
<th>% of votes</th>
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</thead>
<tbody>
<tr>
<td>Radius Color Pivot; Radius</td>
<td>15</td>
</tr>
<tr>
<td>ColorPage T16; e-Machines</td>
<td>10</td>
</tr>
<tr>
<td>SuperMac 200° Dual-Mode Trinitron; SuperMac Technology</td>
<td>8</td>
</tr>
<tr>
<td>SuperMatch 21 Two-Page Color Display; SuperMac Technology</td>
<td>6</td>
</tr>
<tr>
<td>Radius PrecisionColorDisplay/19; Radius</td>
<td>6</td>
</tr>
<tr>
<td>Radius PrecisionColorDisplay/21; Radius</td>
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<td>Others</td>
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</table>

(37% of respondents voted in this category)

#### Removable-Media Drive

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<tr>
<th>Product/Manufacturer</th>
<th>% of votes</th>
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</thead>
<tbody>
<tr>
<td>Bernoulli series; Iomega</td>
<td>23</td>
</tr>
<tr>
<td>Infinity 40 Turbo; PLI</td>
<td>13</td>
</tr>
<tr>
<td>DataPak series; Mass Microsystmes</td>
<td>8</td>
</tr>
<tr>
<td>Syquest 45; Club Mac</td>
<td>5</td>
</tr>
<tr>
<td>44-Removable; Ehman*</td>
<td>5</td>
</tr>
<tr>
<td>Others</td>
<td>46</td>
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(30% of respondents voted in this category)

*Has recently sold its product lines; see Conspicuous Consumer, this issue, for details.*

#### Monitor—Monochrome

<table>
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<tr>
<th>Product/Manufacturer</th>
<th>% of votes</th>
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</thead>
<tbody>
<tr>
<td>Radius Pivot; Radius</td>
<td>24</td>
</tr>
<tr>
<td>Radius TwoPage Display 21; Radius</td>
<td>11</td>
</tr>
<tr>
<td>Radius TwoPage Display 19; Radius</td>
<td>9</td>
</tr>
<tr>
<td>Radius Full Page Display; Radius</td>
<td>7</td>
</tr>
<tr>
<td>19° Platinum Display; SuperMac Technology</td>
<td>4</td>
</tr>
<tr>
<td>21° Platinum Two-Page Display; SuperMac Technology</td>
<td>4</td>
</tr>
<tr>
<td>Others</td>
<td>40</td>
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</table>

(29% of respondents voted in this category)

#### Scanner—Black-and-White/Gray-Scale

<table>
<thead>
<tr>
<th>Product/Manufacturer</th>
<th>% of votes</th>
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</thead>
<tbody>
<tr>
<td>HP ScanJet series; Hewlett-Packard</td>
<td>28</td>
</tr>
<tr>
<td>MSF-300G/GS; Microwe</td>
<td>12</td>
</tr>
<tr>
<td>LightningScan series; Thunderware</td>
<td>8</td>
</tr>
<tr>
<td>ThunderScan Plus; Thunderware</td>
<td>7</td>
</tr>
<tr>
<td>ScanMan Model 32; Logitech</td>
<td>6</td>
</tr>
<tr>
<td>Others</td>
<td>40</td>
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</table>

(29% of respondents voted in this category)

#### Scanner—Color

<table>
<thead>
<tr>
<th>Product/Manufacturer</th>
<th>% of votes</th>
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</thead>
<tbody>
<tr>
<td>HP ScanJet IIc; Hewlett-Packard</td>
<td>20</td>
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<tr>
<td>Silverscanner La Cie</td>
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</tr>
<tr>
<td>ScanMaker 6002S; Microtek</td>
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</tr>
<tr>
<td>Agfa Focus Color Scanner; Agfa Compugraphics Division</td>
<td>5</td>
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<tr>
<td>ScanMaker 1850S; Microtek</td>
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<tr>
<td>Others</td>
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(22% of respondents voted in this category)

#### Printer—Color

<table>
<thead>
<tr>
<th>Product/Manufacturer</th>
<th>% of votes</th>
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</thead>
<tbody>
<tr>
<td>HP DeskWriter C; Hewlett-Packard</td>
<td>28</td>
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<tr>
<td>Phaser III PAC Tektronix</td>
<td>13</td>
</tr>
<tr>
<td>HP PaintJet XL; Hewlett-Packard</td>
<td>12</td>
</tr>
<tr>
<td>ColorScript 100 series; QMS</td>
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<tr>
<td>HP PaintWriter XL; Hewlett-Packard</td>
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<td>Others</td>
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(28% of respondents voted in this category)

#### Printer—Laser

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<tr>
<td>BLP series; GCC Technologies</td>
<td>13</td>
</tr>
<tr>
<td>PS 410; QMS</td>
<td>5</td>
</tr>
<tr>
<td>PPL series; GCC Technologies</td>
<td>5</td>
</tr>
<tr>
<td>QMS-PB110/1120 Turbo; QMS</td>
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<td>Others</td>
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(46% of respondents voted in this category)

#### Video Editing/Effects

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<th>% of votes</th>
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<td>VideoSpigot; VideoSpigot Pro; SuperMac Technology</td>
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</tr>
<tr>
<td>Sony Viocek; Sony Vioce; Sony</td>
<td>22</td>
</tr>
<tr>
<td>QuickView Studio Multimedia Workstation; E-Machines</td>
<td>9</td>
</tr>
<tr>
<td>Avd/Media Composer; Avid Technology</td>
<td>8</td>
</tr>
<tr>
<td>PC-VR; NEC Technologies</td>
<td>8</td>
</tr>
<tr>
<td>Others</td>
<td>25</td>
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(11% of respondents voted in this category)
### Software

Some percentages do not equal 100 due to rounding. Due to statistical margins of error, some two-way ties were declared.

<table>
<thead>
<tr>
<th>Product: Manufacturer</th>
<th>% of votes</th>
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#### Authoring Tool

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<tr>
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<th>% of votes</th>
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</thead>
<tbody>
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<td>HyperCard; Claris</td>
<td>55</td>
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<tr>
<td>MacroMind Director; Macromedia</td>
<td>27</td>
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<tr>
<td>Aldus SuperCard; Silicon Beach Software</td>
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</tr>
<tr>
<td>Authorware Professional; Macromedia</td>
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<td>Course Builder; Telerobotics International</td>
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<td>Others</td>
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(36% of respondents voted in this category)

#### Business Accounting

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</tr>
<tr>
<td>Peachtree Accounting for Macintosh (atOnce); Peachtree Software</td>
<td>11</td>
</tr>
<tr>
<td>Great Plains Accounting; Great Plains Software</td>
<td>10</td>
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<tr>
<td>Accountant, Inc. Pro; Softsync/Block</td>
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</tr>
<tr>
<td>MultiLedger; CheckMark Software</td>
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<td>Others</td>
<td>48</td>
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(21% of respondents voted in this category)

#### Business Presentation Graphics

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<tr>
<td>Microsoft PowerPoint; Microsoft</td>
<td>22</td>
</tr>
<tr>
<td>DeltaGraph Pro; DeltaPoint</td>
<td>9</td>
</tr>
<tr>
<td>More II; Symantec</td>
<td>7</td>
</tr>
<tr>
<td>CA-Cricket Presents; Computer Associates</td>
<td>6</td>
</tr>
<tr>
<td>Others</td>
<td>17</td>
</tr>
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</table>

(43% of respondents voted in this category)

#### CAD/Drafting

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<tr>
<th>Product: Manufacturer</th>
<th>% of votes</th>
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<tbody>
<tr>
<td>Claris CAD; Claris</td>
<td>29</td>
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<tr>
<td>AutoCAD; Autodesk</td>
<td>12</td>
</tr>
<tr>
<td>MacDraft; Innovative Data Design (IDD)</td>
<td>11</td>
</tr>
<tr>
<td>Ashlar Vellum 3D; Ashlar</td>
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<tr>
<td>Dreams; Innovative Data Design (IDD)</td>
<td>7</td>
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<tr>
<td>Virtur WalkThrough; Virtus</td>
<td>6</td>
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<tr>
<td>Others</td>
<td>28</td>
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(24% of respondents voted in this category)

#### Database—Developer Tool

<table>
<thead>
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<th>Product: Manufacturer</th>
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<tbody>
<tr>
<td>4th Dimension; ACIUS</td>
<td>39</td>
</tr>
<tr>
<td>FoxBase+/Mac; Microsoft</td>
<td>26</td>
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<tr>
<td>Double Helix; Ottera</td>
<td>14</td>
</tr>
<tr>
<td>Oracle for the Macintosh; Oracle</td>
<td>7</td>
</tr>
<tr>
<td>Omnis 5; Express; Byth Software</td>
<td>6</td>
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<tr>
<td>dbBASE for the Mac; New Era Software Group</td>
<td>3</td>
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<tr>
<td>Others</td>
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(28% of respondents voted in this category)

#### Database—End User

<table>
<thead>
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<th>% of votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FileMaker Pro; Claris</td>
<td>71</td>
</tr>
<tr>
<td>Microsoft File; Microsoft</td>
<td>10</td>
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<tr>
<td>Panorama; ProVue Development</td>
<td>8</td>
</tr>
<tr>
<td>RecordHolder Plus; Software Discoveries</td>
<td>2</td>
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<tr>
<td>File Force; ACIUS</td>
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<tr>
<td>MyAdvancedDatabase; MySoftware Company</td>
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<tr>
<td>Others</td>
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(42% of respondents voted in this category)

#### Drawing/Illustration

<table>
<thead>
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<th>% of votes</th>
</tr>
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<tbody>
<tr>
<td>Adobe Illustrator; Adobe Systems</td>
<td>26</td>
</tr>
<tr>
<td>Aldus FreeHand; Aldus</td>
<td>24</td>
</tr>
<tr>
<td>MacDraw; MacDraw Pro; Claris</td>
<td>23</td>
</tr>
<tr>
<td>Canvas; Deneba Software</td>
<td>18</td>
</tr>
<tr>
<td>MacDraft; Innovative Data Design (IDD)</td>
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(67% of respondents voted in this category)

#### Education

<table>
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<th>% of votes</th>
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<tr>
<td>Kid Pix; Broderbund Software</td>
<td>26</td>
</tr>
<tr>
<td>Where in the World Is Carmen Sandiego?; Broderbund</td>
<td>10</td>
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<tr>
<td>Where in Time Is Carmen Sandiego?; Broderbund</td>
<td>5</td>
</tr>
<tr>
<td>Reader Rabbit; The Learning Company</td>
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<tr>
<td>Where in the USA Is Carmen Sandiego?; Broderbund</td>
<td>4</td>
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<tr>
<td>Others</td>
<td>51</td>
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(38% of respondents voted in this category)

#### Electronic Mail

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<th>% of votes</th>
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<tbody>
<tr>
<td>QuickMail; CE Software</td>
<td>42</td>
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<tr>
<td>Microsoft Mail; Microsoft</td>
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<tr>
<td>ccMail; ccMail</td>
<td>7</td>
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<tr>
<td>WordPerfect Office for Macintosh; WordPerfect 6</td>
<td>6</td>
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<tr>
<td>Inbox; Sika</td>
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<tr>
<td>Others</td>
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(26% of respondents voted in this category)
### Software World-Class Awards

**File Server**

<table>
<thead>
<tr>
<th>Product; Manufacturer</th>
<th>% of votes</th>
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</thead>
<tbody>
<tr>
<td>NetWare for Macintosh; Novell</td>
<td>29</td>
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<tr>
<td>MacTOWPS; Silkta</td>
<td>27</td>
</tr>
<tr>
<td>DataClub Classic/Elite; Novell</td>
<td>11</td>
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<tr>
<td>EtherShare; Helios</td>
<td>5</td>
</tr>
<tr>
<td>MacLan Connect; Netmar Systems</td>
<td>4</td>
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<td>Others</td>
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(18% of respondents voted in this category)

**Mathematics**

<table>
<thead>
<tr>
<th>Product; Manufacturer</th>
<th>% of votes</th>
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<tbody>
<tr>
<td>Mathematica; Wolfram Research</td>
<td>60</td>
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<tr>
<td>Theorist; Prescience</td>
<td>10</td>
</tr>
<tr>
<td>MathCAD; MathSoft</td>
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<tr>
<td>MATLAB; The MathWorks</td>
<td>5</td>
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<tr>
<td>TK Solver Plus; Universal Technical Systems</td>
<td>5</td>
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<tr>
<td>PowerMath II; Central Products</td>
<td>3</td>
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<td>Others</td>
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(20% of respondents voted in this category)

**Game**

<table>
<thead>
<tr>
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<th>% of votes</th>
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</thead>
<tbody>
<tr>
<td>Microsoft Flight Simulator; Microsoft</td>
<td>11</td>
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<tr>
<td>SimCity; Maxis</td>
<td>8</td>
</tr>
<tr>
<td>Tetris; Spectrum Hobbyte</td>
<td>7</td>
</tr>
<tr>
<td>Crystal Quest; Casady &amp; Greene</td>
<td>5</td>
</tr>
<tr>
<td>PGA Tour Golf; Electronic Arts</td>
<td>4</td>
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<tr>
<td>Shanghai; Activision</td>
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<td>Others</td>
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(56% of respondents voted in this category)

**Modeling/Rendering**

<table>
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<th>% of votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swivel 3D Professional; Macromedia</td>
<td>20</td>
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<tr>
<td>MacRenderMan; Pixar</td>
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<tr>
<td>Three-D; Macromedia</td>
<td>10</td>
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<tr>
<td>StataVision 3D; Stata</td>
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<tr>
<td>Alias Super 3D; Silicon Beach Software</td>
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<tr>
<td>Infini-D; Specular International</td>
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<td>Others</td>
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(20% of respondents voted in this category)

**Image Processing**

<table>
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<th>Product; Manufacturer</th>
<th>% of votes</th>
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<tbody>
<tr>
<td>Adobe Photoshop; Adobe Systems</td>
<td>74</td>
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<tr>
<td>Aldus Digital Darkroom; Silicon Beach Software</td>
<td>10</td>
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<td>Aldus PrePrint; Aldus</td>
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<tr>
<td>ImageStudio; Lebowet USA</td>
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<tr>
<td>ColorStudio; Lebowet USA</td>
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<td>Others</td>
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(37% of respondents voted in this category)

**Integrated Application**

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<tbody>
<tr>
<td>Microsoft Works; Microsoft</td>
<td>52</td>
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<tr>
<td>ClarisWorks; Claris</td>
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<tr>
<td>Microsoft Office; Microsoft</td>
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<tr>
<td>GreatWorks; Symantec</td>
<td>5</td>
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<tr>
<td>WordPerfect Office for Macintosh; WordPerfect</td>
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<td>RaccTime 3; MacYark USA</td>
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<td>Others</td>
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(28% of respondents voted in this category)

**Music Notation**

<table>
<thead>
<tr>
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<th>% of votes</th>
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<tbody>
<tr>
<td>Final; Coda Music Software</td>
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<tr>
<td>ConcertWare; Great Wave Software</td>
<td>17</td>
</tr>
<tr>
<td>Deluxe Music Construction Set; Electronic Arts</td>
<td>14</td>
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<tr>
<td>Encore; Passport Designs</td>
<td>14</td>
</tr>
<tr>
<td>Professional Composer; Mark of the Unicorn</td>
<td>11</td>
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<tr>
<td>MusicProse; Coda Music Software</td>
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<tr>
<td>Others</td>
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(15% of respondents voted in this category)

**Mac-to-PC/Mainframe Communications**

<table>
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<th>Product; Manufacturer</th>
<th>% of votes</th>
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<tbody>
<tr>
<td>SoftPC; Insignia Solutions</td>
<td>27</td>
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<tr>
<td>DOS Mounter; Dayna Communications</td>
<td>13</td>
</tr>
<tr>
<td>VersaTerm Pro; Synergy Software</td>
<td>9</td>
</tr>
<tr>
<td>LupLink Mac; Traveling Software</td>
<td>6</td>
</tr>
<tr>
<td>NetWare; Novell</td>
<td>6</td>
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<tr>
<td>MacRMA; Digital Communications Association</td>
<td>5</td>
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<tr>
<td>Others</td>
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(26% of respondents voted in this category)

**Music Sequencing**

<table>
<thead>
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<th>% of votes</th>
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</thead>
<tbody>
<tr>
<td>Performer; Mark of the Unicorn</td>
<td>17</td>
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<tr>
<td>Studio Vision; Opcode Systems</td>
<td>10</td>
</tr>
<tr>
<td>Vision; Opcode Systems</td>
<td>9</td>
</tr>
<tr>
<td>Pro 4; Passport Designs</td>
<td>9</td>
</tr>
<tr>
<td>EZVision; Opcode Systems</td>
<td>8</td>
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<td>Others</td>
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(12% of respondents voted in this category)
### SOFTWARE

#### Network Utility

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<th>% of votes</th>
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<tbody>
<tr>
<td>Timbuktu; Timbuktu/Remote; Farallon Computing</td>
<td>43</td>
</tr>
<tr>
<td>Carbon Copy Mac; Microcom</td>
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<tr>
<td>PhoneNet Liaison; Farallon Computing</td>
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</tr>
<tr>
<td>Public Folder; Claris</td>
<td>10</td>
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<tr>
<td>Laplink Mac; Traveling Software</td>
<td>7</td>
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<tr>
<td>Others</td>
<td>14</td>
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<td>(20% of respondents voted in this category)</td>
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#### Personal Finance

<table>
<thead>
<tr>
<th>Product; Manufacturer</th>
<th>% of votes</th>
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<tbody>
<tr>
<td>Quicken; Intuit</td>
<td>59</td>
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<tr>
<td>Managing Your Money; Meca Software</td>
<td>16</td>
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<tr>
<td>MacMoney; Survivor Software</td>
<td>9</td>
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<tr>
<td>Dollars &amp; Sense; Software Toolworks</td>
<td>6</td>
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<tr>
<td>WestBuilder; Reality Technologies</td>
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<td>Others</td>
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<td>(49% of respondents voted in this category)</td>
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#### OCR

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<tbody>
<tr>
<td>OmniPage; Caere</td>
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<tr>
<td>Read-It; Oldani</td>
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<tr>
<td>WordScan, WordScan Plus; Calera Recognition Systems</td>
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<tr>
<td>AccuText; Xerox Imaging Systems</td>
<td>4</td>
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<tr>
<td>ReadRight for Macintosh; OCR Systems</td>
<td>4</td>
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<tr>
<td>Others</td>
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<td>(23% of respondents voted in this category)</td>
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#### Organization/Productivity Tool

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<tr>
<td>More II; Symantec</td>
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<tr>
<td>CalendarMaker; CE Software</td>
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<tr>
<td>Address Book Plus; Power Up Software</td>
<td>6</td>
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<tr>
<td>TouchBase; After Hours Software</td>
<td>6</td>
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<tr>
<td>Smart Alarms with Appointment Diary; JAM Software</td>
<td>6</td>
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<tr>
<td>DynaMed; Portfolio Systems</td>
<td>5</td>
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<td>Others</td>
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<td>(31% of respondents voted in this category)</td>
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#### Project Management

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<tr>
<td>MacProject II; Claris</td>
<td>56</td>
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<tr>
<td>Microsoft Project; Microsoft</td>
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<tr>
<td>FastTrack Schedule; AEC Software</td>
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<tr>
<td>Micro Planner Manager, Micro Planner X-Pert;</td>
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<tr>
<td>Micro Planning</td>
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<tr>
<td>MacSchedule, MacSchedule Plus; Mainstay</td>
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<tr>
<td>KeyPlan; MacVenk USA</td>
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<td>Others</td>
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<td>(24% of respondents voted in this category)</td>
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#### Page Layout

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<th>Product; Manufacturer</th>
<th>% of votes</th>
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<tbody>
<tr>
<td>Aldus PageMaker; Aldus</td>
<td>61</td>
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<tr>
<td>QuarkXPress; Quark</td>
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<tr>
<td>Publish-It Easy; Timeworks</td>
<td>4</td>
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<tr>
<td>ReadySetGo; Lotus/USA</td>
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<tr>
<td>FrameMaker; Frame Technology</td>
<td>3</td>
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<tr>
<td>Aldus Personal Press; Silicon Beach Software</td>
<td>2</td>
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<tr>
<td>Others</td>
<td>5</td>
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<td>(64% of respondents voted in this category)</td>
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#### Spreadsheet

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<tr>
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<th>% of votes</th>
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</thead>
<tbody>
<tr>
<td>Microsoft Excel; Microsoft</td>
<td>82</td>
</tr>
<tr>
<td>Wings; Informix Software</td>
<td>7</td>
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<tr>
<td>Claris Resolve; Claris</td>
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<tr>
<td>Full Impact; Ashton-Tate</td>
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<tr>
<td>Teazep; DeltaPaint</td>
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<td>MacCalc; Bravo Technologies</td>
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<td>Others</td>
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<td>(69% of respondents voted in this category)</td>
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#### Painting

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<th>Product; Manufacturer</th>
<th>% of votes</th>
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<tbody>
<tr>
<td>Aldus SuperPaint; Silicon Beach Software</td>
<td>31</td>
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<tr>
<td>Adobe Photoshop; Adobe Systems</td>
<td>17</td>
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<tr>
<td>MacPaint; Claris</td>
<td>15</td>
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<tr>
<td>PixelPaint; PixelPaint Pro; SuperMac Technology</td>
<td>8</td>
</tr>
<tr>
<td>Kid Pix; Broderbund Software</td>
<td>7</td>
</tr>
<tr>
<td>Studio 8; Studio 32; Electronic Arts</td>
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<td>Others</td>
<td>19</td>
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<td>(66% of respondents voted in this category)</td>
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#### Statistics

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<thead>
<tr>
<th>Product; Manufacturer</th>
<th>% of votes</th>
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<tbody>
<tr>
<td>StatView series; Abacus Concepts</td>
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<td>SYSTAT; SYSTAT</td>
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<tr>
<td>SPSS for the Macintosh; SPSS</td>
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<tr>
<td>Data Desk; Data Description</td>
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<tr>
<td>JMP; SAS Institute</td>
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</tr>
<tr>
<td>Statistica/Mac; StatSoft</td>
<td>6</td>
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<tr>
<td>Others</td>
<td>18</td>
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## SOFTWARE World-Class Awards

### Tax Preparation/Planning

<table>
<thead>
<tr>
<th>Product, Manufacturer</th>
<th>% of votes</th>
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<tbody>
<tr>
<td>MacInTax; ChipSoft</td>
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<tr>
<td>Taxview Professional; ChipSoft</td>
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<tr>
<td>iX Personal Tax Analyst; ChipSoft</td>
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</tr>
<tr>
<td>HyperTax Tutor; Softstream International</td>
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<tr>
<td>TaxSmith series; Double Scorpio Software</td>
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<tr>
<td>Others</td>
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(37% of respondents voted in this category)

### Telecommunications

<table>
<thead>
<tr>
<th>Product, Manufacturer</th>
<th>% of votes</th>
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<tbody>
<tr>
<td>MicroPhone II; Software Ventures</td>
<td>29</td>
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<tr>
<td>WhiteKnight; The FreeSoft Company</td>
<td>25</td>
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<tr>
<td>Smartcom II; Hayes Microcomputer Products</td>
<td>19</td>
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<tr>
<td>VersaTerm Pro; Synergy Software</td>
<td>8</td>
</tr>
<tr>
<td>Quick Link II; Smith Micro Software</td>
<td>5</td>
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<tr>
<td>MacKnowledge; Prometheus Products</td>
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<tr>
<td>Others</td>
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(39% of respondents voted in this category)

### Training

<table>
<thead>
<tr>
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<th>% of votes</th>
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(18% of respondents voted in this category)

### Utility—Protection/Recovery/Backup

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<td>DiskDoubler; Silent Software</td>
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<td>View; Microcom</td>
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(67% of respondents voted in this category)

### Utility—System Enhancement

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(59% of respondents voted in this category)

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<td>Correct Grammar; Writing Tools Group</td>
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<td>RightWriter; Que Software</td>
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(41% of respondents voted in this category)

### Word Processor

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(89% of respondents voted in this category)

### Utility—Font/Print Management

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<td>Freedom of Press; Custom Applications</td>
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(51% of respondents voted in this category)

### Best Customer Support—Software

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(47% of respondents voted in this category)
Apple introduces the technology behind its first hand-held computer

At this year's Consumer Electronics Show in Chicago, Apple introduced its first personal digital assistant (PDA)—a low-cost, hand-held device aimed not at computer enthusiasts but at anybody who needs to organize schedules, names, addresses, and events. The first products in Apple's PDA line will have the name Newton, will ship in early 1993, and will be manufactured by Sharp. These PDAs will be personal, portable, flexible, and relatively inexpensive (under $1000). Although it is still too early to report on exact product details, the broad outlines of Apple's new technology are clear enough for a preview of what the PDA product line will be like.

Apple's PDAs won't be miniature Macs, they will run an entirely new operating system. You won't see a desktop; open up applications to create documents; or navigate documents, files, and folders with the Finder. The PDA won't include a keyboard. Instead, you'll open the cover on a hand-held device and use a pen-like stylus to write directly on the screen. The software Apple will provide with the PDA will recognize the information that you write, convert it into digital form, and store it in a free-form database. An icon bar will give you tools to do things with this data, such as add it to an address book or a to-do list; search for particular items; schedule meetings on a calendar; format text into a standard business letter, memo, or fax cover sheet; or place data in an out basket for communication with the larger world.

Instead of being a multipurpose computer that can be programmed to do virtually anything, a PDA will do a few things exceedingly well. Apple's first PDAs will capture, organize, and communicate the kind of data that you're likely to collect or carry outside of the office—names, addresses, memos, to-do items, drawings, and calendar items. Apple will ship a "docking" program for Macs and PCs that will let you create any kind of data entry form and run a virtual PDA on your computer screen. Docking will enable you to back up and share the data that you collect on the road. You'll connect the PDA to the Mac via the PDA's serial port or with an infrared device.

Apple's first hand-held computer—Newton—is just small enough to grasp firmly in one hand.
I Have Seen the Future, and It's a Prototype

THE FIRST PDAS WILL BE SLIGHTLY larger than some of the electronic personal organizers already on the market. Each product will have an LCD display covered by a transparent tablet that the user will write on with a stylus. The writing will appear on the screen for a moment, then software will transform it into computer characters or graphics.

The large amount of computing power necessary to recognize and transform handwriting quickly will come from a RISC microprocessor from ARM, a company Apple has invested in. The ARM 610 processor, which should afford one to two times the power of a Mac IIfx, according to Apple, is inexpensive, takes up little space, and consumes little power. Apple and ARM have also custom-designed a series of ASIC chips that will surround the processor, controlling the various hardware components and running the operating system and the closely-integrated application software.

Custom-developed ASICs will provide one of the keys to the Newton's small size. Custom-designed ASICs can provide more functionality in fewer chips and can be written onto a transparent tablet to dial your phone.

Write Lunch with Janet, Friday. The PDA understands that lunch is a noon meeting that lasts an hour, that Janet must be Janet Smith (the only Janet in the address book), and that Friday means this coming Friday. The PDA schedules the meeting on your calendar for you.

Scribble two paragraphs to your banker about financing for a llama ranch; circle the note; select the memo form; and watch at the PDA format the note as a formal memo, complete with headers, footers, and a date.

Sound too good to be true? Heard one too many high-tech promises to believe this one? The truth is that this sophisticated series of interactions will rely on several ambitious hardware and software solutions to difficult problems, and it remains to be seen whether Apple's first products will live up to their promise.

Another company, Communications Intelligence Corporation (CIC), offers its PenDup operating system, which runs on MS-DOS-based pen computers and supports multiple languages and a variety of applications. GeoWorks has recently announced a pen-based version of its Windows-like interface that runs on less powerful machines than does PenPoint or Windows. Xerox Imaging Systems has done considerable work in the area of pen-based X-Windows systems, and IBM has announced an intent to develop OS/2 for Pens. Momenta made a big splash with its lavish marketing campaigns but has made little headway in attracting buyers of its proprietary system. —JOHN WAGONER

Other Pen-Based Computers

The first pen-based computers date back to about 1987, when a company called Linus produced a portable pen computer called the WriteTop. It ran MS-DOS, had an 8088 processor, weighed about 9 pounds, and was discontinued in 1989 because of the company's luck of funding. About that same time, Grid introduced the GridPAD—a notebook computer designed mainly for filling out forms. Grid is still producing notebook computers, and it currently ships the GridRight Operating System, which works on top of MS-DOS and supports many standard applications.

Industry spotlights are currently on GO's PenPoint and Microsoft's Windows for Pen Computing operating systems. Both of these systems are shipping, and several companies are producing hardware capable of running them. Like PenRight, both of these operating systems support standard applications.

Momenta Software, which is owned by Communications Intelligence Corporation (CIC), offers its PenDup operating system, which runs on MS-DOS-based pen computers and supports multiple languages and a variety of applications. GeoWorks has recently announced a pen-based version of its Windows-like interface that runs on less powerful machines than does PenPoint or Windows. Xerox Imaging Systems has done considerable work in the area of pen-based X-Windows systems, and IBM has announced an intent to develop OS/2 for Pens. Momenta made a big splash with its lavish marketing campaigns but has made little headway in attracting buyers of its proprietary system. —JOHN WAGONER

<table>
<thead>
<tr>
<th>Company</th>
<th>Computer</th>
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</tr>
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<td>IBM Blue</td>
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<td>now</td>
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<td>Datelife 300/400</td>
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<td>MDE; Windows for Pen</td>
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take less space and power than standard chips. The microprocessor and the ASICs together should consume between 0.8 and 1 watt, Apple said.

A key to the Newton's low cost will be the tight coupling of the system software. Apple intends to make the core operating system very small so it will require less hardware to run. The Newton will use many ROM chips because they cost less than RAM chips. The system will execute a higher percentage of instructions from the ROM rather than relying on high memory requirements to run.

A critical role in making Newton products customizable will be played by a PCMCIA slot. The slot will connect to a 32-bit, high-speed bus and accept credit card-size cards that will provide the PDA with memory or storage. Eventually, these cards will support additional processors, such as digital signal processors. PCMCIA is a relatively new standard for integrated circuit boards that's gaining acceptance.

The Newton will also contain a small speaker, which will provide audio cues about the actions Newton is performing. The first Newton product will not have a microphone or microphone jack for reasons of size and cost. Future products, especially those with speech recognition, will provide for a microphone.

The main interfaces on the first Newton models will be the PCMCIA slot, a standard Macintosh-style serial port, and a directional infrared device expected to communicate at 38.4 Kbps up to 6 feet away. Using the infrared connection, you will be able to transfer information to and from a Macintosh or other personal computer equipped with infrared capability and file-transfer software. You will also be able to use a modem to transfer data and applications between the PDA and personal computers.

An infrared device planned for the future will communicate at speeds faster than 38.4 Kbps and won't have to be aimed at the receiving device. Apple envisions a "roving" version of AppleTalk that will let you walk from room to room and be recognized by and connected to the network using this infrared device.

**The Operating System**

The Newton's operating system will have three main components: one for recognizing text and graphics drawn on the screen (the recognition component); one for organizing information into an object-oriented database (the information component); and one for communicating information to external devices via networks, modems, infrared file transfers, cellular telecommunications, or cabling (the communication module).

The recognition component will consist of several recognizers, software modules optimized to recognize a particular set of symbols or characters. Each recognizer will examine what has been written on the screen and pass what it deems to a controller that will coordinate the varied responses and make the best guess of what's correct based on the data's context and its position on the screen. Think of the process as a digital democracy in which each recognizer will cast a vote as to whether you've written a lowercase letter L, the number 1, or a vertical line; the controller will arbitrate, electing the character that makes the most sense.

At the technology demonstration we saw before Apple's official announcement, the PDA could recognize printed block handwriting, and writing in small-size letters produced small text, while writing in large-size letters produced similarly large text sizes on the screen. We saw the demonstrator draw a circle, square, and polygon, and ask the system to smooth and render them accurately. Objects could also be left as drawn to preserve the rough feel of "ink" on "paper." We couldn't tell how long it took to recognize these samples, or how well the technology can learn to decipher idiosyncratic handwriting.

The first products will ship with three or four recognizers, but Apple will provide developer kits so that vendors can create recognizers for specific data, such as equations or Cyrillic characters. Initially, this system will recognize printing; in the future look for cursive recognition and the ability to write on an angle.

The system will also recognize a few common gestures as simple commands. The gestures are still undefined by Apple, but are likely to include scratching out, to erase something written on the screen; drawing a caret, to insert a word in a line of text; and circling a phrase and tapping once, to ask the PDA to do something with the selected information, such as adding it to a to-do list or calendar.

The information component will capture recognized information and relate it to existing data in an intelligent way. The user will see information structured in forms that will look like the layouts of today's databases. An address book form might have space for names, addresses, and phone numbers, plus notes.

Information will not be stored in static fields; instead it will float around in a data soup of individual, tagged objects, ready to be retrieved in a variety of ways. Each object will have two parts: values and tags. Values will be the actual information in the object (John Q. Public, 1066, Istanbul). Tags will identify the type of information in the object (name, date, or city).

As you enter information into this system, the PDA will link related types of information and related values. Any form will be able to access any of the entered data, so that, in theory, you'll have to enter any piece of data just once.

The PDA knows that Joan's birthday is associated with Joan's phone number, but you can retrieve each item independently. Once you enter Joan's name and address, any letter addressed to Joan can instantly contain her address or be faxed to her. If you have several Joans in the database, writing "Dear Joan" will prompt a scrolling list of all Joans so that you can pick the correct one.

**From Idea to Product Line**

As we write this article, many specific product details are either undecided or undisclosed. We expect the first PDAs to offer the basic functionality outlined here, but subsequent ones will offer different screen sizes and orientations and expanded communications capabilities.

Apple plans to license the core PDA technology to third parties, like Sharp Electronics, which will develop and market its own products. By licensing the technology, Apple hopes to help create a big market for these devices; by manufacturing its own PDAs, Apple hopes to keep control over that market and lead it in innovation and design.

Whatever the future may hold, it's clear that computers are about to jump off our desks and laptops and into our pockets. We may not yet have effortless computing, but we're certainly getting closer to ubiquitous computing. In the future, there will be no excuse for forgetting a meeting or a lunch date, or losing a phone number. We can hardly wait. Honest.
ETTING A HARD DRIVE WITH LOW CAPACITY MAY raise some eyebrows these days, since applications and data only grow in size. But for many people, a drive under 120MB is just the right size. For example, there's the first-time buyer who doesn't really know what to look for or where to start and is on a budget. Or there's the person who simply wants to add another drive to a system.

Users who know how to make the best use of storage, with optimizers and automatic file compression, may not want a huge drive. Other users benefit from having several small drives rather than one large one, since this configuration makes information more easily portable and lets you move storage resources to accommodate changing system needs in a multiple-Mac environment.

Macworld Lab tested 47 hard drives with capacities under 120MB. Almost all these drives use the Quantum LP105S (105MB) and the LP52S (52MB) mechanisms, so what distinguishes vendors? In a nutshell, the differences come down to three basic categories: special features, service and support, and value.

Most drive vendors are longtime players in the market and continue to offer good deals and good service. These vendors offer neither the cheapest nor the most expensive drives but do provide strong quality, service, and attention to detail. Drives from such vendors are typically sold through resellers, which can offer immediate and comprehensive service. However, many drives (even those sold through resellers) can be purchased directly from the vendors, for a better price, without much loss of service. "Hard Drive Details" shows which sales methods each drive company uses.

BY ERICA SANDSTEDT
HARD DRIVES

The new 2½-inch drive mechanisms from vendors like Quantum have made possible smaller, lighter, and faster hard drives and set the stage for a wave of new portable drives.
Drives to Go

THE POPULARITY OF THE MACINTOSH PowerBook has popularized the portable drive—a lightweight, small device that you can treat like a high-capacity floppy. With a portable drive, you can carry a whole business plan around the world in your pocket. A portable drive no bigger than a Sony Walkman can be a solution to those who need such freedom.

More and more drives in the under-120MB range are portables, meant to be used for demos, sales calls, and the like. The portable Macworld Lab tested include the Mass Microsystems HitchHiker 40MB; Liberty Systems Liberty 50 52 and Liberty 50 105Q; Mirror Technologies Mirror 50MB External and 105MB External (also sold by Mirror's sister company, Generation Systems); and Vision Logic MacPocket 40MB.

The best portable drives reviewed are the 52MB and 105MB portables from Liberty Systems. They come with AC/DC switchable power supplies and are very compact—small enough to fit in a jacket pocket. (A carrying case is also available as an option.)

For travelers in both the Mac and DOS worlds, Liberty offers a special controller board and formatter utility (Formatter 5 from Software Architect) that can format Liberty drives with both Mac and DOS partitions. Drives formatted this way can be accessed on Macs and on DOS PCs that have a SCSI board.

Portable drives are quieter than drives intended to stay on your desk because portables have no cooling fans or power supplies. Portables draw their power from the Mac's SCSI ports to save space (so no power supply is needed) and be fully transportable. Although using a portable drive with a PowerBook shortens the PowerBook's battery life, the convenience of sufficient storage on the go makes this trade-off more than worthwhile. And careful battery management can stem the power loss (invoking the PowerBook's sleep mode, so an inactive drive will stop spinning after, say, a minute). Some portable drives, such as Liberty's, support optional power supplies.

Performance Issues

WHETHER YOU ARE SEEKING A PORTABLE or desktop drive, it's easy to let speed become the primary criterion for choosing a drive. But it doesn't make sense to put too much faith in raw speed. If you have a Mac Classic, there is little point in picking a hard drive based on Macworld Lab test results of disk-access speed, since the Classic's slow processor (8MHz 68000) and SCSI interface keep the Classic from transferring data as fast as even the slowest drive can handle. But if you are working on a Mac Quadra 700 or 900 with a 25MHz 68040 processor, you may want one of the drives with the fastest access times, such as the PLI PL105 Turbo or the Total Peripherals Q105X. The MacTel and Mirror M100 drives are also suitable for use with faster processors.

No matter what kind of Mac you use, if you connect more than one hard drive to it, you'll find that none of the drives can go faster than the start-up drive.

Vendors often advertise a drive's average access time, which represents how long it takes for the drive to position its head over a data sector on the disk and transfer one block of data from the drive. Speeds of under 25 milliseconds are fine for most 16MHz and slower Macs; speeds of under 20ms are fine for faster Macs.

Macworld Lab tested the drives two ways: using a collection of real-world activities (such as copying a large folder, seeking multiple records from a database, and writing a large file to the disk); and using a benchmark program to measure raw access speed. The real-world tests reflect the performance a user sees and take advantage of any speed enhancements.

Inside a Hard Drive

Several key components dictate how well a drive performs. The platter stores the information, and the denser the platter's storage capabilities, the more data can be stored and the faster a drive can read and write data (since the bits of data are closer together). The read-write head uses magnetic signals as does a tape recorder. The head skims over the platter, a few millionths of an Inch above the surface, writing magnetic spots with either positive polarity or negative polarity. When it reads, the head senses whether polarity changes between spots; if it does, the logic board that controls the head interprets that bit of data as a 1; otherwise, it interprets that bit as a 0. This binary sequence of 1s and 0s is then interpreted by the drive software on the Mac as files and other discrete data. The drive's logic board also controls the SCSI connectors (through which data enters and leaves the drive), the spindle (which spins the platter), and the drive armature (which positions the read-write head).
such as a cache that the vendor puts in the drive. The raw speed tests factor out such enhancements to show the mechanism’s innate capabilities.

Generally, we found that drives using a Quantum mechanism are the fastest. Drives using a Maxtor mechanism place second as a group, giving acceptable if not exciting performance. Other mechanisms are noticeably slower. The ROM version for each type of mechanism has no noticeable effect on performance, so don’t worry about whether or not your drive has the absolute latest ROM version.

Disk speed is not solely a function of the hardware—the formatting software makes a difference as well. For example, the speed difference between the fastest drives (from PL1 and Total Peripherals) and other drives using the same mechanism was caused by the formatting software. The difference in disk speed can be as much as 10 percent.

In its tests for noise, Macworld Lab found that the quietest drive for desktop use is the MacTel HD Index 32, at 33.1 decibels, while the Rodime Cobra 43c, 80c, and 100e were the loudest, at 47.6dB to 49.9dB. Others that were louder than 45dB include the Apple 80SC, PL1 52MB External Mini Drive and 105 Turbo, Relief Vista 46 and Relax 80 Plus, and Ehmnn HD60S. Readings of about 35dB are audible; at about 45dB, the noise becomes annoying. Many drives had readings in the 34dB-to-40dB range.

Macworld Lab found that the drives using Quantum mechanisms generally did best on speed and noise tests, which explains why Quantum-based drives account for the lion’s share of the market—more than three-quarters of the drives tested.

Bundled Software

Some of the better drives include more than just the typical formatting and diagnostic software. While every vendor offers partitioning software, not everyone has a backup or disk-repair utility. Those who do (such as GCC, PCPC, and Rodime) have been in business for some time and know the value their customers get from these utilities. The best backup software was PCPC’s demo copy of its Netstream, which allows an incremental backup from any type of media to any type of media. Although it’s only a demo copy, it has all that a single user needs; those in a networked environment will want the full program.

Not all backup programs are created equal. A good backup program is fast; compresses data; lets you back up to a variety of media (like tape drives, Bernoulli Boxes, and CD ROM drives); and lets you back up files incrementally (backing up only the files that weren’t backed up earlier). The backup utility that comes with Macs offers none of this.

Partitioning divides a hard drive into separate areas, called volumes, each represented by a separate icon. Each volume

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**How Helpful Is the Help?**

To someone having a problem with a product, a company’s technical support can save the day or be the straw that breaks the camel’s back. Macworld evaluated the technical support offered by vendors of low-capacity drives through each call three times posing as a customer. We devised three questions that could apply to all the drives and that had known answers. The scores, which we calculated according to a point system, are listed in the last column of the “Hard Drive Details” table.

Technical support ranged from excellent to poor, technicians from supportive to combative, and service from eager to indifferent. Our point system awards or subtracts a certain number of points in three categories—accuracy, helpfulness, and accessibility—based on the response (or lack of response). For example, to get the most points possible, a company must answer the calls promptly (no busy signals or long ring times), not put customers on hold, take charge in helping the user identify the symptoms and system configuration, provide a correct answer, and be polite. Points awarded are less if, for example, the technician didn’t ask questions of the user to get the configuration information needed to diagnose the problem. If the response hinders the user—for example, a wrong answer, long periods on hold, late call-backs, or rudeness—points are subtracted. Ultimately, the total is matched to scores of excellent, very good, good, satisfactory, and poor.

In general, we found support to be good. For example, at Relax Technology, the three support technicians were all courteous. They also gauged our caller’s level of knowledge and immediately began asking the right kinds of questions to get the information they needed to diagnose our problem. As our caller reported: “When I posed as a naive user, the technician handling the call knew immediately that I was a bonehead and got right to the problem. ‘Let’s try something,’ he said, leading me right to the problem.”

Better support technicians went a step beyond diagnosing the problem at hand—they educated us to prevent future problems. For example, when answering a SCSI-termination question, a technician at Alliance Peripheral Systems “explained, clearly, the perils of termination and what to look out for,” our caller reported. We had similar responsiveness from technicians at Mirror Technologies, Mass Microsystems, and Optima Technology.

The better technicians are also patient. For example, after our caller spoke with the technicians at Liberty Systems, he reported, “One offered suggestions when I seemed hesitant, without cutting me off.” But patience is not a universal virtue. For example, when our caller played the role of naive user when asking about SCSI IDS, the technician at FWB solved the problem but got exasperated. “He solved my problem but kept telling me to read the manual.”

Correct answers, courteous treatment, and helpfulness are hallmarks of good support—but if you can’t get through to support, they do you no good.

For some companies, getting through is the problem because support centers are overwhelmed. When calling PL1, for example, our caller was on hold for 23 minutes. When our caller complained, the technician growled back, “Oh, I’ve been on the phone for three hours!”

Other companies have customers leave messages rather than stay on hold. But that introduces problems of its own. For example, one message left with La Cie’s support lines went unanswered for four business days; one to Relax’s for three days. Fortunately, the other times we called these companies, our caller got through easily and was helped promptly. An extreme case was PCPC, which never returned two of our three calls. At best, leaving a message usually means waiting a full day until you get a response.

When you do get a response, you likely have forgotten all the details the technician wants. Sometimes, if you’re particularly unlucky, you get an ego-deflating response like the following from a technician at Rodime Systems: “Do you still need help? You probably got it worked it by now, right?”

And some companies make you go to your dealer—who may or may not be up to speed on the product. Apple has a strict “see your dealer” policy. FWB tells customers to call their dealers first. But when our caller said his dealer went out of business, he did get competent, friendly help from FWB.

Technical support is a crucial part of a product purchase. Fortunately, most companies recognize this and offer reasonable support. The horror stories here are the exceptions, but they are not rarities.

—Galen Gruman and George Reynolds
## HARD DRIVE DETAILS

<table>
<thead>
<tr>
<th>Company</th>
<th>Product Line</th>
<th>20-40MB Drives (Capacity/Mechanism/Price)</th>
<th>50-80MB Drives (Capacity/Mechanism/Price)</th>
<th>90-115MB Drives (Capacity/Mechanism/Price)</th>
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<th>Termination</th>
<th>Backup Software</th>
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* = yes; O = no. C = Conner Peripherals. F = Fujitsu, M = Maxtor, O = Quantum Corporation. S = Seagate Technology. * Some drives not fully compliant with FCC regulations. * Not offered; must ask dealer. * Class A business use only. * Ehmans has recently sold its product line to a new company; see Conspicuous Consumer, in this issue, for information.*

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Can be password-protected, encrypted, or given its own System Folder for running under a different System version or under Apple's A/UX version of the Unix operating system. In effect, each volume functions and looks like a separate hard drive.

Partitioning software that subdivides one drive is not often used, especially on low-capacity drives where the need to create multiple, small volumes is rare. But another type of partitioning software can add value to a low-capacity drive. For example, ETC Peripherals' tools include the Super Volume utility, which enable you to combine two or more hard drives as one volume. Its user interface is simple, intuitive, and at the same time very comprehensive.

One of the best software packages to be bundled with a drive is FWB's Hard Disk Tool Kit. Another good package, MacTools Deluxe, is bundled with the GCC and Rodime drives; they also include their own utility program. MacTools Deluxe is easy to use, although its interface is not as friendly as ETC's. Its manual is better written, but this all-encompassing utility can be confusing for inexperienced users because it has so many options.

Ehmans's drives include DiskDoubler and MacTree, two powerful and extremely useful tools for small-capacity drives. DiskDoubler automatically compresses files, freeing as much as half the space on a hard drive. And PLI bundles its own Turbo Optimizer software, which is not as powerful as DiskDoubler, but it is just as useful.
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*d* 24 months for 80MB drives. *t* Portable drives; price includes power supply. *u* Unless purchased directly from GCC. *v* Customers who buy a carrying case get a 12-month extended warranty. *w* Certification pending. *a* Could not check because Microtech refused to provide products for review. *d* 24 months for Quantum-based drives.

mizing and defragmenting files before shutting down. (Defragmentation keeps the data that makes up a file in a contiguous area of the disk, thereby making file access faster.)

Several vendors include shareware on their drives. Although this may seem like a good idea at first, it is soon frustrating to find that 5MB or more of your new drive are filled with advertisements and games that you don't want. This extraneous, unwanted material can also confuse newer users who are faced with an array of files and folders that they may not realize can be removed with no harm.

**SCSI Termination**

CONNECT MORE THAN A FEW SCSI devices and you're bound to run into a few problems. How the devices are terminated, the order in which they are hooked together, the SCSI ID number assigned to each device, and the total length of the cable connecting them—all these factors play a role in whether a system functions properly.

When adding hard drives or other SCSI devices, knowing a couple of basic facts can make the difference between frustration and success.

First, all SCSI devices have a unique number, called a SCSI ID. The devices have a push-button, dial, or DIP switch to set the SCSI ID number. ID 0 is reserved for the Mac's internal hard drive; other devices can use any number from 1 to 6; no two devices can use the same number. The Mac recognizes devices with higher-value IDs (like 6 and 7) before those with
Hard Drive Speed and Noise Tests
20MB to 115MB

Color Key

Fastest
Speed compared to fastest
90-99%
80-89%
70-79%
60-69%

The drives are listed from best overall performance (top) to worst overall performance (bottom), based on both application and low-level SCSI tests. To the left of the product names are codes indicating the manufacturer of the mechanism the drive uses. The key below explains the codes.

For application tests, we measured each drive's ability to duplicate a 3.2MB file and a 10MB folder and search a database for a specific record. We also averaged the drive's speeds for opening and saving files from several applications, including PageMaker and Photoshop. All the tests represent real-world tasks.

Mechanism Key

C = Conner
JVC = JVC
M = Maxtor
Q = Quantum
S = Seagate

* Company uses drive mechanisms from more than one manufacturer; code indicates manufacturer of the mechanism in tested unit.
** Company now uses a Quantum mechanism.

How Drive Mechanisms Compare

Performance differences between different companies' mechanisms are usually much greater than performance differences within mechanisms. These results show the range of results for the products tested by Macworld Lab.
FCC Certification Issues

Much ado has been made lately about FCC certification, with government agents sweeping trade shows to find violators. To be sold legally in the United States, computer equipment must be certified by a testing laboratory; the equipment must not exceed the Federal Communications Commission's standards for radio-frequency emissions. If it exceeds the standards, it may disrupt phones, radio transmissions, and other communications services.

There are two classes of certification: Class A for business use and Class B for home use; devices certified for home use are automatically certified for business use, where the emissions standards are less strict. Of the drives we tested, only Core International's was not certified for home use.

Macworld checked each drive's certification number (required for Class B products) against the FCC's centralized database. "Hard Drive Details" lists the certification status for the evaluation units we received from each vendor. A few vendors had had shipped their drives while awaiting FCC certification; this is technically illegal and could subject companies to fines. By the time you read this, their FCC certifications should be approved.

The regulations governing FCC certification are complex, which confuses some vendors and sometimes the FCC. For example, several vendors have certified their products but did not imprint the numbers on their drives—a technical violation of the FCC rules. Still, other vendors used another company's certification, which is legal only if the vendor made no modifications to the original certified product—but it was impossible for us to know if an illicit change had occurred. We also came across one vendor—Relax Technology—whose 60MB Sierra portable drive didn't have a certification number because of debate over whether a drive that draws power from a SCSI port (as the Sierra does) need be certified at all. The FCC's chief enforcement officer said certification is required because the cable connecting the drive to the Mac emits radio frequencies as the power goes through it. Macworld will continue to research the issues surrounding FCC certification. —GALEN GRUMAN

lower-value IDs (like 1 and 2). (ID 0 is an exception: it is assigned to the start-up device.) This is important because only one SCSI device at a time can be in active communication. If SCSI IDs conflict, no device using that ID is likely to mount and may prevent system start-up. The SCSI IDs do not have to be in the same order as the devices are physically connected along the SCSI chain, but keeping them in the same order minimizes confusion.

Second, the first and last devices on a SCSI chain must be terminated so the signals and voltages across the chain remain stable. Most devices have a special termination connector that plugs into the outside of the box, but a few still use a jumper setting inside the device that requires dealer handling. Companies whose drives are terminated internally include four of Ehman's six drives in this range, ETC Peripherals' DataDrives, Mass Microsystems' HitchHiker 52, MacLand's 52MB drive, PCPC's MacBottom line, Total Peripherals' drives, and Vision Logic's drives. For portable drives like the HitchHiker and Vision Logic MacPocket, internal termination is acceptable, since chances are the only other SCSI device you'll use is the Mac's internal hard drive. But avoid desktop drives that are internally terminated; if you have one, use it as the last device on your chain.

To help you know whether your drive is properly terminated, Optima Technology uses a termination indicator light on its MiniPak 60 so you can see if the drive has been properly terminated. This is a handy feature; other vendors would do well to copy.

To set the SCSI ID, most portables use a dial, since it saves space. But a new user may not recognize the dial as the mechanism to set the ID. And with a small dial you may need a small screwdriver to change the ID.

Third, the total length of a SCSI chain has a limit beyond which the signals traveling along it begin to deteriorate, making devices unreliable. A realistic and safe guideline is 3 meters (about 10 feet), even though the Apple SCSI specification allows 6 meters.

Support Issues

Most companies whose products we evaluate here have been in the Macintosh drive market for five years or longer, and several companies that have been in the Macintosh market for less time than that have been in the general drive business longer.

A few companies—Alliance Peripheral Systems, ETC Peripherals, GCC Technologies, PCPC, and PLI—offer technical support through their own bulletin boards or through services like CompuServe, America Online, and Genie. And all of them are pretty good about answering questions through the BBS, according to a check of their boards.

The quality of documentation varies widely. The best manuals not only explain how to install the hard drive and how to use its software but also teach about the drive's mechanics and operations. FWB's manual is the most comprehensive. GCC's manual is well done for the new user, thanks to its simplified explanations and well-thought-out graphics.

Macworld called all the companies' technical-support lines, posing as a customer, to gauge technical support. Most technicians were knowledgeable, but our caller did get some unhelpful responses (see "How Helpful Is the Help?").

The Best Deals

If you are bargain hunting, ETC Peripherals and APS offer an unbeatable $299 price for their 52MB portables. Both companies' portables have decent speed, are quiet, and come with good technical support. The GCC line is a little costlier but offers better support services. PLI and PCPC charge moderate prices but provide excellent service.

Whether you are a new consumer or an experienced user, the best drive for you depends on your needs. Price plays a major role, as do bundled software and support. If portability is important, pay the extra cost. If you are experienced and are confident that you won't need technical support, don't pay more for service you won't use. If you are inexperienced, pay the extra money for the help.

See Where to Buy for contact information.

ERICA SANDSTEDT is an independent computer consultant and technical-support specialist.

Macworld Lab testing supervised by TIM WARNER.

MW EDITORS' CHOICE

Desktop Drives

- APS External 105MB: in terms of price per megabyte, this is the best deal. You also get good, fast service and technical support. Company: Alliance Peripheral Systems. List price: $449.

- Mirror 105MB External: This speedy drive offers a good price and good support. Company: Mirror Technologies. List price: $479.

Portable Drives

TEN TIPS TO HELP YOU MAKE THE RIGHT CONNECTION

How to Buy a Modem
These days, shopping for a modem can be a much more daunting process than actually using one. Walk into any large computer store and you're faced with a bewildering array of modem products, protocols, and promises. Do you need the 24/96 send-and-receive fax modem for $250 or the 2400-bps model with send-only fax for $150? Should you invest $400 in the 9600 V.32/V.42bis modem with MNP 3 data compression and error correction but no fax capabilities? And what exactly is modem voice messaging, and why would you need such a thing?

Despite all the product choices and alphabet-soup acronyms, shopping for a modem doesn't have to be an ordeal. All you need is a basic understanding of modem protocols and standards, a clear sense of your telecommunications needs, and the ability to recognize marketing hype when you see it. To help you on your way toward making an intelligent buying decision, I have come up with some practical modem-buying tips, along with a glossary (see "Modem Talk").

What's a Modem, Anyway?
The word modem is actually an acronym for Modulator/DEModulator; a modem modulates, or converts, the digital signal from a computer into an analog signal (a series of tones and other sounds) that can be sent over a phone line. A modem on the receiving end demodulates the analog signal back into a digital form that the recipient computer can understand.

Modems transmit data at standard speeds; these speeds are expressed in bits-per-second (bps), or in a measure called a baud rate (see "Modem Talk" for a definition of these, and other, modem terms, which are italicized in the text). Technically, bps and baud are different, but the use of baud in place of bps is so widespread that the terms have become interchangeable.

With bps speeds, generally speaking, the faster the better. For example, the process of sending a 300K file over a 2400-bps modem takes roughly 22 minutes. With a 9600-bps modem, the file zips through the lines in only 3½ minutes. The advantage of a faster modem is even greater if you're downloading, or receiving, a file or other information from a commercial online service such as CompuServe or America Online. Because these services charge for each online minute, time is literally money; the faster you work online, the cheaper it is for you.

Tip 1: Buy the fastest modem you can reasonably afford; in the long run, it will save you money in toll calls and online usage fees. In the current market, unless you're on a restrictive budget, consider shopping for 9600-bps data modems, which sell for anywhere from $230 to $1100. Not all 9600-bps modems are created equal, though—the better models boast features that make communicating faster and more convenient, without adding much to the cost of the modem (see "Tip 7" for an example).

Setting Standards
Without communications standards, you risk creating a digital Tower of Babel with no modem being able to talk intelligibly with another modem. In the past each modem manufacturer had its own scheme to squeeze more speed out of its modems. Few, if any, of these schemes were compatible with one another, however, and some standard-maker was necessary to bring order out of chaos. As you might expect, the first standard-setter was Ma Bell herself.

Back when it had a monopoly on telephone communication in the United States, AT&T created two modems, the Model 103 and the Model 212, which soon became de facto modem standards for 300-bps and 1200-bps telecommunications, respectively. In 1964, in an effort to create consistent modem standards around the world, both domestic and international modem manufacturers shifted the focus of standards making to an international organization called the CCITT (a French acronym that translates as International Telegraph and Telephone Consultative Committee). The standards set by the CCITT ensure that a modem can send to, and receive from, modems around the world.

When shopping for a modem, you come face to face with standards and protocols, and it's easy to get confused. A communications protocol, such as the Microcom Networking Protocol (MNP), is a blueprint that details exactly how a particular telecommunications task will be accomplished. MNP, for example, is a set of rules developed by Microcom to

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combat line noise and ensure correct data transmission between modems.

A standard, on the other hand, is a widely accepted protocol or set of protocols. About ten years ago, Microcom’s MNP was simply one of many error-correction protocols. As time passed and MNP evolved, Microcom implemented better schemes for error control. These schemes, known as MNP Classes 2 through 4, were adopted by other modem manufacturers and thus became a de facto industry standard. In 1988, MNP Classes 2 through 4 were made part of the CCITT’s V.42 error-correction standard.

**TIP 2** The most important point to remember about CCITT standards is that the numbers in a standard’s name are pretty much irrelevant. In other words, the V.42 (pronounced “vee-dot-fourty-two”) standard doesn’t mean you obtain “better” or faster telecommunications than with the V.32 standard. In fact, V.32 is the standard for 9600-bps communications, while V.42 is an error-correction standard.

**Getting Up to Speed**

**THERE ARE THREE TYPES OF MODEM STANDARDS** that you should become familiar with: modulation, or speed; error correction; and data compression. In terms of speed, the two CCITT standards you’re most likely to encounter are V.22bis and V.32. The first of these, V.22bis, defines 2400-bps communications and is supported by virtually all modems sold in the United States today.

V.32 is now the standard for 9600-bps communications, but in the past the major modem manufacturers, such as Hayes, U.S. Robotics, and Teledict, have all had their own proprietary protocols for 9600-bps transmission. Today, these vendors make 9600-bps modems that support their individual protocols—so as not to leave their past customers out in the cold—and that are V.32-compliant, meaning that their modems will adhere to, and work with modems that support, the CCITT V.32 standard.

**TIP 3** If you’re in the market for a 9600-bps modem, make sure it’s at least V.32-compliant. While virtually all new 9600-bps modems are V.32-compliant, there are many older modems now being sold on the used market that are only “V.32-compatible,” which means that they may or may not connect correctly with a true V.32 modem. Don’t be fooled by these “compatible” units: buying a V.32-compliant modem will save you time and headaches.

**Avoiding Errors**

**STATIC AND NOISE ON A PHONE LINE** are mere annoyances when you’re talking to a friend, but they’re major problems to a stream of data. Noisy lines can garble data, preventing information from transmitting correctly.

It is possible to control errors on telephone lines with error-correction schemes based in either software or hardware. One method is the aforementioned MNP Classes 2 through 4, which are part of the CCITT’s V.42 error-correction standard. Another error-control protocol, LAP-M (Link Access Procedure-Modem) is also included in the CCITT V.42 standard.

**TIP 5** Buying a model that is V.42-compliant is a good idea because it means that the modem will establish an error-free connection to other V.42 modems as well as to any modem that is MNP-compatible.

**Turning More into Less**

**DATA COMPRESSION IS THE SAME IN** telecommunications as it is in other areas of computing—it packs more data into a given space. By increasing the density of the data through compression, you increase the throughput of the modem link. For example, transmitting an uncompressed 100K file over a 2400-bps modem takes about 8 minutes. With a compression utility such as Aladdin’s StuffIt or Salient’s DiskDoubler, you can shrink the size of the file down to 50K. As a result, that same file takes only about 4 minutes to transmit at 2400 bps, yet it has all of the data of the original file. In effect, by compressing the file by 50 percent you get the performance of a 4800-bps modem—even though the modem actually transmits the data at 2400 bps.

Data compression can also be achieved through modem hardware; as it sends, the transmitting modem compresses the data and the receiving modem decompresses the data automatically. The process is completely invisible to the user; you just get faster transmissions than you would otherwise. Hardware compression is typically faster than software compression, and compression that is built into the modem hardware is automatically available whenever you send or receive a file. Also, you don’t need to worry if the modem you’re sending to has the same hardware compression scheme as yours—your modem will attempt to make a connection using compression but will fall back to a standard connection if the attempt fails.

Most modems today offer built-in hardware data compression. Microcom’s MNP 5 data-compression protocol is good for an average throughput efficiency of about 200 percent, meaning that a 2400-bps modem can achieve 4800-bps throughput. The CCITT’s V.42bis protocol does even better, with a 400 percent improvement, giving 2400-bps modems that support V.42bis an effective throughput of 9600 bps. MNP 5 modems have been widely available now for several years, V.42bis units for less time, but this standard is fast becoming, well, the standard.

**TIP 6** Although many new modems support both V.42bis and MNP 5 data compression today, not all do. For maximum flexibility in hooking up with other modems, it’s best to get a modem that supports both compression standards.

**TIP 7** The fastest raw modem speed commonly available today is from a V.32bis modem, which runs at a modulation speed of 14,400 bps. Modem manufacturers who claim faster speeds than that
are basing those speeds on the effective throughput rates that can be accomplished only with data compression. So a 9600-bps, V.32 modem that also has V.42bis data compression can theoretically achieve throughput speeds of 38,400 bps; and a V.32bis/V.42bis modem can hit throughput speeds of an incredible 57,600 bps.

In the real world, though, these modems don’t often reach those maximum speeds; noisy phone lines, inefficiencies in communications software, and other factors mean that your real data mileage is almost always less, but it’s still better than if you weren’t using compression at all.

In addition, data compression doesn’t work on all files equally. You’re likely to achieve the maximum possible throughput only on text and on some graphics files, which respond best to data compression. Font and sound files, which already have compact data structures, don’t benefit much, if at all, from the compression built into a modem. Neither do files that are already compressed through software such as StuffIt. The V.42bis protocol recognizes this and reduces or turns off compression if it’s not advantageous.

Modem Sharing
IN THE BEST OF ALL WORLDS, THE rule would be One User, One Modem. But for most companies, it’s impractical to have a modem and dedicated phone line at every desk. An elegant solution is to share one modem among many users via a LocalTalk or Ethernet network. This is accomplished by either a direct hardware connection to the network, as pioneered by Shiva with its line of NetModems, or via software.

With the hardware connection, the modem is just another network device; it accepts a LocalTalk or Ethernet plug and shows up in the Chooser just like a file server or a shared printer. With a software connection, one Mac is linked to the modem via a serial cable going into the modem port; that Mac, known as the modem server, also runs software in the background that allows other users on the network to access the modem.

Each approach has its pluses and minuses. Modems that hook up to the network directly are always available to the users; if the modem server Mac is turned off or crashes, the other users on the network lose their shared modem. Also, a hardware-shared modem is fully dedicated to the task; performance can suffer on a modem server because the software runs in the background on that machine. If the Mac running the modem server is busy with an intensive foreground task, like recalculating a large spreadsheet, the background task of modem serving can slow down. In an extreme case, in which the foreground task involves a lot of disk access and computation, the modem server can be interrupted, causing you to lose the connection.

On the other hand, a hardware-shared modem has to include network electronics in addition to the modem circuitry, which raises the price. For example, the Shiva NetModem V32 is a 9600-bps shared modem that costs $1189. It doesn’t have V.42bis or V.42 protocols, so the best possible throughput is just 9600 bps. In contrast, the Hayes V-series Ultra Smartmodem 9600 is a V.32 unit that lists for $999 and includes V.42, V.42bis, and MNP 5, so the throughput can go as high as 38,400 bps.

TIP 8 Large companies or departments will probably be more comfortable with hardware-networked modems, as one or more of them can be kept in the phone closet with the network hubs and other hardware. But if you need to share a modem with just a few other users, you’ll
get more for your money by buying a modem that networks via software.

**Should You Get the Fax?**

**WHILE SHOPPING FOR A DATA MODEM, you face another decision: do you want to send and/or receive faxes from your computer? If so, you want a fax modem.** Fax modems used to be more trouble than they were worth, but with recent software and hardware improvements, faxing is almost as easy as printing.

When shopping for a fax modem, you'll probably encounter quite a few 24/96 models, and it's important to understand what those two rates mean in context. Data transmission and faxing require different communications protocols; the standard Group III fax machine sends fax information at 9600 bps, but data transmission at 9600 bps requires a more complex scheme. As a result, many fax modem manufacturers—in an effort to produce an inexpensive, efficient product—offer data transmission at 2400 bps (rather than the more-costly-to-implement 9600 bps). Thus, 2400 bps refers to the data speed, and 9600 bps is the fax speed; you can’t transmit data at 9600 bps with a standard 24/96 fax modem.

Prices for fax modems have significantly dropped in recent years. The 24/96 fax modems are the most affordable fax modems, available at street prices under $200 from MacProducts USA, Zoom Telephonics, Global Village Communication, Supra, and several others. For $200 to $300, you can get modems with fax-receive capability from the same companies. But if you’re looking for a fax modem that sends data at 9600 bps or faster, you have to spend a bit more—for example, Supra’s SupraFaxModem V.32bis can handle 14,400-bps data transmission without data compression, has the new 14,400-bps fax speed, and still only costs $399. In the near future, you’ll see more stand-alone fax machines use this 14,400-bps speed, as the fax chips that work at this speed are beginning to ship in volume.

Some fax modems, such as the Prometheus Ultima, now offer voice-messaging features. This turns the Mac into an answering machine; callers can leave voice messages, which are digitized and stored on a hard drive. You can have special outgoing messages for particular callers, and the system can even forward messages to another phone number. While it sounds great in theory, voice messaging has some problems in practice. In order not to miss any messages, you need to leave the Mac on all the time; the messages take up a lot of space on a hard drive; and if the Mac crashes while you’re out, you’re going to miss your phone messages. Make sure you get a thorough test drive before you invest in a modem with voice messaging.

**TIP 9**

Even if you already own or have access to a fax machine, a fax modem can be a good investment. Faxing from your desktop modem means you don’t have to take those extra steps of printing your document and then feeding it into a fax machine. It also saves you from having to put your document into the office fax queue. In addition, most fax modem...
software enables you to send the same document to many recipients easily. The extra cost of the fax chip and software adds $100 or less to the price of a data-only modem, so why not have the fax capability? Even if you use the fax features only occasionally, it's worth the extra money to have those conveniences.

Selecting the Right Software
THE MODEM IS ONLY HALF OF THE communications equation. The other half is the software that works with the modem, and lots of packages are available. Many modem manufacturers bundle communications software with the hardware. Since it's free, you usually get what you pay for—bundled software tends to be of the bare-bones variety, with few of the amenities that enable you to work quickly and easily online. Among the important amenities you'll want are scripting, which allows you to automate all or part of an online session, and advanced file-transfer protocols like Zmodem.

ZTerm, a full-featured communications program by David Alverson, is available from online services and most user groups as shareware. Try out the program for a few weeks; if you like it, pay the author $30. It provides scripting and includes Zmodem, yet costs much less than most commercial packages.

Among the commercial programs, the three most popular are Hayes's Smartcom II ($149), FreeSoft's White Knight II ($139), and Software Ventures' Microphone II ($295).

Smartcom II is the easiest of the three to use; it has a clean interface and a simple-to-understand script-making facility. Although its script language is not as powerful as those of the other two programs, Smartcom II is much more accessible to the average user and provides the tools to handle most of the online sessions you might want to run.

Microphone II and White Knight are well suited to people with more complex communications needs. While these two programs provide plenty of features and prewritten communications settings for the casual user, advanced users are in their element. Both programs have script languages rich in features that you can use to implement complex functions, such as a miniature bulletin board system and automated data retrieval from online services.

Some online services, such as America Online and Prodigy, provide the terminal software needed to access their services. Both America Online and Prodigy bring a point-and-click Mac interface to the task of navigating their respective services, although America Online has a much clearer and more intuitive interface.

A Closer Look at Modem Features

1. Prices for modems offering a 9600 bits-per-second data-transmission rate have come down recently, making them a good value. And while some online services currently support only 2400-bps transmission, many of them will move to 9600 bps in the near future.
2. CCITT V.32 is the standard for 9600-bps telecommunications; V.32bis ensures that the modem will work with the vast majority of 9600 modems supporting the same transmission standard. Look for V.32bis if you buy a 9600-bps modem.
3. The CCITT V.42 error-correction standard ensures that a modem can establish a clean connection to other V.42 modems. This standard also incorporates another error-control protocol, LAP-M (Link Access Procedure Modem).
4. Modems with data-compression protocols, such as MNP 5 and V.42bis, can send data at much faster speeds than modems without data compression. MNP 5, for example, enables a 2400-bps modem to send at about 4800 bps. Modems with V.42bis can move data even faster. Currently, MNP 5 is more commonly found in modems; a modem with both protocols would be ideal.

While you can access CompuServe with a general communications program, CompuServe also sells two front-end programs that make getting around this complex service much easier. CompuServe Navigator ($99.95) is designed for logging on to CompuServe, getting lists of the available messages and files, and logging off. While off line, without the clock running, you choose which messages and files you want to receive. Then you let Navigator log back on, retrieve the chosen material, and log off. You can then review the downloaded data at your leisure. Another program, CompuServe Information Manager, is oriented more toward the user who wants to browse the service with the help of a Mac-like interface.

TIP 10. For the beginner who wants a solid, easy-to-use general communications program, Smartcom II is recommended. For more advanced communications needs, it’s a toss-up between Microphone II and White Knight.

What's Ahead?
MODEM TECHNOLOGY HAS BEEN changing rapidly over the past few years, and it's reasonable to wonder if the modem you buy today will soon be obsolete.

Based on what the CCITT is considering, it appears that the market has at least a year of breathing space before the next wave of innovation hits. CCITT is working on a new modem standard, currently dubbed V.fast, which will enable modems to reach a raw speed of 19,200 bps to 24,000 bps over standard telephone lines. If all goes well, this standard could be finalized sometime in 1993, with products incorporating the standard appearing shortly thereafter.

In 1994 and later, ISDN (Integrated Services Digital Network) is expected to become available to a majority of U.S. telephone customers. ISDN is an international telecommunications standard that enables a single line to simultaneously transmit voice, video, and data signals (see “Digital Data on Demand,” Macworld, February 1992). Because ISDN provides a digital connection, as opposed to the analog telephone lines we currently use, it promises to make modems obsolete. You will replace your modem with an ISDN connection, which will provide you with completely clean, 64,000-bps communications.

But not to worry: even when ISDN becomes widely available, analog phone lines (and therefore modems) aren't going to disappear—just as black-and-white TVs are still produced, despite the omnipresence of color stereo sets. And in such a fast-moving field as telecommunications and electronics, that's about the best we computer users can ask for.

See Where to Buy for contact information.

TOM NEGRINO is a Macworld contributing editor. His wife wishes he would order a dedicated modem line.
While You Wait

by James A. Martin

Four years before there were film recorders for the Macintosh, C. H. Banks, a partner in the Dallas service bureau Associated Graphics, was creating presentation slides from his Mac. "We would produce images in MacPaint and MacWrite and print them out at the best quality we could on white paper," Banks explains. "Then we'd stick those pieces of paper on the wall and shoot them with a Polaroid black-and-white slide-film camera. The slides looked terrible, but at the time, this was state-of-the-art slide-making on the Mac."

The state of that particular art has changed considerably. Today, there are roughly a dozen film recorders available for the Mac; and while all of them promise to affordably, quickly, and easily generate slides directly from the Mac, they don't always live up to their marketing claims. Affordability, for example, is in the eye of the beholder; the lowest-priced film recorder costs $5000, while some higher-end models cost over $30,000 (see "Justifying a Film Recorder").

So what exactly is a film recorder, and why would anyone buy one? A film recorder is essentially a 35mm camera, a monochrome CRT (cathode-ray tube), and a color-filter wheel all wrapped up inside a nondescript box—an electronic darkroom on your desktop (see "Inside a Film Recorder"). Almost every film recorder is a QuickDraw-based SCSI device; only General Parametrics Corporation's Spectra Star 450 slide maker—thermal color printer combination uses a PostScript RIP. (Other film recorders, such as Presentation Technologies' Montage FR2 and Agfa's models, can be equipped with optional PostScript RIPs; all film recorders support PostScript-compatible software interpreters such as Custom Applications' Freedom of Press Professional or Visual Business Systems' Professional Output Manager.)

There are plenty of reasons to take the plunge into slide making. Generating a slide presentation in-house and having it ready to show the next day can provide an important business advantage. Service bureaus use high-end film recorders to offer slide services to customers. And the medical community is fast becoming one of the film recorder's best customers; videotapes of surgical procedures can be edited into slide shows.

Macworld Lab tested eight film recorders to determine which ones offer the best value and performance.
Pictured clockwise are Agfa's PCR II, General Parametrics' Spectra Star 460, and Minus Industries' FilmPrinter Turbo II.
Missing from the lineup are Agfa's Forte, and Verité from Prime Option (formerly American Liquid Light), which didn't arrive in time for our testing. Also absent is Presentation 'Technologies' replacement to its Montage FR1 film recorder; a shipping unit of the new FR2 wasn't available by our deadline. We took into consideration how easy (or how difficult) the product is to use, hardware flexibility, hardware and software controls and features, the amount of time required to image slides, and finally, the quality of the slides (which we judged by both projecting the slides on a screen and looking at them through a 4X loupe on a light box).

**Hardware Controls and Flexibility**

Ideally, a film recorder should offer certain hardware controls to make using it easier—the ability to push a button and rewind the film, for example, or a liquid crystal display (LCD) panel that lets you know what the film recorder is doing. Unfortunately, this is not always the case.

Most film recorders offer at least some level of hardware control and user feedback. For example, all three Lasergraphics models—the LFR Mark II, the LFR, and the Personal LFR—use the Ricoh/Lasergraphics SmartBack 35mm camera, which I found to be the easiest of the cameras to use. The SmartBack includes a 16-character LCD that tells you, among other things, how many exposures have been made and how many are left on the roll of film.

The General Parametrics film recorder—thermal color PostScript printer combination, the Spectra Star 450, includes a 2-line LCD panel and push-button controls, which help to offset the product's murky documentation. And the push buttons on Mirus's FilmPrinter Turbo II make it easy for you to rewind film and to switch between connections for hooking up either a Mac or a PC.

Agfa's recently released PCR II film recorder takes top honors, though, for its hardware controls and feedback. The PCR II's 2-line, 16-character LCD keeps you well informed as to what's going on inside the film recorder. The display gives you what Agfa calls "intelligent error messages" (how many "intelligent" errors have you made lately?) and tells you the name of the file you've just selected for printing, how many images have been exposed on the film, the output resolution chosen (2K or 4K), and more. Using the PCR II's settings panel, you can change the recorder's pacing (a function that matches the timing of the film recorder to the rasterization speed, thus eliminating some imaging problems), color control, and other settings. (Agfa's ProColor Premier features a settings panel and an 8-character, 1-line LCD and offers many of the same hardware adjustments, such as pacing, as the PCR II does.)

Some film recorders, particularly lower-end models such as the Personal LFR and the FilmPrinter Turbo II, come with a 35mm camera permanently mounted; you can't use another type of camera. That's fine if you plan to do nothing but generate 35mm slides. Other recorders enable you to use various types of devices such as bulk loaders, Polaroid instant print cameras, or 70mm cameras.

Software: No Clear Winner

Among the features all film recorder programs have in common are support for PICT files; color-balance controls; the ability to batch-print files; and slide preview. Although many recorder applications allow you to print TIFF files, several applications, such as those of the GCC, Polaroid, and the Lasergraphics models, do not; you have to convert the TIFF file into PICT format and print the file on an application such as Adobe Photoshop (printing from an application can slow down the print speed).

Although many of the programs that come with the film recorders work fine, there is no shining star. For instance, GCC's Print Manager and Mirus's MirrorPrint were our favorite programs—from film recorders aimed at beginning and low-end users—in spite of some problems. GCC's Print Manager's visual cues and language are quite clear. For example, Print Manager's dialog boxes lead you clearly through the process for adjusting letterpressing in a slide's text, and changes appear as you make them.

Print Manager also offers image-enhancement options for eliminating blooming (an aberrant color that sometimes develops between two colors), and for anti-aliasing (for more on imaging...
### Slide Maker Speeds

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</tr>
<tr>
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<td>ProColor Premier</td>
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</tr>
<tr>
<td>Spectra Star 450</td>
<td>$642$</td>
</tr>
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</table>

Times are in seconds. *Using RISC Rascol external rasterizer.*

The slides generated for the speed tests represent a variety of rasterizing challenges to a film recorder, from simple (the text with the logo image and the pie chart) to moderately difficult (the rafters) to complicated (the large Adobe Photoshop-scaned image of the baby and violin). The tests were run on a Macintosh IIci with System 7.0.1, 8MB of RAM, an 80MB internal hard drive, and Apple's cache resolution (2K). The batch-printing test consisted of 11 different slides ranging in complexity. Speeds include times for rasterizing and printing.

<table>
<thead>
<tr>
<th>Batch Printing</th>
<th>Baby and Violin</th>
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<tr>
<td>ColorFast</td>
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<td>$168$</td>
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<tr>
<td>Spectra Star 450</td>
<td>$972$</td>
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Rascol. Because rasterization takes place on the Macintosh with most film recorders, overall performance depends on the type of Mac you own. Images were printed from within the film recorder's software and not from another application, such as Aldus Persuasion. We printed all slides at both high resolution (4K) and medium resolution (2K). The batch-printing test consisted of 11 different slides ranging in complexity. Speeds include times for rasterizing and printing.

You can't directly print a TIFF file in MacRascol RIP; you have to convert the TIFF file to PICT, or print from an application such as Photoshop 2.0 that handles TIFF files. Also, the software commands aren't always straightforward; in order to preview an image, for example, you have to choose Cropping as an option in MacRascol RIP. On the plus side, you can print slides in the background; although background printing releases the Mac for other tasks, it can mean that slides take twice as long to image.

Agfa's Conductor is the most feature-packed software package. With the ability to preview, resize, crop, stretch, center, rotate, and zoom in on an image, as well as to adjust color, Conductor could almost be mistaken for a low-end image-editing program. In addition, Conductor gives you the best feedback of any film-recorder software; it tells you exactly what's going on ("Recording Red Pass," problems, see Lab Notes, in this issue). But frankly, with the test files we printed, neither feature made much difference.

MirusPrint is simple to navigate, offers a handful of thoughtful features (such as the ability to automatically shut down the Mac after finishing a batch-print job), and provides helpful visual clues about what the film recorder is up to. MirusPrint lets you create and save your own color lookup tables, which can help you get better color out of your film. But because the color lookup tables affect the film, and not your monitor, you can't view the changes on screen; thus, adjusting the tables involves a good deal of trial and error and a good deal of patience.

I ran into a snag with MirusPrint's previewing feature, however. I couldn't preview a spoiled, 32-bit, 13MB color Photoshop TIFF image, which had been saved as an RGB file; MirusPrint only displayed a black box. When I asked the folks at Mirus about this, they suggested I save the image as an 8-bit indexed color file and then preview it (the idea being that the large 32-bit image could be hitting a memory ceiling). That didn't work, either, and Mirus's response was that it "doesn't really target Photoshop users" with its product. Fair enough, but it's a limitation nonetheless.

Among low-range to midrange film recorders, the Lasergraphics machines offer software with several useful features but with limitations, too. (Under a licensing agreement, the software for Presentation Technologies' Montage FR2 is essentially the same as the Lasergraphics software.) Lasergraphics film recorders force you through a two-step process when imaging slides. To print (or preview) a slide, you must first create a queue in the Lasergraphics RIP; you have to convert the image to PICT, or print from an application such as Photoshop 2.0 that handles TIFF files. Also, the software commands aren't always straightforward; in order to preview an image, for example, you have to choose Cropping as an option in Lasergraphics RIP. On the plus side, you can print slides in the background; although background printing releases the Mac for other tasks, it can mean that slides take twice as long to image.

Agfa's Conductor is the most feature-packed software package. With the ability to preview, resize, crop, stretch, center, rotate, and zoom in on an image, as well as to adjust color, Conductor could almost be mistaken for a low-end image-editing program. In addition, Conductor gives you the best feedback of any film-recorder software; it tells you exactly what's going on ("Recording Red Pass,"
FILM RECORDERs COMPARED

<table>
<thead>
<tr>
<th>Product</th>
<th>Forte</th>
<th>PCR II</th>
<th>ProColor Premier</th>
<th>ColorFast</th>
<th>Spectra Star 450</th>
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<tr>
<td>Company</td>
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<td>Agfa</td>
<td>Agfa</td>
<td>GCC Technologicals</td>
<td>General Parametrics</td>
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</tr>
</tbody>
</table>

* = yes; O = no. * Lasergraphics fonts are software, not hardware, resident. ** With optional RISC Rascal, film recorder rasterizes images. *** With SlideScript RIP, film recorder rasterizes images.

"Recording Green Pass," and so on), and a ruler with a moving tick mark shows you how far that task has progressed. Once the job is done, Conductor informs you how much time it took to image the file, what kind of file it was, the resolution of the file, and more.

But with all of its features and controls, Conductor takes more time to learn than the other film recorder programs do. Also, at times it feels awkward to use. Using Conductor's zoom tool within preview mode, for example, feels a bit like walking in outer space; the tool forces you to draw a box—by slowly dragging toward the lower-right corner—around the part of the image you want to magnify. And if you make several alterations on an image, you can't easily restore the file to its original preview size, as Conductor offers only one level of undo.

Justifying a Film Recorder

With prices from $5000 to $36,000, film recorders aren't exactly an impulse purchase. But the cost of having slides processed out-of-house can add up significantly over time, too. Service bureaus charge anywhere from $4 to $20 to create a typical slide with a 48-hour turnaround; for rush jobs (24 hours or less) be prepared to pay up to $60 per slide.

To decide if a film recorder is worth its expense, start by determining how many slides per year you generate. Figure that the average business presentation contains anywhere from 8 to 25 slides and that, ideally, there should be 1 or 2 slides for every minute of a typical presentation.

If you must make a 20-minute slide presentation each month, for example, then figure at a minimum you need to generate about 240 slides per year (that's 20 slides each month, based on the 1-per-minute theory). Providing that you need a rush job, and given that the average service bureau charges about $8 per slide, you'd pay $1920 per year for slides output from a service bureau. Within two years, that's $3840; at this rate, it would take just over three years to recoup the cost of a low-end film recorder, such as the Lasergraphics Personal LFR ($55995).

Aside from the initial purchase price, there are other costs to consider. Among them are film and processing (generally, about 80 cents per slide); training; cost of resources (most film recorders are slow and can tie up a Macintosh for 25 minutes or more); service (most manufacturers charge $180 to $1500 per year for extended warranties); support (the salary of someone on staff to maintain the film recorder, or a support contract with the dealer you bought it from); and equipment upgrades.

There's one cost-justification factor, however, that's difficult to foresee: how much you actually use the film recorder once you've bought it versus how much you planned to use it before you purchased it. John Sloan, chairman of the surgery department at the Chicago College of Osteopathic Medicine, is a case in point. "I justified the purchase of a film recorder based on the fact that I was sending 500 slides per year to the service bureau at $15 per slide," he says. "What I didn't expect, though, is that since I bought a film recorder, I'm making 1500 to 2000 slides a year."
**Lasergraphics** Lasergraphics Ricoh Mamiya Ricoh Pentax

**LFR Mark II** Personal LFR Turbo II Digital Palette Montage FR2 Verite

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<tr>
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 recorder's foot-dragging, still, anyone who routinely faces rush jobs will want to steer clear of this film recorder. Competing with the Spectra Star for the Mañana medal is GCC's ColorFast. The absence of background printing on the ColorFast makes its sluggish printing even more frustrating than the Spectra Star's. The best option with the ColorFast is to batch-print files overnight, but if you need to drop off your film at the end of the day for overnight processing, you'll have to find something else to do while the ColorFast takes over your Mac. Still, there is some good news. According to GCC, a ColorFast driver upgrade, which should be available by the time you read this, will enable the film recorder to print in the background.

The Most Improved Player award in the speed category goes hands down to Mirus. When we last reviewed film recorders ("From Screen to Slide," July 1989), the Mirus FilmPrinter was dubbed "the slowest of them all." This time, however, we were impressed by how quickly the FilmPrinter Turbo II printed slides; frequently, the Mirus recorder came in second or third in our speed tests. Mirus has completely redesigned the film printer's digital processing mechanisms, and it shows.

In general, the Lasergraphics film recorders—particularly the newer Personal LFR and LFR Mark II models—performed extremely well in our speed tests. When attached to a Lasergraphics RISC Rascol—an optional controller that off-loads image rasterizing from the Mac—any of these recorders is unbeatable (see "Slide Maker Speeds").

In some cases, though, the RISC Rascol slows down print jobs slightly. The Mark II rasterized and printed a large Photoshop graphic in 3 minutes and 14 seconds without the RISC Rascol and in 3 minutes and 40 seconds with the RISC Rascol. The reason is that a scanned image, such as the one we printed from Photoshop, is rasterized by the computer during the scanning process; thus, sending that image through the RISC Rascol's rasterizing process adds an extra step.

The RISC Rascol isn't cheap—the base unit is $5995, while the RISC Rascol Plus (due out by year's end), which has an embedded PostScript driver, is $9995. But if you regularly need to crank out slides in a hurry, there's no better way to do it.

**Image Quality**

HELPFUL HARDWARE AND SOFTWARE controls and lightning-fast speed don't add up to much if the images a film recorder captures aren't presentable. Most of the film recorders we evaluated delivered slides suitable for a boardroom presentation, yet none of the recorders passed every test with flying colors.

To determine how smoothly a recorder handles color transitions, we created a number of slides with gradient-filled color backgrounds. Ideally, gradients should blend from one color to another without noticeable steps (or banding), but every film recorder we tested generated at least one gradient slide with some banding. In an effort to eliminate or minimize banding, some manufacturers have increased their film recorders' number of resolvable colors by representing each color with 33 bits or 36 bits instead of 24 bits.

The slides we printed on GCC's ColorFast, using the recommended Polaroid film, all came back with a distinctly yellowish cast. Compare the color tones in the Photoshop image at top, printed on the ColorFast, with the image above, output on the Agfa PCR II.

**Pink, White, and Yellow** The slides we printed on GCC's ColorFast, using the recommended Polaroid film, all came back with a distinctly yellowish cast. Compare the color tones in the Photoshop image at top, printed on the ColorFast, with the image above, output on the Agfa PCR II.

**Drawing a Fine Line** We used this Canvas 3.0 sample image, with all of its hairlines, to test how the film recorders could handle fine-line resolution. Among the film recorders we tested, Agfa's PCR II did best in resolution testing. With most of the film recorders we tested, the hairlines in the center circle were slightly fuzzy. Agfa's PCR II did the best job on this test—the lines came out crisp.

Aside from testing banding, our slides were designed to test a film recorder's resolvability, the ability to produce thin lines and curves, and color control, the ability to handle color saturation and balance (and avoid such problems as blooming). We also took note of how well the recorders reproduce fonts. All of the models we
tested come with their own fonts and also support Adobe Type Manager and TrueType fonts; we noticed little, if any, resolution problems with fonts.

Slides from GCC Technologies' ColorFast were the most perplexing. We shot two rolls of the film GCC recommends—Polaroid Presentation Chrome 100—selected the appropriate color lookup table, and otherwise followed the manual's instructions, yet every slide had a yellow tint (see "Pink, White, and Yellow"). We shot another roll of film, Kodak Professional 200, and our slides came back with the proper color balance (the resolution wasn't as sharp, however). When contacted, GCC said it hadn't heard of this problem before but suggested the cause might be the developing process or using outdated film. We used the same professional developing house for all of our film, however, and this problem occurred only on the two rolls of Polaroid film we shot on the GCC; also, the film we used was dated April 1993. Conclusion: Who knows? It's simply one of those head-scratching experiences film recorder users are likely to encounter.

GCC slides also showed signs of blooming—the RGB test slide contained a thick yellow transition line between areas of red and green. While the ColorFast wasn't the worst offender when it came to banding, there were noticeable steps in the black-to-white gradient test slide. (Although few people will create them, slides with black-to-white gradients put a film recorder to the ultimate banding test, because the range of colors between black and white is wider than the range between other colors.)

Another disappointment was the General Parametrics Spectra Star: the blooming test revealed a thick yellow line; banding was quite noticeable in several gradient test slides; and while resolution quality was a notch above that of the GCC, some of the Spectra Star's colors looked washed out.

Agfa's ProColor Premier fared well in resolution tests, thanks to the unit's large (7-inch) CRT and small (0.1mm) CRT dot size (typically, the larger the CRT size and the smaller the dot size, the better the resolution). The test was sharp and the colors rich and balanced. The ProColor loses points for banding, though, which was noticeable in the black-to-white gradient test slide, among others. We also noticed ghosting, or blurring, on the ProColor's fine-line resolution test, but adjusting the film recorder's pacing eliminated the problem.

The Mirus FilmPrinter Turbo II, which is only about $500 more than the ProColor Premier and supports 36-bit resolvability, did a much better job controlling banding and blooming than did the Agfa recorder. In the black-to-white gradient test, the Mirus slide showed no signs of banding. The Mirus's biggest weakness is its handling of fine resolution (its CRT size is 2.4 inches, the smallest of the lot). On a test slide with a number of small white lines, the FilmPrinter was unable to correctly print the lines, some of which are curved, smoothly.

All three Lasergraphics film recorders performed well in our quality tests. In terms of resolution, the LFR Mark II, with a 6-inch CRT and 0.027mm tube dot size, was bested only by Agfa's PCR II recorder—text was especially clear, even at small point sizes, and fine black lines maintained their identity, rather than blurring into a single thick black line, as was the case with the Mirus FilmPrinter Turbo II. There were some instances of banding (see "Banding Exposed"), but for the most part, banding and blooming remained minimal. Surprisingly, the quality of slides made from the lower-cost LFR was only incrementally inferior to those made from the top-of-the-mark Line II when observed under a loupe and the Personal LFR, in turn, created slides that weren't markedly lower in quality than the LFR's.

Agfa's new PCR II became the standard by which we judged film-recorder output quality. Boosting a 7-inch CRT, a tiny (0.037mm) CRT dot size, and 30-bit resolvability, the PCR II's slides excelled in resolution quality. Text in 10-point type and relegated to corners (where it's most difficult to obtain good resolution, due to the slight curvature of most cathode-ray tubes) showed up dressed to kill. The film recorder wasn't free of imaging problems, however; on our black-to-white gradient test, the PCR II slide showed noticeable banding, and only by adjusting the pacing (which slowed the print time by 20 percent) were we able to burst the ghosting out of the fine-line resolution test.

Dedication Is Required
THE QUALITY OF SLIDES GENERATED from a Macintosh has vastly improved since the days C. H. Banks and his colleagues snapped slides of ImageWriter printouts, but the process of making those 35mm images has become much more complex. Think of it as a cross between color printing and professional photography—that is, a task that requires a certain level of skill and knowledge. If you're going to spend the money on a film recorder, go the extra mile and dedicate a staff member, trained in graphic arts, to the task of creating and printing slides. If that isn't possible, then you should ask yourself if you wouldn't be better off sending slides out to a professional service bureau. After all, what's most at stake in a business presentation is your company's reputation; why squander it just to save a little money or time?

See Where To Buy for contact information.

Macworld testing supervised by MARK HURLOW.
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Code: MACW 892

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Pastel Development Corporation
P.O. Box 110
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or call 1-800-756-8553
Code: MACW 892
Fractal Design Painter 1.2

PROS: New Wet Paint layer; records and plays back brushstrokes; 26 new paper textures. CONS: Insufficient fill tool and gradation options; problems with Undo command. COMPANY: Fractal Design Corporation (408/688-8800). REQUIRES: Mac II; 2.5MB of RAM; hard drive; System 6.0.5; 32-bit QuickDraw. Recommended: 4MB of RAM; pressure-sensitive tablet; 24-bit video board. LIST PRICE: $349.

REVIEWED IN MACWORLD AS RECENTLY AS FEBRUARY, Fractal Design Painter already has a substantially improved upgrade with a bounty of much-needed features.

Painter’s most exciting new tools are four watercolor brushes, which paint on a special Wet Paint layer. Until you fix the watercolor to your painting by saving the current file or choosing the Dry command, you can edit the image on the Wet Paint layer independently of the rest of the painting. You can also modify brush-strokes on paint that has already been laid down in the Wet Paint layer.

To automate the painting process, Painter now offers a built-in macro feature. After recording a single brushstroke, you can apply it using any brush tool or color by merely clicking on the painting. If you prefer, you can instruct Painter to automatically fill a selected area with random strokes.

The new paint bucket tool has an enormous palette of fill options, but it still lacks some capabilities found in Adobe Photoshop’s fill tool. For example, in Painter you can fill an area of contiguous color, but you can’t specify the tolerance (selected range of related colors) of the tool, nor can you antialias the boundaries of the fill so it blends in with surrounding pixels.

You can fill an area with a gradation, but this feature is also unsophisticated. You can select from eight angles to determine the direction of the gradation, but you can’t enter an angle value of your own. Nor can you fill an area with a radial gradation; Painter only permits linear gradations.

One of Painter’s most interesting enhancements is its expanded collection of paper textures, including extraordinary surfaces such as long-grain rice, caviar, and a basketball’s bumpy skin. Painter also lets you scale a texture, which makes the grains appear larger or smaller, and adjust the depth of the grains to make the texture rougher or smoother. Painter 1.2 provides a Paper Mover, which lets you open texture libraries, transfer textures between them, and rename textures. Unfortunately, you still can’t create a surface texture of your own.

Painter has bolstered its frisket (masking) capabilities in version 1.2. You can resize a frisket, although you still can’t draw one that’s geometric. You can also diffuse the edges of a frisket using the Feather option. Finally, you can now apply most of the commands under the Edit menu to a masked area just as if the frisket were a selection. One exception is the Rotate command, which lets you rotate a floating selection numerically but is not applicable to friskets.
In most modelers, you edit 3-D objects from top, front, and side views. Sketch emulates three dimensions by letting you define perspective planes that constrain the creation or extrusion of a line or shape. So, for example, if you draw a rectangle on an active plane, the rectangle lies flat on that plane, like a decal affixed to a wall. A new drawing in Sketch opens to a single horizontal plane. Using the Plane tool, you can add planes that are parallel to, perpendicular to, or angled with respect to the active plane. You can even define the surface of an existing 3-D object as a plane, enabling you to exactly position other objects directly on its contours. For example, if you have already drawn a mountain range, you can add snowcaps that exactly conform to the rocky structure. Finally, you can affix a plane to an imported background image, perfect for architectural and environmental designers.

Sketch also has exemplary editing tools. When you create a 3-D object, Sketch creates a series of isoparms, which are cross sections of the extruded or lathed object. You can select any isoparm independently of the rest of the object and move, scale, or rotate it; Sketch updates the object accordingly. You can even reshape an isoparm by adding points, moving points, and changing the curvature of individual segments. Unfortunately, Sketch doesn’t account for the cap when you reshape an extruded object, so that if you manipulate an isoparm close to either end of a 3-D object, end and cap may no longer jibe. The only solution is to reshape the cap by hand.

Sketch’s biggest shortcoming as a drawing package is its lack of any form of text tool. In fact, the only way to include text in Sketch is to enter it in a program like Illustrator, convert the text to graphic objects, and export the file to the EPS format. You can then import the EPS image into Sketch, extrude the text, and even reshape the characters if you want. Note, however, that Sketch does not support compound paths—objects with holes cut out, like the letter O—so if you want to extrude such a letter, you have to first trace it as a single outline.

**Drawing and Extrusion Tools**

**DRAWING A 3-D OBJECT IN SKETCH** is a two-step process. You first draw a line or flat shape on the active plane. Then, to give the object depth, you extrude the line or shape in a path along a different plane. To create a snake, for example, you draw an ellipse to represent the circumference of the body and then extrude it along a serpentine path; Sketch caps each end of the extrusion with the original shape, in this case, an ellipse. Lathing, which is similar to extruding, involves rotating a line or shape around an axis. To create a bottle, for example, you first draw a profile of the bottle and then use the Revolve tool to define the size and angle of the circular path around which Sketch will extrude the edge. The result is a radially symmetrical 3-D object. Both techniques are intuitive and flexible.

Sketch also uses a spline curve needed to enable you to draw organic curves, normally the exclusive realm of 2-D illustration programs like Illustrator and Alias Preeel. As is the case with the popular 2-D Bézier-curve tool, the way you create points in Sketch determines the appearance of the line segment you create; if you place one point, then click to place a second, you get a straight line segment; clicking and dragging to place the second point creates a spline curve; option-dragging gives you an arc of a circle. The same controls apply to extrusion paths. Though less precise than true Bézier curves, in which a floating handle determines the curvature of a segment as it enters or leaves a point, Sketch’s spline curves represent a dramatic improvement over the polygons that pass for curves in most modeling programs.

**3-D Illustration and Rendering Program**

**Alias Sketch 1.0.2**

**PROS:** Draws in 3-D space; can use existing objects as a plane; easily draws organic curves and extrudes objects; good editing tools and lighting controls; comprehensive surface-mapping controls; high-quality renderer. **CONS:** Reshaping isoparms does not account for caps; no text tool; does not support imported compound paths; no RIB support; slow wire-frame display; counterintuitive navigation tools. **COMPANY:** Alias Research (416/362-9181). **REQUIRES:** Any Mac II with 68882 math coprocessor; 8MB of RAM; System 6.0.5; 32-bit QuickDraw; hard drive. Recommended: Color monitor. **LIST PRICE:** $995.

![Image](https://via.placeholder.com/150)

**P a i n t e r 1.2 ' s new features are watercolor brushes (upper right), and a paint bucket tool that you control using options in the Fill Palette. The image on the left was drawn entirely with the mouse.**

**Painter isn’t perfect. The Undo command isn’t as sensitive as it should be. For example, you can’t undo a change made to the boundary of a selection or of a frisket. I also met with a bug that deletes the contents of a previously selected area when you choose the Undo command. But these minor complaints aside, Painter 1.2 provides the best painting tools of any Mac application. Combined with Photoshop or ColorStudio, Painter easily satisfies the needs of the electronic artist.**

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**DEKE MCCLELLAND**

**MACWORLD August 1992 155**
guide to total rendering time, since Sketch offers no estimate; you can see how much of the image is rendered, figure out how much time has passed, and guess how much time is left. As with other 3-D packages, if you don’t like the way an image is being rendered, you can cancel the operation. Under System 7, you can render in the background (with significant slowdown of foreground activities).

Navigating with Turtles

SKETCH’S BIGGEST DRAWBACKS ARE quirky navigation and sluggish performance. Working in three-dimensional space on a two-dimensional display is necessarily complicated. But Sketch doesn’t help the user any with its omission of an autoscrolling feature—it doesn’t even have scroll bars. Inexperlicly, you can scale the window only proportionally, so if you use a full-page monitor, half of your work space goes wasted. I struggled with adapting to the Z’PR (pronounced like zipper) tool, which lets you zoom, pan, and roll an image inside the window. Once I got it, I found the Z’PR useful, but surely a standard Macintosh zoom tool would help users get over the learning curve a little more quickly. In terms of speed, Sketch needs some work. You can increase the display speed by lowering the accuracy of curves in the wire-frame mode, and you can even temporarily hide objects that you don’t need to see for the moment. But as your work becomes more complicated, the lethargic speed of the modeler becomes a nuisance.

Still, I am very impressed with Alias Sketch. Despite its first-version failings, its unique collection of tools makes it the only program on the market that lets you sit down and play with 3-D modeling. I’ve yet to see another modeler that’s this easy to pick up. In less than an hour, you can create an object like a bottle or a piece of furniture and start rendering it on screen. Sketch trounces other modelers (with the possible exception of Ray Dream Designer, from Ray Dream) at creating naturalistic curves and fluid images. Sketch may prove to be the turning point that finally brings many two-dimensional artists into the more versatile world of three-dimensional space.—DEKE MCCLELLAND

Vicom Terminal Emulator

PROS: Supports multiple simultaneous sessions; includes parser tool, for reformattin g data, and data-scope developer tool. CONS: Spartan emulation environment; lacks many U.S. modem configurations; complicated development tools. COMPANY: AM Computer Technology (The Fisher Group, distributor; 714/597-1123). REQUIREMENTS: Mac Plus, 2MB of RAM; System 6.0. LIST PRICE: Connect320 $195; Connect340 $245; MultiTerm320 $295; Pro (includes Connect320 ten-pack) $3500.

THE BANE OF CORPORATE INFORMATION users is the need for a deskful of terminals to communicate with a company’s mainframe computers. Terminal emulators alleviate hardware clutter, but end users still face the intimidating mainframe interface. Vicom’s terminal emulators aim to solve the interface problem with programmable front ends.

The entry-level Connect320 package provides basic emulation for TTY, ANSI, VT100-320, DG2111, Adds VP50, and CEPT1/2 terminals. An optional upgrade, to Connect340, adds emulation for VT241 and VT340 with color ReGIS graphics. The basic package also supports Xmodem, Ymodem, Zmodem, and Kermit file-transfer protocols, and can execute (but not create) macros, scripts, and user-interface front ends. With MultiTerm320 you get the ability to build macros (scripts) and custom user interfaces. High-end Vicom Pro adds VIP-7800 emulation and the SuperScript language for sophisticated script control down to the protocol level.

Unique to the Vicom line is the ability to run multiple sessions simultaneously over separate connections, via the Mac’s built-in serial ports and over a network using Apple’s Communication Toolbox. This is handy in corporations, where multiple connections to one or more host systems are common.

As terminal emulators go, Vicom is Spartan. A vertical icon bar provides a one-step connect button, access to configuration dialog boxes, and miscellaneous functions. A horizontal button bar lets you control common terminal functions such as character echo, Xon/Xoff, session recording, and text buffering. The user can neither customize the icons and buttons nor create custom macros or scripts. Vicom’s British heritage shows in its preconfigured modem set: many popular U.S. devices such as those from Telebit, Practical Peripherals, and Zoom Telephonics are missing. Worse, you can’t define your own modem configurations, if Vicom doesn’t have your configuration and it deviates much from Hayes standards, you’re out of luck. The only relief from Vicom’s bare-bones emulation environment is its built-in parser tool, which lets you slice downloaded text files into rows and columns for extraction—very handy for ad hoc data capture. However, the lack of user scripting limits the end user’s ability to automate this feature.

Midrange MultiTerm320 comes with a macro facility, provides basic scripting, and has an interface editor that lets you modify the icon bar and add buttons and menus. The macro language lacks a key feature: automatic script writing. Virtually every other Mac communications program lets you generate scripts by example; you perform whatever procedure you wish to automate (such as sign-on), and the program builds a script to replicate the procedure. With MultiTerm320 you must enter script commands manually, a tedious and error-prone process. Vicom stores macros in text files whose syntax must be checked separately, whereas other Mac products provide interactive script entry and error checking.

Macros run directly via the Macro command, or via a custom button or menu item created with the interface editor. The menu editor also lets you customize menu bars and menu items, but it doesn’t support hierarchical menus.

Vicom Pro adds text boxes and scrolling lists to the interface editor, along with a far more comprehensive (and complex) scripting language called SuperScript. I did not receive the SuperScript manual for evaluation, but the company sent me examples showing that SuperScript can implement such low-level facilities as file-transfer protocols and data translators. A built-in data-scop e utility lets you observe low-level data traffic in both ASCII and hexadecimal, which is nice for debugging. However, the complicated SuperScript language and Pro’s hefty entry price make it practical only for preparing canned functions for use by large numbers of users.

If you’re in a large corporate MIS department with programmers to spare, or if you need device emulation and multi-session capability, the Vicom family might be useful. But for many environments, products such as MicroPhone are cheaper and easier to use.—MEL BECKMAN

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Circle 235 on reader service card
AFTER MORE THAN EIGHT YEARS, every Mac still ships with two serial ports. In 1984 this seemed like a luxury; in 1992, it's a limitation. Modern Mac power users wanting to connect modems, label printers, bar-code readers, and other serial devices soon find themselves wanting just one more serial port.

Two years ago Global Village came out with the TelePort, a 2400/4800-bps data/send-fax modem connected to the Mac's ADB port, freeing one serial port for other uses. Global Village's innovative successor, the TelePort/FullFax, adds 9600-bps fax send-and-receive capability, and significantly upgrads fax software.

You simply plug the tiny, lightweight modem's cable into the ADB port (the cable has a built-in Y-adapter so you don't lose an ADB port in the process) and plug a modular phone jack into one of the modem's two phone jacks. You can plug a telephone into the remaining jack. New features include a built-in speaker and a voice/data switch that lets you automatically toggle a single phone line between voice and fax operation.

The data portion of the TelePort/FullFax is identical to its predecessor. There are no external switches or status lights on the modem; instead a pull-down menu and status indicators in the Mac's menu bar simulate them.

The software includes a Control Panel device (control panel for System 7 users) that lets you connect either Mac serial port to the modem by clicking on the appropriate connection, and a built-in F-key that acts as a software A-B switch. This arrangement works well—power users find the F-key handy, while casual users can stick with the intuitive ckey. No manual switching is necessary when using the fax send or receive features.

The fax software contains major enhancements. You still send a fax by holding down the option key and printing from within an application, but the fax address book is much improved, supporting multiple address files, address groups for fax broadcasts, delayed transmission, and import/export data exchange with many popular stand-alone address-book data formats. You can now choose multiple destinations for ad hoc broadcasts.

Transmissions take place in the background, so you can continue working in other applications. A menu-bar display tracks progress page-by-page. An automatic error-recovery feature tries to retransmit the document a predetermined number of times if an error occurs. Unfortunately, there are no provisions for resending partial documents without reprinting the fax images from the originating application.

The TelePort/FullFax can automatically answer the phone and receive faxes, or receive faxes manually. In automatic mode, it can power up Macs that have a keyboard power switch to answer incoming calls. The TelePort/FullFax even automatically prints incoming faxes. Receiving and printing, like sending, occur in the background. However, receiving significantly slows response time in the foreground application, and compute-intensive foreground tasks sometimes cause fax reception to fail.

The built-in voice/fax switch works with a telephone or answering machine connected to the modem's second modular telephone jack. When you (or the answering machine) answer an incoming call, the TelePort/FullFax listens in. If it hears a fax machine's Guard Tone, the TelePort/FullFax disconnects the telephone or answering machine and enters fax-receive mode.

The FaxCenter application lets you reschedule, view, and print faxes, using folder icons to represent incoming and outgoing faxes. You schedule faxes for transmission by dragging them to a folder named Scheduled, while incoming faxes appear automatically in a Received folder. You can envelope (combine) faxes, or forward received faxes to another location. Unfortunately, the enveloping feature inconveniently strips off cover pages, with no provision to add a new cover page.

You click on a Clipboard icon to view the fax-activity log, which records every fax transmission and any errors that might occur. Similarly, you drag incoming or outgoing faxes to the fax software's trash can icon to delete them, although the lack of confirmation or retrievability makes this feature dangerous.

Overall, the TelePort/FullFax is solid and reliable. Its ADB connectivity fills a useful niche in the Mac marketplace, while the compact design and lack of external power requirements make the TelePort/FullFax useful even as a modem for PowerBooks.—MEL BECKMAN

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**IBM LaserPrinter 10A**

**PROS:** Outstanding 600-dpi output; multiple darkness settings; includes printer utilities for System 6 and 7; quiet operation. **CONS:** Large, awkward design; can't be used by PCs over a network; slow on large PostScript files. **COMPANY:** Lexmark International (800/356-5835). **REQUIRES:** Mac Plus; hard drive. **LIST PRICE:** $399.

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**TelePort/FullFax**

**PROS:** Frees modem port for other uses; MNP Class 5 compression; automatic power-up; voice/fax switch; fax send/receive; fax autoprint. **CONS:** Crunky fax enveloping; receiving faxes slows foreground operation; no partial resend. **COMPANY:** Global Village Communication (415/329-0700). **REQUIRES:** Any Mac with ADB port. **LIST PRICE:** $295.

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The TBM LaserPrinter LOA is remarkably quiet. After revving up briefly at start-up, the printer idles with a barely discernible hum. A power-saver feature lets the printer snooze in near-silence when not in use.

Unfortunately, the LOA has a few awkward design features. Paper trays, exit bins, and feed guides protrude from both ends of the unit, stretching its total length to a space-robbing 30 inches. Part of the problem is the front exit tray, which adds 8 inches to the printer’s length and has a holding capacity of just 20 pages. (Fortunately, it’s removable.) Likewise, the printer interface box juts out 3 inches from the back and is flimsy, making it highly susceptible to bumps and jolts.

The LOA has an outstanding eight-button control panel. Status messages appear on the clearest, brightest LCD readout I’ve ever seen, and the menu structure is logical. For manual feeding, there’s a smartly designed adjustable paper guide that allows you to keep manually fed sheets properly aligned. The top exit bin has a 250-sheet capacity and a sensor that automatically causes printing to pause when the bin becomes full.

The manual is completely Mac-oriented, with just a few odd deviations (menus, for example, are called pull-downs). Printer utilities for System 6 and 7 come with the printer and include a convenient desk accessory that lets you adjust print resolution, activate or disable PQET, and select the paper source (when auxiliary trays are installed) for print jobs.

Replacement print cartridges for the LOA cost $199 and yield about 10,000 pages. Lexmark also offers a high-yield cartridge with a life of 15,000 pages for $259. Other accessories include a 500-sheet second paper tray ($49), a 75-envelope feeder ($79), and a heavy-duty label/card stock tray ($69).

Some popular page printer features are lacking here: there is no SCSI port option for adding a hard drive to the printer; and, as mentioned, PC emulations are not available for the LOA, making it unsuitable for networks that include both PCs and Macs. But if you have a Mac-only office, and have less than $4000 to spend for 600-dpi resolution, the LaserPrinter 10A is the obvious pick.—JOSEPH SCHORR

PRIORITY TO THE INTRODUCTION OF System 7, networked users had to choose between DataClub and Sitka’s TOPS if they wanted to use a distributed file-sharing system. Even with the introduction of System 7’s File Sharing option, DataClub still stands as the only fully distributed file server, making file sharing as transparent as possible to the user.

DataClub is available in two configurations: DataClub Classic and DataClub Elite. DataClub Classic’s main feature, originally found in DataClub 1.0, is background file sharing. DataClub Classic supports System 6.0.x and System 7.0.x.

DataClub Elite’s gateway feature allows non-DataClub users to access a DataClub user’s Mac (originally available in DataClub 1.0) and now supports a dedicated file server, which makes DataClub a direct competitor to Apple’s own AppleShare file server.

Since DataClub is compatible with the AppleTalk Filing Protocol (AFP), any DataClub folder can have the same read, write, and delete privileges that an AppleShare folder would have. To find out where a folder is stored, you use the Mac’s Get Info command. Should you want to move the file, you select a new location from the Get Info window’s pop-up menu of available drives. DataClub then transfers the folder and its contents to the selected hard drive.

Although I didn’t run into any performance problems using DataClub Classic, there are occasions when having many files on a DataClub drive will slow down your system. Keeping some files on your own hard drive can improve performance. Every time you create a folder using DataClub it can be saved anywhere on the DataClub server. If you regularly keep files on your drive, a DataClub preference allows you to create new folders on your Mac. If you jealously guard your hard drive space, but still want to share files, you can instruct DataClub not to allow other users to create folders on your hard drive. You can also have your DataClub administrator relocate folders for you using the DataClub Admin application. Since the DataClub Admin application displays the relative use (load statistics) of each hard drive that’s a part of a DataClub server, the administrator can relocate folders to better distribute usage.

DataClub Elite

DATACLUB ELITE, A NEW ADDITION TO the DataClub line, is designed to be a replacement for Apple’s AppleShare server software.

One advantage of DataClub Elite is its ability to make multiple dedicated servers appear to the user as a single server. Even if you have a number of servers, each with multiple hard drives, the user sees only one server, a feature that simplifies access to the files stored on the different servers. Also, the DataClub Admin application for DataClub Elite can be used on any networked Mac, not just on the server, making it easier to manage multiple servers.

So if you want an easy way to store and exchange files, I recommend DataClub Classic—it makes networkwide file sharing a cinch. On the other hand, if you need the added security (for example, being able to physically lock up the server Mac) and reliability of a dedicated server (for multiple servers), take a look at DataClub Elite. Elite performs as well as Apple’s AppleShare software and offers features that even AppleShare doesn’t include, such as making multiple servers look like one.—DAVE KOSIUR
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**PowerPlay 1.0**

**PROS:** Multilevel data hierarchy is easy to navigate; graphs are easily labeled and colored. **CONS:** Limited range of graph types and arithmetic; no analysis tools; no free technical support. **COMPANY:** Broderbund Software (415/382-6600). **REQUIRES:** Mac II; hard drive; System 6.0.4. **LIST PRICE:** $695; technical support $105 per year.

It can be frustrating to be a middle manager in a large company. The Mac on the desk provides millions of CPU cycles every second, ready to serve you, yet your firm's operating data remains tantalizingly just out of reach. Even if you're networked to the mainframe where the data resides, there's too much of it; plus it's hard to access, organize, and display.

PowerPlay is one of several recent products to address this problem. It offers small, manageable views of data and graphs and tabulates the views in several colorful ways. The program reads data from text files, which you must construct in very specific ways, since the structure controls access to the data. Usually these files are imported from large remote databases in the necessary format. PowerPlay is designed to be one component of an overall approach to business information systems that include DOS and mainframe systems, yet the program can be useful by itself.

The data in PowerPlay is organized in a hierarchy in which each numerical value is labeled by several pyramiding categories. Say a single figure represents the sales results of one person, selling one color of one shoe style for March 1992. By climbing up the salesperson pyramid, you can display ever larger chunks—the sales office, the region. Navigate the merchandise pyramid, and you can display all colors of one shoe, then all shoes. The time pyramid lets you view the month, the quarter, the year, and so on. PowerPlay lets you focus on—or in the program's parlance, "drill down"—different depths in many categories at once. Graphs and cross-tabulations permit you to compare items at any level of detail, such as relative sales of shoes in five different colors in each of three regions. This structure has drawbacks, since levels must be strictly nested. Do you show shoes of all colors for each size, or all sizes for each color? You can't have it both ways in the same database, as you could in a non-nested structure.

Pop-up menus allow you to easily navigate the hierarchy. Once you've drilled down as far as you want, you choose your display method. PowerPlay supports three-way cross-tabs (rows, columns, and layers) and bar, pie, and line graphs. Legends automatically appear in a separate window. You can readily swap variables among rows, columns, and layers, and do the same on graphs by changing how you cluster or stack bars. When exporting displays via the Clipboard, PowerPlay adds a separate legend to indicate the level to which you have drilled down in each of the category pyramids.

PowerPlay's graphing ability is limited. The program supports three dimensions for categories, but it cannot display three dimensions; so, to chart sales by region, color, and size, you get several small graphs comparing color to size, one for each region. True x-y plots aren't possible. PowerPlay also lacks powerful tools for understanding data, such as histograms and boxplots. It has no facilities for data analysis, not even a logarithm for scaling plots. The arithmetic mean is the only summary provided.

PowerPlay's manuals and help stacks are generally well written and clear. Telephone help is available only by paid subscription.

Overall, this is a good program for a very limited range of tasks. For the price, I would rather buy Muse from Ocean Research, which does a comparable job of organizing and graphing data but also has 3-D displays, manages eight dimensions rather than three, and manages the database as well.—PHILIP STEIN

**Just Grandma and Me**

**PROS:** Fun for all ages; motivates kids to read. **CONS:** Hefty hardware requirements; may create family competition for computer time. **COMPANY:** Broderbund Software (415/382-4400). **REQUIRES:** Mac II (also runs on LC); CD-ROM drive; 4MB of RAM; System 6.0.7. **LIST PRICE:** $49.95.

Whether you're a parent or a child, you've undoubtedly been touched by Mercer Mayer, the award-winning author of hundreds of children's books. One of his best stories, Just Grandma and Me, has just been released as the premier title of Broderbund's Living Books series. Just Grandma and Me isn't the first interactive storybook. The Discis Books series has been available almost since the first Macintosh CD ROM drive shipped. With the Discis CDs, young readers can read illustrated stories on screen, clicking on pictures and unfamiliar words for pronunciations or definitions, or simply listen while the computer reads the stories aloud.

From Grandma's opening menu screen, it's clear that Broderbund's first Living Book is far more lively than any of the Discis Books. An animated Little Critter explains the main options out loud while pointing to two buttons. Then he dances to a spirited Latin tune until you make your decision.

If you click on Read to Me, each page displays in turn, highlighting the text as the critter-child's voice reads it. But the pictures don't just sit there; animation, dialog, and sound effects enhance the story.

If you choose Let Me Play, the story pauses after each page, so you explore. Nearly every object responds to a mouse click in some unexpected way. The mailbox opens, water pours out, and a hufflif frogs away. A beach umbrella launches like a rocket and lands in the ocean. A starfish stands up, pulls out a top hat and cane, and does a soft shoe.

The graphics are charming, the animated sequences hilarious, the sounds lifelike, the spoken words clear, and the totality is absolutely captivating. Even the older kids on my software testing team explored every nook and cranny of all 12 pages. Parenting7parents invariably got suck'in, too.

Everybody loved this program, but I was especially taken by Gabriel, a Peruvian-born two-year-old who was crying softly in his mother's arms when he noticed the colorful pictures on the screen. When the story started and the pictures came to life, Gabriel was hooked. Before long he was waving the mouse around, clicking on pictures and words, watching and listening to the results with every ounce of his attention. I wish Gabriel could have stayed longer so that I could have seen his reaction when the computer read the story in his native Spanish (the program also includes a Japanese narration). I hope he'll have lots of opportunities to play with this and other Living Books. Multilingual talking storybooks just might help him to find the courage to talk more.

But that's just hopeful speculation. For now I can only be sure that this first Living Book is a big hit with Gabriel, Alex, Anna Marie, and all the rest. The kids and I are delighted that more are on the way.—GEORGE BEEMAN AND THE SHOOBEDOO-BOP SOFTWARE TESTING TEAM
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Low-End Page-Layout Software

**MacQuill 1.0**

**PROS:** Inexpensive; easy to use. **CONS:** Lacks several common features such as word count and k kerning; no import/export facility; weak documentation; occasionally buggy. **COMPANY:** Nest Software (408/441-1944). **REQUIRES:** Mac Plus; System 6.0.2. Recommended: Hard drive. **LIST PRICE:** $149.

MACQUILL BY NEST SOFTWARE IS an integrated application combining word processing and page layout under one menu. Like most integrated applications, which attempt to merge the key virtues of disparate programs, MacQuill comes up a little short when you compare its separate parts to their stand-alone counterparts.

As a page-layout program for serious publishing, MacQuill is rendered useless by the absence of basic features like kerning and the ability to import text files. As for word processing, absent are a few regulars like curled quotation marks and 168-key; if your daily composition involves more than simple correspondence, you’re out of luck.

But if you are looking for a simple page-layout program at a very low cost, then MacQuill is for you. Case in point: using MacQuill, I was able to create a newsletter in less than three hours, and the final output looked quite fine.

You work with MacQuill in two modes: word processing or page layout. Let’s say you’re creating a newsletter. Using the frame tool, you draw and place frames, which act as placeholders for graphics and text. Rulers on the top and left side of your document help you keep things straight. (Perfectionists will appreciate the ability to enter measurements in inches, centimeters, or points for precise frame placements.)

The Frame Link tool lets you link parts of a story into one. Frames can be linked so that text flows from one column to another on the same page, and across multiple pages (here’s where MacQuill’s two-page view comes in handy). For example, you can begin a two-column feature story on page one and finish it on the back page, as newspapers do. Frame-to-frame links are depicted by lines and arrows, even across pages, which makes tracking several stories easier to manage.

Once frames are linked, you switch to word processor mode to place your text and graphics. MacQuill lets you type directly inside a frame’s dotted border, or you can paste in text copied from another document via the Clipboard. However—and this is a big however—there’s no file-import function.

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Utility Package

**ALSoft Power Utilities 1.0.1**

**PROS:** Economical bundle of Utilities II and MasterJuggler. **CONS:** Some utilities lack depth. **COMPANY:** ALSoft (713/353-4090). **REQUIRES:** Mac Plus (Mac II for ScreenEclipse); System 6.0.4 (7.0 for MenuExtend). **LIST PRICE:** $129.

TO CREATE ALSOFT POWER UTILITIES, ALSoft first bundled its two most popular programs (unchanged from their stand-alone versions)—the disk optimizer DiskExpress II and MasterJuggler, a font, DA, sound, and application manager. Then ALSoft added five more utilities to round out the deal: MenuExtend, MultiDisk, DiskCheck, ScreenEclipse, and DiskFlash. Surprisingly, ALSoft Power Utilities doesn’t overlap much with the other two most popular utility packages, Norton Utilities for Macintosh ($149 from Symantec) and Now Utilities ($129 from Now Software).

MasterJuggler has enough features to keep the most die-hard font and DA habitué happy. It works under System 6 and System 7 and enables you to access fonts, sounds, and F-keys without installing them in the System file. It also lets you store and use PostScript screen and printer fonts in folders other than the System 7 Extensions folder. ALSoft’s Font/DA utility combines the different PostScript screen fonts into one menu choice, so for example, you can access B Garamond Bold simply by choosing Garamond from the Font menu and bolding it from the Style menu. MasterJuggler also lets you have as many as 120 resource files open, including those on networked file servers. The Font/Show feature previews fonts in a variety of sizes and styles. MasterJuggler also has an Application List from which you can launch and switch between applications and documents. You can assign sounds to different Mac events, such as ejecting disks, shutdown, and restart.

When there’s not enough contiguous free space on a hard drive to handle a whole file, the hard drive controller writes pieces of the file wherever they will best fit. These fragmented files can take longer to read into memory the next time you use them, slowing performance. DiskExpress II defragments files and places the most-used files at the start of the disk. DiskExpress works in the background, and you can specify when automatic optimization will be active.

The other items in the package, though somewhat useful, seem to be mainly filler. Each does one or two things well, but competing products do the same tasks, and better. For example, MenuExtend adds hierarchical menus for folders installed in the System 7 Apple menu; MicroQuill Publishing’s HAM does the same and lets you reorder the Apple menu items. NowMenus, part of Now Software’s Now Utilities, adds a hierarchical menu to the Chooser and enables menus to drop without a mouse-click. DiskCheck performs a full read-and-write verify of your hard drive and checks for directory damage, but to fix any problems it finds, you need Apple’s Disk First Aid, or the Norton Disk Doctor.

ScreenEclipse is a minimal screen saver. It dims the screen by the amount and at a time you specify, but it doesn’t work on the Mac Plus, SE, SE/30, or PowerBooks, because they don’t support screen dimming. Some freeware screen savers provide more functions than ScreenEclipse. Last, DiskFlash puts a flashing icon in the menu bar to denote drive activity. There are different settings for read and write activity. This is marginally useful on Macs lacking visible hard-drive lights, but it’s mostly a toy.

If you need a disk optimizer and resource manager, this package makes sense, as you’ll save money over buying MasterJuggler and DiskExpress II separately ($49 and $89.95 list price, respectively). But unless ALSoft beefs up the rest of the package, that’s the only good reason to buy the ALSoft Power Utilities. —TOM NEGRINO
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PROMENADE DECK

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The WideWriter 360 is fast and quiet. Plus its 360 x 360 dpi resolution produces crisp, laser-quality lines, text and graphics. Of course, this large format printer is also big on features, including:

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HP ScanJet IIP

PROS: Professional-looking scans; compact design; excellent value. CONS: Filmy hinge on cover; inadequate documentation; technical support hard to reach. COMPANY: Hewlett-Packard (208/323-2551). REQUIRES: Mac Plus; 2MB of RAM; System 6.0.8; hard drive. LIST PRICE: $1095.

Hewlett-Packard's ScanJet IIP sets a new standard for affordable desktop gray-scale scanners. From its striking compact design to the great job it does with line art and black-and-white photos, the ScanJet IIP is an exceptional product.

The scanner is just 16 inches long by 11 inches wide by 3.25 inches tall, but it scans images up to 8.5 by 11.7 inches. The back panel holds a SCSI ID dial, a power cord plug, and both a 25-pin and a 50-pin SCSI connector. IIP also supplies a 25-pin-to-50-pin SCSI cable and a 50-pin SCSI terminator. Unlike HP's old ScanJet Plus, which had an external power supply and a SCSI interface box and had to be the last SCSI device in a chain, the new scanner is a single unit that can be placed anywhere on the SCSI chain. However, the scanner's power must be on for the SCSI chain to behave properly.

Marketed as a 300-dpi device, the ScanJet IIP uses interpolation to generate scans up to 600 dpi, making it possible to capture line art for high-resolution output. The documentation neglects to mention that to scan at 600 dpi, you simply type 600 in the resolution settings in the DeskScan II software's Print Path window.) Line drawings scanned at 600 dpi on both the ScanJet IIP and Microtek's 600/2ZS and then output at 2540 dpi looked virtually identical. Enlarged to 300 percent in QuarkXPress, the Microtek scans were marginally smoother. (The 600/2ZS also uses a 300-dpi scan head plus interpolation, but it is sold as a 600-dpi scanner [$1995].) Photographs scan best without interpolation, but scanning photos at 300 dpi produces fine results.

The excellent gray scales are in part the result of HP's DeskScan II software and its ability to calibrate the scanner to a program and output device. Calibration is easy; deciphering the instructions is not. You can create and save custom settings that allow you to select calibration-and-resolution combinations in the main DeskScan window. DeskScan can automatically adjust contrast and brightness; select the most important part of an image (a face, for instance), and DeskScan balances the whole image accordingly. For truly professional-looking gray scales, I'd still want Photoshop for its image-manipulation features. The ScanJet IIP also works with LightSource Computer Image's Ofoto software (select the ScanJet Plus driver).

The ScanJet IIP has no Photoshop plug-in. Instead, it supports Twain, a new protocol for scanning from within applications. Zedoor's DeskPaint is bundled with the scanner and uses Twain. For improved OCR (optical character recognition) performance, HP's AccuPage technology is built into the ScanJet IIP; HP offers an optional document feeder for rapid OCR scanning.

The ScanJet IIP's printed documentation is good, but minimal. Most information resides in 700K of online help that is muddled and difficult to understand. Also, the scanner's cover sports a plastic hinge to allow books to sit on the glass; it seems flimsy and destined to break. Otherwise, the ScanJet IIP is an elegant piece of technology. It delivers excellent results for a street price of around $750.—Bill Justin

Nisus Compact 3.3


None, I Shrunk the Word Processor! Nisus Compact, a stripped-down version of Nisus 3.0, bills itself as "perfect for the PowerBook," presumably because the PowerBook is compact, and thus needs a compact word processor. And it's compact in price and in disk space (363K versus 845K for the big-brother version). Unfortunately, the feature list is very, very compact, excluding many useful components. Missing are the dictionary and thesaurus, hyphenation, graphics editing, menu keys, mail merge, cross-references, table of contents, indexing, word count, macros, online help, and program editing. Nisus Compact retains only a small portion of its progenitor's eclectic feature set: multilevel undo, pattern matching, attribute search and replace, Clipboard editing, and column selection. A handful of excised features are available as extra-cost add-on modules: dictionary and thesaurus, mail merge, and menu keys. After you register your purchase, Nisus also sends balloon help.

Nisus Compact's 200-page manual seems to be carved out of the original Nisus user's guide. Many features, such as searches using wild cards and replacing attributes, are inadequately or confusingly described. The index is missing entries for many basic functions (for example, find and replace).

Nisus Compact has a few features to appeal to PowerBook users. A thick I-beam cursor eliminates the problem of losing the cursor on the PowerBook's slow-reacting LCD screen, and a battery-charge-level indicator lets you monitor the PowerBook's battery level. A clock displays the time, and a sleep menu command lets you put the PowerBook to sleep without switching to the Finder. But all of these features are available as shareware utilities. This Nisus also supports Apple's XTND file-translation system, so you can convert just about any other word processor format. A File Clerk feature, available only under System 7, is supposed to augment the Finder for managing documents. It lets you organize Mac files into user-defined categories, view the categories as sorted lists within predefined constraints, and open documents directly from the lists. However, moving or duplicating files using the Finder confuses the File Clerk; yet you cannot move or duplicate files from within Nisus (other than via the Save As command). File Clerk is of limited utility if you run full-size Nisus on your base-station Mac.

Nisus 3.0 can read and process files created by Nisus Compact, but Nisus Compact doesn't support all of Nisus 3.0's features. You can inadvertently lose cross-references, index markings, and other Nisus 3.0 text attributes if you aren't careful.

In memory usage, Nisus Compact is not compact. It needs at least 900K-more than WriteNow, MacWrite II, WordPerfect, and curiously, even Nisus 3.0 need. But 900K is a minimum; tests with a 100K file produced "out of memory" alerts after only a few minutes of use. Simply editing a document uses up memory because of the multilevel undo. You can reduce the undo depth, but plan to use at least 1000K when editing average-size (100K to 300K) documents.

PowerBook users can get more features at about the same (or lower) price as Nisus Compact with MacWrite II and WriteNow 2.2, neither of which have the memory quirks of Nisus Compact. The only real advantage of Nisus Compact to existing Nisus users-reduced disk space—can be minimized by larger PowerBook drives and disk-compression utilities. An unfortunate case of too little too early.—Mel Beckman
**SupraFax Modem V.32bis**

**PROS:** Inexpensive, fast, informative.
**CONS:** Minor issues with compatibility.

**COMPANY:** Supra Corporation (503/967-2400).

**REQUIRES:** Mac Plus; hard drive; System 6.0.2.

**LIST PRICE:** $479.95

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**Fax Modem**

SuRFAX Modem V.32bis

**PROS:** Inexpensive; fast; informative.
**CONS:** Minor issues with compatibility.

**COMPANY:** Supra Corporation (503/967-2400).

**REQUIRES:** Mac Plus; hard drive; System 6.0.2.

**LIST PRICE:** $479.95
PERSONAL INFORMATION MANAGERS (PIMs) help you keep track of names and addresses. Although After Hours Software's TouchBase is one of the best, it still has room for improvement.

TouchBase offers two ways to view data. The List view lets you scroll through all the names in a database. Double-clicking on a name in the List view switches you to the Detail view for that person. All fields are displayed in the Detail view. The Detail view also includes the Record Summary, which lists the person's name, address, and telephone numbers in a Rolodex-like area. Unfortunately, you can display only one view at a time.

The onerous part of any contact manager is data entry. TouchBase automatically formats initial caps or all caps when you enter data in lowercase letters. TouchBase also automatically formats telephone numbers with or without parentheses or with a slash after the area code. Feature lacking in both Portfolios Systems' Dynodex and Power Up Software's Address Book Plus. TouchBase also provides customizable fields that can be used for electronic-mail addresses, or keywords for searching your database. In short, entering data is quick and easy.

If you don't want to use the templates, building a presentation is still a straightforward process. First, you create individual scenes of text and graphic objects (called actors), then you add path-based movement to selected objects and text blocks, and then you link the individual screens together.

Editing animations in Magic is also easy. The Cue palette gives you time-based control and synchronization of each scene's movement, transitions, and sound in a single chart that lets you coordinate complex actions with the mouse. Magic's editing features are outstanding.

It's easy to add interactivity to a Magic presentation. Any actor can be turned into a button that when clicked beeps, highlights, or activates another scene. You can reorder thumbnails (small representations of your scenes) of all scenes to change the sequence of your presentation and still maintain your interactive links.

Magic includes QuickPIcs, an application that compresses a PIC file or a sequence of PICT files into a faster and smoother-running file that plays directly from a hard drive. Macromedia (formerly Macromind ParaComp) also includes a runtime version of Magic and allows distribution of finished presentations.

Magic is easy to use, but that doesn't mean you'll turn out beautiful, informative presentations. The program comes with four disks of clip media (clip art, animations, sounds), some good template sets, and an adequate tutorial.

Magic doesn't offer the features (or the learning curve) of programs like Director or Authorware Professional. For example, you can't create objects that change shape or rotate as they move. Magic's linking capabilities don't match Director's, and you can't access laser-disc players without using a program like MediaMaker.

Magic can't do everything, but what it can do it does well. Many of the multimedia presentations I've seen could have been created in Magic. So, if you want a painless path to creating multimedia, take a good look at Macromedia's Magic.—Jim Feeley

Making Magic Magic uses the same tools to create graphics and animation elements to create components of your presentation. The Cue palette gives control over action in each scene.
Strategy Game

Spaceward Ho 2.0.1

**PROS:** Fine graphics; easy to learn; humorous and absorbing.
**CONS:** Occasionally responds oddly to your requests.

**COMPANY:** Delta Tao Software (408/930-9336).
**REQUIRES:** Mac Plus; hard drive; System 6.0.5. **LIST PRICE:** $59.

N O DOUBT ABOUT IT, SPACE IS THE final frontier. But Spaceward Ho doesn’t seek out new civilizations or adhere to prime directives. It’s just like real life—all capitalism and imperialism.

During setup, you specify the composition of your galaxy, the number of opponents, and their levels of intelligence: dumb, average, or smart. When the opponent is dumb, even a novice can win. If the opponent is average, you have to be extremely aggressive or it’ll be a long, drawn-out game. If the opponent is smart, you’ve had it. You can also play one or more real human beings, taking turns on a single computer or playing over a network.

The play starts with you governing your own planet, which comes with an active population mining your world’s resources and generating a handsome global income. As your colonists work away, your job is to locate resources, distribute funds, and govern the militia. As you investigate neighboring planets, your scouts report back the habitability of a planet and the abundance of its resources. You can colonize the planet with the simple intent of strip-mining it dry, or you can establish a productive economy, a remote refining base, and then strip-mine it dry. When first colonizing a new planet, you have to spend money on mining and terraforming, which makes the planet more hospitable. For example, a planet can forever have a gravity of only half your home planet’s, but via terraforming, you can ensure a pleasant 72 degrees Fahrenheit all year round. Needless to say, the welfare of the colonists has nothing to do with charity or benevolence, but rather with generating cold, hard cash. A happy planet, you soon learn, is a profitable planet.

But lurking out there in the galaxy are one or more faceless enemies. In an attempt to defend yourself and eliminate your foes, you use most of your surplus income and every scrap of mined metal to build spacecraft. You should also invest some remaining income in new technology so that you can build stronger, more efficient ships. Unfortunately, if you stop funding mining, you run out of metal and can’t build any more ships. If you stop building ships, the enemy destroys your colony and cuts off your source of metal. A special problem shows up when you try to mine and build ships on the same planet. If you slightly underfund the planet as a whole, the program tells you that you have no money allocated for ship building. Delta Tao claims this oversight will be remedied in a future upgrade.

I spent less than 15 minutes skimming the documentation before playing the game. With a little experimentation, I even played moderately well. Then out of nowhere, after several hours of play, the computer surrendered. That’s it? My opponent is dead? What’s a general to do when the enemy gives up the fight? The answer is to start another game. And another. And another.

—DEKE MCCLELLAND

Interactive Fiction Game

Sherlock Holmes, Consulting Detective

**PROS:** Beautiful video scenes.
**CONS:** Slow play; not challenging.

**COMPANY:** Icom Simulations (708/552-4440).
**REQUIRES:** Mac LC, Mac II; 2MB of RAM; color monitor; CD ROM drive; System 6.0.7. **LIST PRICE:** $69.95.

SHERLOCK HOLMES, CONSULTING Detective, looks nifty and is a cool concept. Still, the true measure of a game is how much fun it is, and to be blunt, Sherlock Holmes isn’t much fun.

The basic premise is that you are competing with Sherlock Holmes to solve three different mysteries. You begin at the table of contents, where you choose the case you’d like to solve. After a brief introduction, you select the main scene icon. The main screen, where all action takes place, is surrounded by eight icons.

The table-of-contents icon and the judge icon are purely functional. The judge icon takes you to a judge who determines whether you have solved the mystery, by asking you a series of questions. (You don’t get to hear the judge’s questions until you have seen the appropriate clues; this forced me to play the first case for an extra half hour to find proof for an assumption I had already made.) Two icons are for list-keeping: the directory is a complete list of characters from all three cases, plus characters from Sir Arthur Conan Doyle books, and the notebook allows you to record a list of names from the directory for quick reference. The remaining icons provide clues.

The newspaper icon is a more readable version of the paper newspapers included with the game. The Holmes’s files and Baker Street Irregulars icons are also text clues (the Baker Street Irregulars report in by telegram). Unfortunately, the screen draw is slow, and only occasionally are the clues interesting enough and significant enough to be worth the wait for the image.

The game is really all about travel. Each time you click on the horse-and-carriage icon as well as a name from either the directory or the notebook, Holmes and Watson travel to the selected character. Occasionally no one is home, but if the character is relevant to the mystery, you watch Sherlock and Watson interrogate the witness.

Although the video can be choppy and pixelated, the scenes are beautifully done. They’re wonderfully staged, coherent, and well acted. But the interface can be frustrating. The video scenes have buttons like a VCR’s, including pause and stop. Unfortunately, rewind always takes you to the beginning of the scene, and a useful fast-forward is nonexistent. If you missed a name—easy to do with the actors’ Holmesian English accents—you have to start the scene over. And you can’t fast-forward slightly, so you have to sit through the whole scene all over again (you can at least stop the scene once you hear the missed dialogue).

Apart from choosing which icon to use and which character to research, most of the game is just sitting and watching. The scenes are interesting, but as a game, Sherlock Holmes lacks variety and challenge. It’s only slightly more interactive than TV, and the picture’s not as good. I solved the first two cases within three hours, and to tell the truth, I was too bored to solve the third. For $69.95, I would rather have gone to the movies ten times.

If you’re going to check it out anyway, at least take two words of advice: Be careful. The innocuous words CD ROM drive on Icom’s list of requirements are not exactly the whole truth. To run video, your CD ROM needs a seek time of 380 milliseconds or better; your data transmission speed must be 150K per second; and it might help if you have a data cache on your CD to smooth out the video. On older or slower CD ROM players, Sherlock Holmes might not play at all.

—WENDY SHARP
N o l o's L ivin g T rust 1 .0

PROS: Great value; can edit saved trusts; can preview saved trusts and return to editing mode; supports multiple fonts. CONS: Can't preview partially completed trust. COMPANY: NoLo Press (510/549-1976). REQUIRE: Mac Plus; System 6.0.1. LIST PRICE: $79.95

O L O S L I V I N G T R U S T I S A W E L -
come departure from other Macintosh products in the estate-planning genre, such as Jian's Living TrustBuilder and Legisoft's TrustMaker (see Reviews, May/June 1992). What differentiates Nolo's Living Trust from the competition is its ability to make the Mac facilitate, not hinder, the drafting of a trust document.

First, Living Trust offers both online program help and legal help at virtually every step of the drafting process. Second, you get a stand-alone application, not a collection of text clauses that you must assemble manually via a word processor. Third, you can review and edit clauses containing lists of property and beneficiaries once you have entered them. Fourth, you can preview the full text of a completed trust and then return to editing mode to make changes as necessary. And fifth, Living Trust lets you save a trust document as a text file but issues appropriate warnings about the legal implications of tinkering with that file.

The product is a carefully thought-out, well-designed Macintosh application. Each trust is saved to disk as a named document. Once a file has been created, Living Trust presents an overview of the seven-step trust-drafting process: specifying state, name of trustee, name of trustor, and so on. The program monitors your progress and prevents you from moving to step two until you have completed step one. When you complete all seven steps, you can preview the trust and then return to drafting mode to enter any corrections.

Dialog boxes provide useful tips throughout the drafting process— telling you not to start your property description with my, for example, and not to capitalize a given entry unless it’s a proper noun—virtually eliminating the need to go back and redraft clauses in the trust.

The program also supports a sophisticated level of branching. If a trust has multiple beneficiaries, some of whom are minors, you can specify a custodian for each minor without affecting the other beneficiaries. Implementing such a scheme is as easy as clicking on a few buttons and answering a few on-screen questions.

The ability to edit lists of information is one of the primary benefits of this product. You build a list of assets to be placed into a trust by using Add and Delete buttons in the Property List dialog box. If you create a list of ten items and then want to delete item number eight, simply jump back to that screen, click on item number eight, and press the delete key.

Nolo's Living Trust 1.0 comes with a comprehensive manual that provides technical information for setting up the software as well as legal information about the creation, modification, and termination of living trusts. The manual also contains sample trust documents, along with checklists for ensuring that your efforts will have legal effect once they have been printed and signed. Obviously the software cannot prevent a user from entering the wrong state or spelling a beneficiary's name incorrectly, but Living Trust does a noble job of guiding a person through the drafting process.

In short, this product makes drafting a trust with a computer the way it should be. You can concentrate on content and not worry about how all the sentences are hooked together. If you want to modify a beneficiary or delete property from the document, it’s simple to do that without creating an entirely new document from scratch. This is a polished product and a great value.—BILL DAVIES

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S cript-Writing Tool

StoryLine 1.02

PROS: Contains entire contents of Jack Truby's Story Structure class; includes four classic movie examples. CONS: Contains entire contents of Jack Truby's Story Structure class; lacks useful reports; poor documentation; large display preferred; hardware-key copy protection. COMPANY: Truby's Writers Studio (310/575-3050). REQUIRE: Mac Plus; 2MB of RAM (6MB with System 7); hard drive; System 6.0.5. LIST PRICE: $345.

G O O D P L O T T I N G I N A S C R E E N P L A Y
can make the difference between an audience that's on the edge of its seats and one that's vacating them. StoryLine professes to offer expert training in the craft of plot development. It promises to “lead you through the thicket of superficiality to what your story is really about.” For me, however, StoryLine only complicated my efforts to adapt my first novel for film.

StoryLine is HyperCard-based. Since most of its cards are large, StoryLine works best on a large display. It's hard to view even single cards on a small screen, and next to impossible to compare multiple cards. Cards in each of the primary stacks (called sections) contain blank text fields, in which you enter important character and story attributes, such as Hero's Basic Action and Power Structure. Some fields are somewhat obscure. One calls for “psychological and moral opposites of the fundamental qualities of the basic action,” that is, "those qualities in your hero that are the reverse of what your hero will experience in the basic action of the story.” I was taught that a character's qualities are not always revealed during the writing process; characters show their personalities through action and dialogue.

There's no clearly chronological process in StoryLine. There is a 7-step feature, but with over 20 sections to choose from, working with the program is frustrating and sometimes haphazard. Once you've filled in your characters' attributes and motives, world view, symbols, and other story elements, you can study your plot data with different views. For example, the Conflict view lets you compare your main character and main opponent side-by-side, so you can adjust their differences accordingly, for maximum opposition. However, StoryLine does not analyze your supplied data; it simply gives you a structure and leaves it to you to determine if the story will work on the big screen. Also, there are no useful reports; you're limited to printing out your cards.

In addition to providing an elaborate skeleton on which to construct your screenplay, StoryLine ships with sample screenplays for four movies—Star Wars, The Godfather, Vertigo, and The Verdict—each lovingly deconstructed from Action to Zoom shot. As you make your way through familiar characters, conflicts, motives, and scenes, you discover what each story is really about—according to StoryLine's author, screenwriter Jack Truby.

Although Truby clearly put a great deal of thought and experience into translating his eight-week screenwriting class into a Macintosh program, I cannot recommend StoryLine. Perhaps graduates of the class will find it a useful tool and a helpful refresher, and some users might benefit from the sample script analyses. However, the documentation is both jargony and skimpy, providing little guidance to the newcomer trying to navigate the complicated maze of stacks.—JOE HUTSKO
Have you ever wondered what your design would look like printed on a grocery bag? Okay, maybe not. But when you're working with a Phaser™ III color printer, your thoughts do tend to go a little wild.

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Pascal was originally developed as a teaching language, with features that mitigate in favor of clear code and against tricky programming. As it happens, many programmers take great pride in the tricks they can do in other languages, particularly C, and the 1980s produced many high-quality C compilers. Thus at present C is more popular than Pascal among professionals, although Pascal still dominates university courses.

Symantec has produced, in Think Pascal 4.0, a programming environment so good that its only serious competition is Symantec's own Think C 5.0. You can start learning the language with Symantec's training program Just Enough Pascal, using the new Instant Project feature to handle libraries and organization. Then you can step through the sample programs in the Think Pascal user's manual, or use Pascal texts specifically coordinated with Think Pascal (Macintosh Pascal Programming, by Dave Mark and Carwright Reed [Addison-Wesley, 1991] is just brilliant). You can even learn to master Mac Toolbox calls from Pascal with the $99 companion program Think Reference, a well-organized hypertext version of the contents of Inside Macintosh, volumes I-V (see "The Whole Shooting Match"). Finally, there's an argument to be made that object-oriented programming in Pascal, benefiting from the early evolution of Macintosh Object Pascal, is a natural transition from standard Pascal and is easier than the transition from C to C++. Think Pascal 4.0 is a remarkable accomplishment: a program good enough for professional programming that neophytes can also love.

Think Pascal 4.0 is very good indeed. Symantec claims a compilation speed of 60,000 lines per minute on a Ileci (virtually the same speed as Think C 5.0), and I measured speeds averaging 48,000 lpm on an assortment of files. Please note that just a few years ago programmers lived with just a fraction of this speed in MPW Pascal, and also had nothing resembling the efficiency of the Think Pascal 4.0 linker or the convenience of the Project Organizer. In practice, the compiler/linker speed in 4.0 permits you to recompile comfortably after every tiny code change, a powerful debugging trick. The Lightsbug debugger itself is faster in earlier versions, and instant syntax checking with the editor's Pretty Printer is a wonderful touch.

Think Pascal 4.0 supports System 7 and the standard programmer's set of Apple events, as well as extensions to allow creation of larger programs and programs using virtual memory. The already immense Think Class Library has been enhanced with not just the System 7 classes, but also new classes for pop-up menus, improved text handling, and multiwindow documents.

Think Pascal 4.0 is an outstanding value, with no weak points and dozens of strengths.—CHARLES SEITER

Zeus 0.91

Typically, only Beta products (those still in the testing phase) bear version numbers lower than 1.0. Delta Tao numbers its newest product 0.91 to show that although it's shipping, Zeus is a program in progress.

Zeus retains the look and feel of Delta Tao's Color MacCheese and adds a handful of unique features. The paintbrush tool, in addition to offering antialiasing and a variety of shapes and sizes, can be configured to paint exactly within an existing outline. For example, if you begin painting on a white area of the document and your brush comes in contact with a black line, the paint will not cross that line. Other features unique to Zeus are 24-bit masking and layering. Unfortunately, the manual sheds no light on how to use these functions. Worse yet, the layering feature is limited and cumbersome. To establish layering inside a Zeus document, you combine two existing images so that one shows through the white areas of another. To create more than two layers, you have to assign the background image its own background, and so on. As you might imagine, this enormously complicates the process of reordering and editing layers.

Zeus tries hard to match capabilities found in more expensive programs, sometimes successfully, other times not. Like Adobe Photoshop, Zeus exploits QuickTime's compression capabilities, allowing you to save PICT files at 10 to 20 percent of their normal size. Like Electronic Arts' Studio/32, Zeus lets you select and reshape the most recently drawn line or shape. Zeus also provides a text layer for printing high-resolution type. Unfortunately, Zeus doesn't handle object-oriented text nearly so well as Studio/32 does. First, Zeus provides no means for resizing a text block to compensate for column width. Second, though it handles TrueType fonts adequately, Zeus fails miserably when setting type in a PostScript font in combination with Adobe Type Manager 3.0. Like SuperMac's PixelPaint Professional, Zeus can create spot- or process-color separations, but you have to print each separation manually and the process ignores items on the text and background layers. Finally, Zeus provides a rudimentary animation function with which you can subdivide a painting into a series of sequential frames. But Zeus in no way automates the animation process, nor does it support any of the common animation file formats, hardly qualifying it as a rival to the monochrome paint and animation program Studio/1.

Despite the consistently self-lauding style of the documentation, Zeus lacks a number of features you expect from high-end paint programs. Its selection capabilities don't measure up to those found in Studio/32 or Photoshop. Zeus's filters are hardly worth mentioning (though version 1.0 will reputedly support Photoshop filters). Furthermore, Zeus lacks support for pressure-sensitive tablets and it provides insufficient balloon help. Worst of all are the bugs. Throughout my testing, for example, the program crashed periodically when set to 4MB of application RAM, a strange phenomenon considering that it supposedly works on 2MB machines. At times when Zeus encounters an error message and you access another program such as a word processor document, when you return to Zeus, the same error message appears. For now, Zeus is a program brimming with good ideas and poor implementation.—DEKE MCCLELLAND
**Digitizing Tablet**

**Acecat for Macintosh**

**PROS:** Low cost; lightweight. **CONS:** Hard to adjust aspect ratio; limited as a mouse replacement.

**COMPANY:** Acecad (408/655-1900).

**REQUIRES:** Any Mac with ADB port (not compatible with PowerBooks); System 6.0.5.

**LIST PRICE:** $149; plug-in power module $19.95.

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**Network Management Utility**

**Network SuperVisor 2.0.1**

**PROS:** Full featured; powerful data-collection capabilities; topology editor maps live network.

**CONS:** Some operations not intuitive; some features poorly implemented; no help function.

**COMPANY:** CSG Technologies (412/471-7170).

**REQUIRES:** Mac Plus; 2.5MB of RAM; System 6.0.4; hard drive. Recommended: Mac II or SE/30; 4MB of RAM; 12-inch monitor.

**LIST PRICE:** $495; 50 users $795; 75 users $995; unlimited users $1,295; SuperVisor Jr. $149.

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**Network Supervisor is a full-featured network-management application with a detailed approach akin to that of a Swiss Army Knife. The program consists of an application that goes on the network manager's computer and a cdev that you install on systems throughout the network from which you want to harvest data. Unfortunately, some of the program's features fall a little short in intuitiveness and usefulness.**

At the heart of Network SuperVisor is a 4th Dimension database that lets you scan all the machines on a network equipped with the SuperVisor cdev (control panel) and get information concerning cdevs and INITs (extensions), software, system versions, Numbus and SCSI devices, and the CPUs themselves. You can also maintain a record of each machine, including its serial number, purchase date, purchase price, and the user's name, department, and phone number. You can combine and manipulate this information in a variety of ways to produce graphs and custom reports. You can also export it to another database or spreadsheet for further analysis, or to a word processor.

What separates Network SuperVisor from other network-management applications is that it doesn't stop at data collection. An alert function tells you when a Mac goes offline, a topology editor enables you to create live maps of your network; and a standardization function scans the network for a standard set of programs, extensions, or devices (defined by the network manager) and sends an alert when a user removes or substitutes an item. Network SuperVisor has no facilities for remotely working on networked machines, but you can send messages, make screen shots, and send (but not receive) files.

In an operational sense Network SuperVisor performs very well, collecting data quickly and accurately. The database itself is well designed and versatile, providing a number of report templates. What bothered me was the amount of time I had to spend learning to use the application. Apart from the manual, there's no help—no balloons, nothing. The manual contains a tutorial that leads you through the various functions, but the underlying logic of the program isn't explained until later in the manual. The interface itself is not so intuitive that you can easily maneuver unaided. Also, some functions are awkward to implement. For example, to set a given device to alert you if it has a problem, you must manually enter the device name, type, and zone in a dialog box; you cannot simply choose from a list of devices currently online. If you make any mistakes in spelling or syntax, the connection will not be established. The alert function is also not available when you're browsing the database. It's not worth paying up 3MB of RAM just for a simple on-screen notification.

A much-reduced version of the application, Network SuperVisor Jr., also polls the network for hardware and software information and performs the standardization check, but it does not have the topology editor or alert function. At $149, it's a great value for a network of 30 machines or fewer. For larger networks, especially those that are just being set up and need to be inventoried, and where multiple zones and routers are involved, the full package can be beneficial in designing and managing the physical layout of your network.—**Matthew R. Clark**
Among the many personal organizer programs for the Mac, Active Memory distinguishes itself by providing strong network support. Active Memory lets you track your own projects and attach alarms to each; you can also use Active Memory as groupware, updating project information to and from other users' systems. You can assign each activity a type, date, the people involved, priority, and free-form comments of up to 4000 characters. This information appears in columns with fixed headings (Type, Date, To, #, Info), but within each heading, classifications are up to you. Types can be general, such as tasks to be done for each activity (call, send, meet, and so on), or specific, such as project titles. Active Memory has more pop-up menus than any other application I've seen—one for every column and each data cell (except the Info cells). This speeds data entry, but it can also be a hindrance, since you can bump into a pop-up by mistake when you simply want to edit the cell contents. For example, each Date cell has one pop-up to select a date and another to choose the type of notification or alarm. You can add frequently used dates, alarm types, and import/export formulas to the pop-up for those categories. To maintain consistency you must add each activity type to the Type pop-up menu before you can use it. There's no way to simply create a type as you work.

Active Memory has icons for eight common tasks: display pending deadlines, dial a number (if you have a Hayes-compatible modem), search for a text string, print the entire contents of the current file, documentation is similarly sloppy. Version 1.0 of Picture It is also buggy. When I used the Find command to locate le steak, Picture It gave me one of le steak's, and English words are defined (in English) while the French are not—glaring omission.

Picture It has four modes: Navigate, Flash, Type Answer, and Multiple Choice. The Flash and Navigate modes are useful for studying and reviewing vocabulary. In Navigate mode you choose words from the master list or a custom list. You can hide or show either the English or French word, click on the Find button to locate a specific word, and move through a list with the Next or Prev button.

In Flash mode you view and listen to words sequentially or randomly. Click on the View button, and pronunciations play as each word appears; click on Next, to proceed to the next word, or on Return, to go back to the Options display. You can choose whether the English or French text and audio play first, or disable the audio entirely.

Type Answer and Multiple Choice would be most useful for self-testing, except that they are roughly implemented. Type Answer mode displays an entry in one language and requires you to type the translation. If you choose to view the English and spell the French, you must indicate the word's gender in parentheses—(f) or (m). Unfortunately, in cases where the program's words have been input incorrectly, a correct response is counted as wrong. In the master list, two spaces were keyed between la dinde (turkey) and (f); you must key in the same for your answer to be considered correct.

In Multiple Choice mode, you're given four possible French equivalents for each English word (or vice versa). Clicking on the right choice allows you to proceed to the next word. Choosing the wrong word results in an Incorrect Response message. Then you either press Reveal Answer or move on to the next word; you don't get another try among the remaining choices. In this mode and in Type Answer, a box at the window's upper left corner keeps score.

To make Picture It worth the $69.95, you need to create some custom word lists—a simple but time-consuming task. With the added lists, Picture It can serve as a decent ancillary tool to a more complete curriculum. Still, it's hard to overlook the lack of French definitions—this is, after all, a dictionary. In the end I would choose another way to supplement mon étude de cette langue magnifique.
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**Job Cost/Time Billing 1.05**

**PROS:** Accounts receivable and job-cost capabilities in one module; excellent report writer; can be integrated with General Ledger module.

**CONS:** Interface is sometimes counterintuitive; documentation has omissions and errors; occasionally slow; minor bugs.

**COMPANY:** Satori Software

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**REQUIRES:** Classic II; 2MB of RAM; hard drive.

**LIST PRICE:** $1,495; Personal Entry option $400 (allows unlimited users).

**ANY TIME-BILLING AND JOB-COST PROGRAMS ARE REASONABLY FLEXIBLE FOR ENTERING BILLING INFORMATION AND INVOICING CLIENTS, BUT THE REPORTING CAPABILITIES FALL SHORT. SATORI'S JOB COST/TIME BILLING, PART OF THE COMPANY'S COMPONENTS SERIES OF ACCOUNTING PROGRAMS, INCORPORATES HIGH-END JOB-COST AND ACCOUNTS-RECEIVABLE PROGRAMS INTO ONE MODULE, AND THE PROGRAM INCLUDES AN EXCELLENT REPORT WRITER THAT ALLOWS YOU TO CREATE UNLIMITED FORMATS FOR INVOICES, STATEMENTS, AND REPORTS.

At the heart of Job Cost are six entities—employees, actions, functions, clients, jobs, and phases. An action is a billable service or expense that you want to track, such as a client conference or a telephone call. A function is a specific employee task that has its own cost. In the example of home construction, building a house is a job, pouring the foundation is a phase, and rough carpentry is a function.

The job setting is the key to Job Cost's flexibility. Each job can be billed either by time and materials or on a fixed-price basis. You can bill (or track) time and/or expenses by using a predetermined rate schedule, each employee's rate, or at cost. You can specify options such as overhead and markup percentages. Each job can be divided into an unlimited number of phases, and you can create detailed project estimates for each phase.

Once you have set up the business and job parameters, Job Cost lets you create an almost unlimited number of journals for recording time and expenses. There are seven journal types—time slips, time sheets, cash receipts, credit memos, trust accounts, retained journals, and miscellaneous cash journals. When you enter journal data, you can override most default values. The program tracks data for each business object, such as billable, unbilled, billed, and unbillable; and tracks cost amounts for each job, phase, client, and employee.

For printing invoices, statements, and reports, the program has a robust report writer. Unlike most report writers, Job Cost's is compact and straightforward. You can create virtually any report layout combining four simple types of objects—fences, calculations, filters, and graphs. A fence is a repeating group of related fields from one of the Job Cost files. A filter is a set of sorting, selection, and subtotaling criteria. A calculation field is a formula that uses other report data.

The program's reporting capabilities satisfy most time-billing and job-cost needs of almost any service business. It's not without its flaws, however. First, although the Job Cost interface is straightforward and well organized, it has some confusing elements. For example, the master file windows use horizontal scroll bars to move from record to record. If you edit a key field on an existing master record, the program actually creates a new record based on the edited information—it does not change the existing record. Second, the documentation has some errors and inaccuracies and the tutorial is sparse. The manual has no comprehensive setup examples and no index. The program also has a variety of minor, non-structural bugs.

Overall, Job Cost/Time Billing is a reasonable first release that effectively addresses the needs of its target audience—service companies with sophisticated billing and job-cost requirements. Recommended, with reservations.—STEVE MANN

**Correct Grammar 3.0**

**PROS:** Customizable rule sets

**CONS:** Slow; poor design; odd and confusing errors; lack of support for common file types.

**COMPANY:** Wordstar International

**INTERNATIONAL:** (812/523-1740). **REQUIRES:** Mac Plus, hard drive.

**LIST PRICE:** $99.

**GRAMMAR CHECKER**

**LANGUAGE IS MY BUSINESS. THE NEED TO MAKE MY POINT SUCCINCTLY AND EFFECTIVELY, WHETHER IN A REVIEW, A FEATURE STORY, OR FICTION, IS Paramount. CORRECT GRAMMAR FROM WORDSTAR ENDEAVORS TO HELP WRITERS PRODUCE SUCCINCT, EFFECTIVE PROSE. UNFORTUNATELY, IT FAILS FOR A VARIETY OF REASONS; SOME FAILURES STEM FROM DECISIONS MADE IN DESIGNING THE PRODUCT, BUT MOST ARE RELATED TO BASIC PROBLEMS WITH COMPUTER-BASED GRAMMAR ANALYSIS.

After launching Correct Grammar, you open the file you want to check and choose one of 11 styles (Academic, Informal, Legal, and so on). You can customize any rule set to ignore split infinitives, for example, or to note overly long sentences. Each problem is presented, in order, as the program analyzes the document. I would prefer to be able to optionally select a "pickiness level" and have the program print out all its analysis—maybe even in order of severity—so I could consider it carefully.

A few minutes using Correct Grammar is sufficient to drive almost any writer batty. Amid such useful comments as "This main clause may contain a verb in the passive voice" or "The quoted material appears to be improperly punctuated" are unhelpful suggestions. When I used the term metal plate, the program noted: "This word sounds like a form of 'medal' or 'meddle.'" Although it offers definitions to help you choose between soundslike words like effect and affect, a program that flags all homophones isn't very helpful. Some suggestions were simply incorrect. "Consider using 'as' or 'as if,'" Correct Grammar offered, when the original is clearly correct. Sometimes it recommends the plural form of a verb, when the singular is needed.

Correct Grammar violates Mac interface conventions in irritating ways. When you quit the program, it gives a text-readability analysis, even if it has checked only one word in the document. System 7 features are poorly implemented. The Help button, for example, simply toggles help balloons on and off, instead of offering substantive help, such as to explain why you would want to know "syllables per 100 words." And while the program claims support for many file types, I had to continuously reformat and save my Microsoft Word 5.0 documents to Correct Grammar in text format. Experiments with DOS versions of WordPerfect and Word proved equally failure prone. Correct Grammar actually tried to analyze the formatting codes.

On the upside, the program offers several customizing options, and it has numerous preset writing styles, although they're very similar. Correct Grammar also comes with a sample file and related tutorial in the clear documentation. Ironically, when I used Correct Grammar to check the first chapter of its own documentation, it identified nine grammar errors.

Somewhere along the way, Wordstar seems to have missed the goal of this application. Though worthy in its aspirations, Correct Grammar offers precious little assistance in improving your writing.

—DAVE TAYLOR
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Circle 82 on reader service card
In 1872, TYPEWRITER DESIGNER Charles Sholes found that the keys on his new prototype jammed if struck too quickly. Did he strike back to the lab, determined to overcome this technical challenge? Nah—too much trouble. Instead, he concocted a keyboard arrangement that was so stupid, so illogical, that people couldn’t outtype his machine. It worked (or didn’t work, depending on how you look at it), and we’ve wasted untold billions of finger-miles on that obsolete layout ever since.

In 1930, an efficiency nerd named August Dvorak studied the language and devised a better layout. It places the common letters—E, T, S, and so on—right under your fingers on the home row. It increases your speed by 20 percent, accuracy by 50 percent, and your fingers only have to travel ¾ as far. It was brilliant—but it arrived during the Depression, when people were too depressed to learn anything new. Nobody resurrected the Dvorak arrangement until 1978, although it’s been gaining popularity ever since.

That was only one attempt to help us type with less effort and more words per minute (wpm). Here are eleven others.

Half-QWERTY 1.1
HALF-QWERTY IS A SYSTEM EXTENSION (INTT) that, when you press the spacebar, turns the left half of your keyboard into the right half (and vice versa), allowing you to type the whole alphabet with one hand. The Matias Corporation suggests you can use your free hand for the mouse. A casualty of the keyboard’s asymmetry is the apostrophe, which has no corresponding key in the half-QWERTY setup. The brackets, plus sign (+), and hyphen (-) disappear too, unless you use the right side of the keyboard. And capital letters are tricky. Surprisingly, one thing that isn’t hard is learning Half-QWERTY; somehow your brain triggers the appropriate finger of your left hand instead of the right. Within 15 minutes, I could type at 20 wpm if I really concentrated (and didn’t need any apostrophes).

Half-QWERTY is a bit overpriced at $79.95. Otherwise, for one-handed people—or those with a mouse, a piece of paper, or a drink in one hand—Half-QWERTY isn’t half bad.

The Bat
EVIDENTLY, INFOGRIP IS ANOTHER COMPANY that thinks hands are one too many. The Bat ($495) is a peculiar-looking replacement keyboard with only seven keys. By pressing various combinations of keys, or chording, you can type every letter, number, symbol, and cursor key. You get two of these keypads, one per hand (each can type all the characters), which can be as far apart as you want. The padded heel rest and the 20-degree angle make your hands comfortable.

The company bet me a steak dinner I could learn the alphabet within an hour. They won—barely—but that’s not to say learning this system is easy. The key combinations make no sense at all (why do you have to press four keys for an O, but only one for a Y?). The utterly confusing manual and noninteractive HyperCard tutorial don’t help a bit. And even the pros can only muster around 30 wpm (says the company). Some “industry observers” swear by chording keypads—but I think this one actually makes the QWERTY layout look efficient.

The Sword 1.4.2
THIS NICELY EXECUTED CONTROL PANEL is an abbreviation expander (Abbrev-V-8, $69). It comes with a quick-reference card packed with 200 common words and word parts—like “the” and “ing”—and their corresponding abbreviations. You’re supposed to type “ instead of the, “for you,” and so on; instantly, the program expands the abbreviation to its full form. The program even adds a space after each period and capitalizes the first letter of sentences for you.

Most of the abbreviations are easy to remember: mb means maybe and rf is necessary. Some are not, like “for year” and “in” for thing. Another quibble: the manual is nearly impossible to read (eight fonts or styles on a page is typical). But if you appreciate having 200 ready-to-go abbreviations, then this is your program. Know, though, that The Sword’s rivals let you create thousands of your own expandable words; The Sword’s user-definable list is limited to 40.

TypeIt4Me 3.0
THIS TRULY WONDERFUL SHAREWARE gizmo (by Ricardo Etore, who requests $30) is handy for anyone who’d like to do less typing and make fewer typos. Like The Sword, TypeIt4Me expands abbreviations. But TypeIt4Me abbreviations (like DT) can stand for a much longer spurt of typing (like ex-billionaire playboy Donald Trump). A cheat-sheet list of all your codes appears in the TypeIt4Me menu (squeezed in on the left side of the Apple menu). Best of all, TypeIt4Me lets you decide what the abbreviations are.

The program is also great for autocorrecting common typos, like typing every time you type “a.” And if you ever have boilerplate text—anything from Yours truly to multipage blobs of legal—TypeIt4Me is indispensable. You almost forget the fact that it doesn’t distinguish capital letters, which means that your abbreviations can’t begin a sentence. America Online and user groups have it; go GetIt4Yourself.

Thunder 7 1.0.6
THIS PROGRAMS SLICK TYPE-EXPANDING feature has one whopping advantage over TypeIt4Me: Thunder 7 is smart enough to capitalize the expanded word or phrase if you capitalize the first letter of the abbreviation as you type it. Thunder 7 is even smart enough to capitalize all the letters of an expanded word when you capitalize the whole abbreviation.

There is just one disadvantage: it’s a drag trying to remember your abbreviations. You can’t see a list unless you open your word file (a five-step process), which you can’t leave up on the screen. (You can print it, of course.) It seems to me there was one other little feature... oh yeah, Thunder 7 is also a full-featured spelling checker and thesaurus (Baseline Publishing, $99.95).

Magic Typist 1.7.2
MAGIC TYPIST ($99) IS YET ANOTHER abbreviation expander, with a clairvoyant twist. As you type, Magic Typist silently learns every word that’s
longer than seven letters (or a length you set). The next time you type the first few letters of that word, Magic Typist expands it automatically. If there are several possible conclusions of the typed-word-in-progress (such as beatnik, beatific, or Beatrice Arthur), a minimal list pops onto the screen, listing the possibilities by number. Press the appropriate number key, and Magic Typist zaps the word right into your manuscript.

Only one thing mars this clever, lazy-person's approach: Magic Typist always pops its little list when it's proposing an expansion, even if there's only one possibility. That's a shame, that it means it can't correct common typos like adu on the fly (as TypeItMe does). Oldhavi Corporation, which recently acquired the software, plans a software, manual, and packaging overhaul.

Typing Made Easy 1.8

THIS INTERACTIVE PROGRAM (QED Information Sciences, $49.95) is a computerized version of your tenth-grade typing teacher. You get the whole spiel, complete with constant exhortations not to look at the keyboard and those awful "aaa ;a;a;a; typing drills.

Two big problems. First, the program doesn't show you what you're typing and doesn't keep when you make a mistake. Therefore, it's entirely possible to type an entire exercise off by one letter, and never know it until you finish and get a grade of zero.

Second problem: Typing Made Easy isn't made for learning to type on a computer. There's no lesson on using the numeric keypad. Dumbest of all, you're actually penalized when you don't type two spaces after a period. Hey, this is 1992! We got proportional fonts now, bub!

Type Right

THIS TYPING TUTOR (Barron Enterprises, $39.95) has only Geneva text, no graphics, punctuation mistakes in the on-screen instructions, and no way to jump ahead if you get sick of an exercise. And because it is written in Microsoft Basic 1.0, Type Right is so slow that you can easily outtype it.

Typing Instructor Encore 2.1

TYPING INSTRUCTOR ENCORE (Individual Software) is the program for the MTV generation: friendly, varied, graphics-laden, colorful. It has some nice touches: you can make up your own drill material, you can learn to use the numeric keypad, and an excellent tutorial on word processing covers ergonomics and copy-and-paste. Lots of Chicago font in a small window is a bit ugly and 1985ish, but the content compensates, and the $29.95 price sure is right. (No Dvorak, and once again you're expected to type two spaces between sentences. Weird.)

Frankly, I spent most of my time in the Lobster Sea Adventure—the first typing drill capable of giving you an adrenaline rush. You have a one-second head start, and then it's your mistake-free typing versus the lobster's appetite. Childish, goofy, but it really works.

Mavis Beacon Teaches Typing 1.3

THE BOX FOR MAVIS BEACON (THE SOFTWARE TOOLWORKS) says "The Finest Typing Program in The World." I guess I concur. This tutor program has so much artificial intelligence (AI), variety, and articulate plain-English feedback, that it's the only typing tutor that doesn't somehow feel amateurish. The brilliantly written, painstakingly researched manual alone is almost worth the $49.95.

Mavis, the AI being inside the program, analyzes your progress and makes neat discoveries: that your right ring finger is the weakest, say, or that you tend to use the correct finger but the wrong row, or that you take too long to recover from making a mistake. She even studies your rate of errors and, when it's obvious you are getting cranky, suggests you play her typing arcade game. You can make up your own drills, although Mavis's real-world examples are clever and funny (none of that jiffy stuff). I wish there were a numeric-keypad workout. But believe it or not, this is the only typing tutor that can teach you the Dvorak layout. And a ghostly outline of your hand illustrates the correct fingering.

Typing Tutor 5 1.0

THIS PROGRAM (QUE, $49.95), TOX, USES artificial intelligence to individualize your lessons; it also shows you a keyboard with some jagged-looking transparent hands to show you where to put your fingers (a feature modeled on Mavis).

Typing Tutor's Natural Language Generator creates drill sentences that are composed of words the program thinks you need work on. Typical example: "That faddist blackjacking beside that acade my> depicts. A belduquc was fought composed of words the program thinks you need work on. Typical example: "That faddist blackjacking beside that academia> depicts. A belduquc was fought"

The Upshot

WANT TO IMPROVE YOUR WPMP THEN learn the Dvorak layout. No keypad gizmo can touch it for efficiency and comfort. A typing expander can save even more time and labor—TypeItMe isn't perfect, but it's the most convenient, flexible, and price-effective.

Whether you're learning Dvorak or QWERTY, Mavis Beacon should be your teacher. Or, if you are young and learning to type for the first time, consider Typing Instructor Encore's livelier, more colorful approach.

P.S.: To put your Mac into Dvorak mode, just get Keyboard Switcher (for System 6) or a Dvorak keyboard layout (a System 7 module). Both are available from America Online or user groups. Go for it; Dvorak only took me a couple days to learn, I can still use the wretched QWERTY layout when necessary, and I can type for pages at a time without making a single mistake.

See Where to Buy for contact information.

Contributing editor DAVID POGUE types 75 wpm, sleeps 8 hpd, eats 3 hpd, and is trying to improve his Spy.
CHOOSE THE RIGHT TOOL FOR THE JOB.

Every toolbox has a variety of tools. And each one has a different purpose. You wouldn't use a screwdriver to drive a nail, so why use an artistic program to do your technical drawings?

If you need to do artistic illustration, it makes sense to look at one of the artistic programs shown here. But if you do technical illustration, MacDraft's the right tool for you.

MacDraft is designed specifically for architectural/engineering design & drafting and technical illustration. It provides you with a complete scaled drafting environment designed to respond quickly and accurately to the way you think and work. You can create multi-layered drawings and even assign a different scale to each layer to create details. As you switch between layers, MacDraft will automatically display the sizes of objects, dimension lines and area calculations in the units of that particular layer. You can also create custom line styles and store commonly used graphics in user-created symbol libraries.

When it's time to get your technical drawings done, you need a tool designed specifically for the task at hand. You'll find MacDraft's finely crafted drawing tools incredibly easy to use, powerful and amazingly accurate. In addition, most tools provide a number of options that will allow you to tailor the tool to meet your drawing needs. For example, with a simple click of the mouse, you can choose to draw arcs by their radius, any 3 points or even draw an elliptical arc.

So for your technical drawing needs, choose the tool that was designed specifically for the job. MacDraft. For your Macintosh® and now available for Windows.

MacDraft Competitive Upgrade (either Macintosh or Windows)—only $149!

Attention: AutoSketch®, Canvas®, CorelDRAW!, Designer®, Generic CADD®, MacDraft™II users. Act now—Limited Time Offer! Call us today for details!

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Monitor Radiation News

New Product Blocks ELF Magnetic Radiation

NoRad Corporation is now shipping ELF ProTech, the first externally mounted Extremely Low Frequency (ELF) magnetic field radiation suppressor for video display terminals (VDTs). Independently tested on popular monitors, ELF ProTech reduces ELF magnetic fields to well below the latest Swedish standards (SWEDAC, MPR II).

NoRad’s proprietary technology (patent pending) safely absorbs ELF magnetic radiation by up to 70% all around the display—front, back, sides and top. And, the higher the field strength, the greater the reduction.

For the first time, you can upgrade your current monitor with external shielding rather than buy a new, low magnetic radiation monitor. Installed in minutes without special tools, ELF ProTech preserves image quality and safeguards warranties and computer performance.

ELF ProTech’s universal design fits all monitors, and is color-matched to today’s displays.

New Shield Delivers Brighter Image

The NoRad Shield, the industry-standard radiation and glare shield, is now even better. Advancements in manufacturing give NoRad Shield users High Light Transmission (HLT), which increases image brightness by a full 50%.

Already the highest resolution shield available, NoRad has increased the Shield’s resolution even more—to 260 lines per inch. This means a clearer image from your monitor.

Independent Tests Support NoRad Product Line

An independent, government-certified laboratory has tested the NoRad Shield and ELF ProTech to verify performance and shielding effectiveness.

Using U.S. Military Standard 285, the NoRad Shield was tested against the leading technologies which claim radiation protection. Only the NoRad Shield blocked 99.99% of virtually all electric field radiation—not only ELF and VLF, but all the way up into the microwave range, and greater than 50% of the total magnetic radiation above 30 KHz - the broadest protection available.

ELF ProTech was tested according to the most stringent Swedish standards (SWEDAC, MPR II) for its ability to suppress ELF magnetic radiation from popular, high-emission monitors. ELF ProTech brought magnetic fields at all of the required 48 test points below the 2.5 milliGauss benchmark, and a dramatic 37 of the 48 points were below 2.0 milliGauss.

Together They're Unbeatable!

It’s a fact that monitors and VDTs emit electromagnetic radiation across a wide range of frequencies, in both electric and magnetic fields.

With the NoRad Shield and ELF ProTech you have the best solution for monitor radiation. To order or receive a free booklet on "The Myths and Facts of Anti-Radiation Screens" call:

1-800-262-3260

NoRad
1549 11th Street
Santa Monica, CA 90401
(310) 395-0800 FAX: (310) 458-6397

Circle 133 on reader service card
**Hardware**

**20-inch Color Display**
A 20-inch color system that has a screen resolution of 1024 by 768 pixels at 72 dpi and a screen refresh rate of 75Hz. The system can be configured to display 8-bit or 24-bit color, has front-mounted control knobs, and uses a HiBichi tube. 8-bit system $3195, 24-bit $3995.

**Flexscan F550i**
A flat-square 17-inch color display with a dot pitch of 0.28mm and 30kHz to 65kHz horizontal and 59Hz to 90Hz vertical scanning frequencies. The monitor can display noninterlaced images at resolutions up to 1280 by 1024 pixels and has digital controls for picture adjustments, so users can store up to 32 different signal combinations. The screen has a nonglare coating and the monitor complies with the Swedish MPR II guidelines for electromagnetic emissions. $1749. Nanzo, 310/325-5202, 800/800-5202; fax 310/590-1679.

**GatorStar GX**
A LocalTalk-to-Ethernet router-repeater that is built around a 16.7MHz 68302 processor and has 24 LocalTalk ports, each able to connect to four Macintosh nodes. The device can detect malfunctioning LocalTalk nodes, remove the affected port from the network, and then restore the port when normal functioning resumes. It also supports multiple protocols, including AppleTalk, TCP/IP, and SNMP. The Gatorkeeper software that is included allows users to configure, monitor, and manage the device from a central location.

**Informarion Statin**
A paperless display system with a 24-by-34-inch screen that creates images by electrostatically applying toner to a white metallic film layer as the film scrolls past a print head. After an image has been displayed, the toner is collected for reuse. The display can be connected to a Macintosh via AppleTalk, and a user can then display any TIFF file by dragging the file to an icon that represents the Information Station. The product ships with Slide Show 3.0-software for creating sequences of images, delays, and linking—and has a 30MB internal hard drive. $9998. Applied Resources, 913/469-9191; fax 913/469-0360.

**Magic RailGun Pro**
A 68030 accelerator for the Mac Plus and SE-avable in speeds of 16MHz, 25MHz, and 33MHz; has been built-in monochrome video output for single-page and two-page displays up to 21 inches in size, and comes with a 19-inch monochrome monitor. The board also has a math coprocessor and can be configured with up to 16MB of RAM. For SEs: 16MHz $899; 25MHz $999; 33MHz $1199. For Plluses: add $100 to SE prices. Mac-Products USA, 512/472-8881, 800/622-3475; fax 512/499-0888.

**Optima 96**
A 9600-bps modem that provides v.32 connectivity, v.42bis data compression, and v.42 error control. It comes with a Mac-to-modem cable and Smartmodem communications software. $440. Hayes Microcomputer Products, 404/411-1617; fax 404/449-0087.

**PowerCache Adapter LC**
An adapter that enables the Mac LC and II to use DayStar’s PowerCache NuBus CPU accelerators. The accelerators, based on the Motorola 68030 processor, come in speeds of 33MHz, 40MHz, and 50MHz and have an optional 68882 FPU. $49. DayStar Digital, 404/967-2077, 800/962-2077, ext. 305; fax 404/967-3018.

**PowerMath LC**
Math coprocessor board for the Mac LC that contains a 16MHz 68882 floating-point unit for increasing the calculation speeds of math-intensive tasks. The board plugs into the LC’s Processor Direct Slot and comes with SANE software to further boost the speed of certain math operations. $159. DayStar Digital, 404/967-2077, 800/962-2077, ext. 305; fax 404/967-3018.

**PowerPad**
A portable numeric and function keypad for the PowerBooks that connects through the ADB port and has an ADB port of its own so that other devices can be daisy-chained from the keypad. The number and operator keys are arranged as on Apple’s extended keyboard, and with one key-stroke the user can switch from the number keys to 15 function keys. The product comes with 110Key Tape, a dediccessory that works like the tape on a financial calculator and accepts and displays input directly from the PowerPad. $129; with CE Software’s QuicKeys, $189. Sophisticated Circuits, 260/485-7979, 800/627-4669; fax 260/485-7172.

**RC-570 NuBus Electronic Still Presentation (ESP) Kit for Macintosh**
A still-video-imaging kit that includes the RC-570 still-video camera, a NuBus digitizing board with an ESP piggyback board, and software for converting captured images to TIFF and PICT files. The video camera captures up to 25 still-video images on a reusable 2-inch video floppy disk; users can then input the recorded images into a Mac using the NuBus board. The piggyback board allows images from the Mac to be stored on the camera’s floppy disks, and the camera can send images to any standard video display.

**SketchMate ME**
A sign-making device that also works as a professional 8-pin plotter and is designed for creating architectural signage, presentation materials, graphic designs, and display signage. The device uses standard HPGL and comes with SignMate ME lettering software, which allows users to design vinyl signs using ATM outline fonts. A-size $895; B-size $1195. Roland Digital Group, 714/975-0560; fax 714/975-0569.

**Tape 5000**
An 8mm tape-storage subsystem that provides up to 5GB of backup per cartridge and has a 500K-per-second data-transfer rate, according to company literature. The drive ships with one tape cartridge, a drive-cleaning kit, and Retrospec Remote network backup software. Additional tape cartridges are $59 each. The $27 unit has a mean-time-between-failure rating of 40,000 hours, according to the company. $6495. Storage Dimensions, 408/951-0210; fax 408/954-1200.

**TitleMan**
A title generator that creates fully animated video continues...
TiteMac

TiteMac includes a NuBus board that acts as a frame buffer, software for creating and editing PostScript type and graphics, and an external chassis that takes in black-burst reference and puts out RGB, linear key, and sync. Type can be exported directly to high-quality printers.

Tower of Power II

An upgrade for the Mac II, IIx, and IIi that provides six drive bays (four half-height external bays and one internal full-height bay) and a fan-cooled 275-watt power supply in a tower enclosure. The basic model has a bracket for mounting a floppy drive, a power adapter circuit board, cables, and instructions. Options for the basic package include a variety of monitors, optical mice, and keyboards. The product comes with a Control Panel device that allows users to turn the accelerator on and off, ejecting disks, and shutting down the computer.

TransWarp 040-33

A 8086 accelerator with a 56Kbps port interface. The device can be used with software packages that require high-speed processing capabilities.

Ultimate Home Office

A communications center that provides voice-mail, data modem, and fax capabilities in one device. The product incorporates 14,400-bps V.32bis modem with MNP 5 and V.42bis error correction and data compression, Macfax software for sending faxes and receiving voice-mail messages. Users can create up to 599 voice-mail boxes, each with a different message. Messages are played back through a telephone handset.

Inhouse Subscription Manager

Circulation-management software for publishers and newsletter professionals based on ACQUIST's 4th Dimension. Simplifies subscription circulation, fulfillment tasks.

MacUSA

An electronic atlas with profiles and maps of all 50 states and Puerto Rico; contains detailed maps, graphics, and annually updated state data. State information can be compiled using bar charts or thematic maps, and the maps and graphics can be exported in a variety of Mac-OS formats. The maps show major state features, elevations, and the location of major cities and towns; the program also shows each state's railways and all state songs. 1MB min. memory.

MicroLeague Baseball, the Manager's Challenge

A baseball simulation game that lets players control their own team and make coaching decisions to directly affect the outcome of a game. Players can make a batter bunt, hit or take a pitch, make fielder adjustments, and check the 30-player roster for potential pinch hitters or defensive replacements. The software compiler allows players to accumulate season stats and track league standings. After each game a complete box score can be printed. 1MB min. memory. $49.95. Micro-League Sports Association, 302/336-9990, 900/273-1142; fax 302/366-8800.

MIDISchool

An educational HyperCard program that uses interactive lessons and a built-in sequencer to teach the basics of using MIDI. The program saves student notebooks, which record each student's progress with the lessons, and contains a glossary of MIDI terms. The package is designed in book format, with 12 chapters, and each chapter includes an explanation of a MIDI term and a graphic. Many of the graphics are animated. 2MB min. memory. $119. Educational, 603/688-4788, 800/824-4788.

NetMounter

A program that allows Macintosh users to access NetWare file servers without using Novell's NetWare for Macintosh. Users can mount NetWare volumes through the Chooser as they would an AppleShare volume, and all AppleShare services remain available while NetWare volumes are being used. The program uses a feature called ExtMounter Mapping that lets users continue...
Introducing the PRO series.

My, how your data has grown. System 7 and QuickTime have added a lot. To get more storage, you could buy a bigger hard disk, but that's like getting another bowl for this fish.

Why do it? When for practically the same price and performance, your data can swim in the open sea, so to speak, of the new Bernoulli® 90 PRO from Iomega.

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Unfortunately, this ad isn’t a Bernoulli. We’ve run out of space. So call today for a free brochure about the new PRO series drives. They offer the price and performance of a hard disk. But never fill up. And that’s no fish story.
open files on a NetWare server from within a Macintosh application. 1MB min. memory. Single user $99; five users $395; ten users $995. Dayna Communications, 801/531-0600, fax 801/359-9135.

Nolo's Living Trust Software that systematically leads users through a series of questions and then compiles the answers to produce a living trust that is valid and effective under the laws of users' state of residence. The user can set up an individual or shared marital trust, which can then be changed or revoked at any time. The program also features online help and a glossary of legal terms. 1MB min. memory. $79.95. Nolo Software, 510/549-1976; fax 510/548-5902.

Ready For Trial Software for trial lawyers that is designed to manage and analyze deposition and trial transcripts. The program has a database engine and a full-text retrieval engine, and lets users divide documents into segments and then characterize each segment for later retrieval. It includes 16 report formats, each of which contains a table of contents, and comes with TransFile, a utility for converting ASCII files into the program's format. 2MB min. memory. $995. Robbins Analytics, 612/224-1209, 800/767-3239; fax 612/224-2633.

Roll Call A church-management software package that provides attendance tracking, a donation record system, visitation scheduling, and directory maintenance. A variety of subgroups can be created within the congregation list, and attendance records are kept by clicking on attendees' names. Receipts for donations can be generated for any time period, and comments from previous visits to individuals or families can be recorded in the church database. 2MB min. memory. $495. By The Numbers, 219/293-4893, 800/554-9116.

ShadowLAN Network software that allows users to share printer or modem ports with other Macs across an AppleTalk or EtherTalk network. By selecting a port from the program's control panel, users can turn on the sharing option.装置 devices that the device connected to that port available to other users on the network who also have the software installed. Each shared port can have its own password or only selected users can access a particular port. 1MB min. memory. $149; additional five-packs $49. Applied Engineering, 214/241-6000, 800/954-6227; fax 214/484-1365.

Shakespeare and the Globe Theater A tutorial HyperCard stack designed to introduce students to Shakespeare by providing details of his life and his family, the people who worked with him at the Globe Theater, the social hierarchy, religious beliefs, and living conditions of the time in which he lived; and an examination of the interior and exterior of the Globe Theater. The stack also includes the full text of A Midsummer Night's Dream; requires HyperCard 1.2 or later. 1MB min. memory. $129. Shakespeare On Disk, 914/266-5705.

Time Treks An adventure game, with 12 levels of play, that challenges players' knowledge of history and investigative skills and allows them to explore thousands of historical facts; 180 time lines; and hundreds of time-related views of science, communications, wars, empires, and so on. The program also has an archives section, where users can browse through historical data; and the game contains quotations, color charts, and tables. 2MB min. memory. Consumer version $59.95; educator version $89.95; lab pack (five copies) $269.95. EarthQuest, 415/921-5838; fax 415/222-3817.

Video Sampler Disk Set A set of two disks containing a QuickTime movie player and three sample QuickTime movies. The set is designed to serve as an introduction to QuickTime, aimed specifically at people who have no other means (such as a digitizer or CD-ROM player) of acquiring QuickTime content. 2MB min. memory. $35. Northern Video Graphics, 612/338-6089.

ACCESSORIES

Cable Safe An antitheft security product for the PowerBooks. Includes a steel bracket that attaches to the bottom of the computer through existing screw holes on its underside, a cable that attaches to the bracket, and a padlock that can then lock the cable around any immovable object. The bracket folds underneath the computer when not in use, and the product comes with a Torx screwdriver, needed for installation.

CD ROMS

Berlitz Think & Talk Spanish An application designed to teach practical Spanish by having the student listen to language as it is used in everyday situations and repeat what he or she hears. Dialogue and scenes with sound effects, music, and other audio cues are controlled interactively by users, and sentences can be heard as many times as a user likes. The course teaches more than 1000 words, has 50 language lessons, and has an online, bilingual dictionary. 2MB min. memory. $199. HyperGlot Software, 617/558-8270, 800/726-5087; fax 617/588-6569.

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DayMaker Travel Case
A carrying case for the Macintosh PowerBook that comes with Day-Maker personal organization software. The case is made of water-repellent Du Pont nylon Cordura, has an inner-back design that gives users access to cable connections on the back of the PowerBook, and is designed so users can work on the computer while it is still in the case. DayMaker software’s features include scheduling, appointment tracking, to-do list management, and phone and address storage. The case also has a padded shoulder strap and a locking zipper. $149.95. Pastel locked. The keyboard also contains a spanned color guide printed on a large, UV-coated reference sheet that contains swatches of over 2000 process colors that can be compared with colors on users’ monitors for printing color accurately. A reference table on the sheet shows the relationships between dots per inch, line-screen ruling (a measurement printers use), and data file sizes. The guide also contains color-scanning tips, color theory illustrated with RGB and CAYK conversions, and detailed process separation tips and techniques. $24.95. Integrated Graphic Media, 818/363-7545; fax 818/914-1987.

Keyboard Lock for Mac LC
A keyboard lock that lets users disable the keyboard to prevent unauthorized access. Programs can run while the keyboard is locked. The keyboard cable plugs into a lockbox that plugs into the Mac’s ADB port. A metal lock covers the Mac’s port to prevent substitution of an unsecured keyboard and to protect the internal components from theft. $39.95 to $104.95. PC Guardian, 415/459-0190, 800/288-8126; fax 415/459-1162.

Kristal Clear
A line of clear glass filters for a variety of monitors that is designed to reduce glare, static, and electromagnetic emissions. The filters feature a hinged frame for horizontal and vertical adjustment that the company says allows the filters to fit 95 percent of the 12- to 19-inch monitors on the market. $119 to $200, depending on monitor size. Sunflex, 408/522-8850; fax 408/522-8840.

LANMax Surge Protectors
A family of eight surge protectors with catastrophic surge eliminators that disconnect any protected equipment in the event of a surge large enough to damage the protective circuitry. The devices come in configurations to support a variety of network schemes and offer combinations of AC protectors and data cable protectors. $149 to $159. Panamax, 415/499-3900, 800/472-5555; fax 415/472-5540.

Mouse Yoke
A device that turns any mechanical mouse into an aircraft-style steering yoke for use with flight-, auto-driving-, and submarine-simulation software. Users clamp the yoke to a desktop and then insert the mouse under an elastic strap. Yoke movements are then translated into corresponding mouse signals. The device works with any software package that provides mouse support for directional control. $34.95. Colorado Spectrum, 303/225-6929, 800/238-9883; fax 303/225-1663.

PowerBook Opener
A tool that consists of a socketed handle and special bits for opening the case of the PowerBook 100, 140, and 170. The product comes with instructions for opening the case, for users who want to install memory or cards. $18.95. Central Products Corp., 713/529-1080; fax 713/529-2006.

B O O K S

Danny Goodman’s Macintosh Handbook: Featuring System 7
A guide to System 7 printed on four-color 8- by-10-inch spreads, each divided into three levels of detail—beginner, intermediate, and advanced. The book also contains a glossary-based index and a large troubleshooting section. A typical spread includes basic definitions for beginners, shortcuts and tips for intermediate users, and technical details for advanced users. All System 7 features are covered in detail, including installation, compatibility, publish and subscribe, and memory management. Written by Danny Goodman with Richard Saul Warman. $29.95. Bantam Computer Books, 212/492-9666, 800/223-6834, ext. 9479; fax 212/492-8941.

To have your product considered for inclusion in New Products, send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number to New Products Editor, Macworld, 501 Second St., San Francisco, CA 94110. Macworld reserves the right to edit all product announcements.
The more information your business generates, the more you stand to lose. Because not all the 8mm tapes used by business are designed for business.

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This compact D8 cartridge starts out where our video grade leaves off, holding up to 5 gigabytes, for today's high-capacity storage and archiving. With data security features you'd only expect from the inventor of the 8mm video format.

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Sony Enhanced Data Grade D8. A memory worth celebrating.

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M ANY PEOPLE HAVE trouble operating a PowerBook's built-in trackball because it's so small (particularly on the PowerBook 100) and lightweight. You can't do anything about the size, but you can replace the original ball with a marble that weighs much more, as a tip last month suggested. The extra weight helps keep the ball from lifting up and losing contact with the rubber rollers that track its movement. Steve Mayzels of Cupertino, California, sent some detailed advice to augment the July tip. He favors Qualatex brand marbles, specifically Premium Quality Marbles—The Collector Series (made by Pioneer Balloon Company of Wichita, Kansas, and sold at many toy stores including Toys "R Us and Pay Less Drugs). Choose a style with a smooth finish—the Meteors, Silvers, Cat's Eyes, or Pearls. The Galaxies, which have a pebbled surface, don't work well as trackballs. Qualatex marbles come in a net bag with 35 marbles to play with (16mm) and one shooter (25mm)—the right size to replace the PowerBook 100's trackball. The PowerBook 140 and 170 require a 30mm marble, which Pioneer Balloon does not manufacture for retail sales.

Pick over the bags of marbles in the store and choose the smoothest one. Although a slight orange-peel texture won't affect tracking accuracy, it may make the marble rotate less freely. Toy marbles aren't manufactured to very strict tolerances, so you may have to buy several bags of marbles to find one that works reliably. If the marble is too large, it will bind; if it's too small, it will track erratically. Even if you buy several packages of marbles, you shouldn't have to spend over $8 to find a marble that works as a trackball.

**Stand-up Mac**

I have a Mac II that takes up a fairly large portion of the middle of my not-too-huge desk. From time to time I've seen photos and ads in *Macworld* in which a Mac II was standing on its end beside or beneath a desk or workstation. I'm tempted to try this with my machine, but my Apple owner's manual sternly promises a plague of locusts if I ever try to orient the computer in any except the "missionary position." Is there a way that I can safely make my Mac II stand up on the floor, or will that cause the ball bearings to fall out of the math coprocessor?

**Jim Henry**

Dallas, Texas

**A.** You can stand a Mac II, IIx, or IIci on end if you keep it from falling over and provide an inch or so of ventilation space on all sides. The Vertical CPU Stand (S1995) made by Basic Needs (800/633-3703 or 619/738-7020) consists of two feet that you adjust to fit the cabinet, positioning them so they don't block the cabinet's air vents.

**Question**

Why can't a file name have a colon in it?

**Sam Snow**

Signal Mountain, Tennessee

**A.** Mac application programs and system software use colons internally in specifying the path through the folder structure to a file. A path name consists of a disk name, a succession of folder names, and a file name, with colons between them. For example, the path name /Hard Drive:System Folder:Control Panels:Sound specifies the location of the sound control panel on a System 7 start-up disk named Hard Drive. Putting a colon in a file name confounds the scheme for specifying paths.

**Thick Hairline**

When I use Deneba Software's Canvas 3.0 to print on an HP DeskWriter ink-jet printer, all lines thinner than 1-point print 1-point thick. Can you solve the problem?

**Yvan Lamontagne**

Trois-Rivieres, Quebec, Canada

**A.** You need to choose Rulers from Canvas's Layout menu and change the Printer option from ImageWriter to LaserWriter. The LaserWriter setting tells Canvas you are printing on a device whose dot density is an even multiple of 75 dots per inch (dpi); the DeskWriter's dot density is 300 dpi (72 x 5). The ImageWriter setting tells Canvas you are printing on a device whose dot density is a multiple of 72 dpi. When printing to a StyleWriter, you should set the rulers command's Printer option to ImageWriter because the StyleWriter has a dot density of 360 dpi (72 x 5).

**Hypothetical Question**

Suppose someone put several hundred sound files in my System 7 Startup Items folder. How can I stop the sounds from playing during start-up so I don't have to wait for them all to finish before removing them?

**Bill Auffich**

Philadelphia, Pennsylvania

**A.** To block the opening of items in System 7's Startup Items folder, press the shift key when the Finder's menu titles first appear in the menu bar during start-up. To additionally inhibit the loading of extensions from the Extensions folder, Control Panels folder, and System Folder, press the shift key when the smiling Mac icon appears at the very beginning of the start-up sequence. You can release the shift key after the "Welcome to Macintosh" message appears.

**Word 5 Feature-Bug Tip**

To copy the headers and footers from one Word 5 document to another, simply copy the last paragraph mark from one document and paste it at the end of the other. [To see paragraph marks, use the Show ¶ command or click the ¶ icon in the ribbon normally displayed at the top of the screen.]
Making Registration and Crop Marks

Sometimes you need to make your own registration or crop marks in Aldus FreeHand. For instance, your page size may be too large for FreeHand's standard printers' marks to fit on the paper, or you may have several objects each requiring its own crop marks on one page. Oliver Muoto of Los Angeles suggests the following steps for making registration marks.

Aside from the initial construction in step 1, the procedure is the same for making crop marks. This procedure ensures that your crop marks and registration marks appear on each separation when you print spot- or process-color separations.

1. Construct a registration mark from a circle and two perpendicular lines. Align the objects with the Alignment command, and group them with the Group command.

2. Select the grouped registration mark, choose the Fill and Line command, and turn on its Overprint option. This causes the registration mark to print whether it is in front of or behind other objects.

3. Duplicate the registration mark for each spot color—or each of the four process colors if you are making a process-color separation—with the Duplicate command. Then assign one of the spot or process colors to each registration mark.

4. Align all the registration marks so they are centered vertically and horizontally. Their front-to-back ordering doesn’t matter.

5. Group the centered registration marks and you've got your own registration mark that will show up on each separation. Duplicate and place as many of these as you like anywhere on the paper. (Three registration marks should suffice.)

One person's timesaving feature is another person's time-wasting bug. David Rahmel of Los Angeles confidently copied the entire contents of a draft letter with empty headers and footers to his template document with a letterhead logo in the header. To his consternation the empty header replaced his logo header, and he spent half a day figuring out why. To preserve the header, footer, and other section formatting at the end of a Word 5 document, don't paste at the very end of the document. Instead, paste before a blank line or blank space at the end of the document. This precaution is not necessary if you use Word 4, in which you can replace a document's last paragraph mark only by selecting that mark and pasting over it.

If your document has multiple sections whose headers, footers, and other section formatting you want to copy to another document, successively copy and paste each section mark from the source document to the destination document. See the Word manual for more on section formatting.—L.P.

Viewing Desktop Items by Name

When I got System 7, I soon filled up my desktop with aliases of commonly used folders and programs. After a while, I could hardly find the icon for an inserted floppy disk on my cluttered screen. If only I could use the View menu to arrange items on the desktop by name, the problem would be solved. You can get the same effect with System 7's custom icon capabilities. First you open a paint program, select some blank white space, and copy it. Then you use the Finder's Get Info command on each desktop item you want to view by name, and paste white space over the icon in each item's Info window. As you can see in "Name Only," pasting the white space leaves only the item names visible, and six items without icons fit in the space previously occupied by two items with icons.

HyperCard Precision

Supposedly all calculations in HyperCard are carried out to 19 significant figures. This is true of all built-in functions. But the precision of user-defined functions depends on the Number-
Message in a Bottle

Eric Aparicio of Saratoga, California, found this message in System 7's System file and so can you. Using Microsoft Word (version 3, 4, or 5), you can open any copy of the System file except the one in the System Folder on your startup disk by pressing the shift key while choosing Word's Open command. If you don't have Word, use a disk editor like Norton Utilities or MacTools. Who are Blue Meanies? They are roving Apple software engineers who contribute to numerous system software projects.

Unfortunately, the IcePac isn't quite big enough to satisfactorily accommodate a PowerBook 140 or 170.—L.P.

4D Draw Preferences Option

**TIP** According to the manual for the 4th Dimension Draw module, the command 4R Set Preferences has five parameters. It actually has six. The sixth is Confirms, and it determines whether users see a dialog that asks "Do you want to save this drawing?" every time they switch layouts or close a drawing file. You would turn off this parameter if you are handling file saves with your own procedures or if you are displaying drawings as read-only. The correct command syntax is:

```
4R Set Preferences <param1> <param2> <param3> <param4> <param5> Confirms
```

The Confirms parameter can have one of three values: 0 for off, 1 for on, or -1 for unchanged. The Confirms parameter also works with the 4R Get Preferences function.

**David Green**

**Cannas, California**

We pay from $25 to $100 for tips published here. Send questions or tips on how to use Mac computers, peripherals, or software (by mail or electronically) to Quick Tips, Lon Poole, at the address listed in How to Contact Macworld at the front of the magazine (include your address and phone number). All published submissions become the property of Macworld. Due to the high volume of mail received, we're unable to provide personal responses. m

LON POOLE answers readers' questions and selects their tips for this monthly column. His two most recent books are Amazing Mac Facts (Microsoft Press, 1991), a collection of the best published tips; and Macworld Guide to System 7 (IDG Books Worldwide, 1991).

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**PowerBook on Ice**

**TIP** As an editor for Outdoors magazine, I received a sample IcePac fishing creel made by Performance Angling. I was told to carry the day's catch or your lunch, but unless you have a large drive, it's best to carry the bag in a PowerBook. I live in New York. I have to think about things like that.

Gary P. Joyce
Holbrook, New York

Unfortunately, the IcePac isn't quite big enough to satisfactorily accommodate a PowerBook 140 or 170.—L.P.

**Updating System 7 Icons**

**TIP** Have you ever decompressed a file only to find it has a generic (blank) icon? You don't really want to rebuild your desktop to fix one icon (especially if you have a large drive). Instead, open the info window for the icon, and add the Finder's Get Info command. Click the icon in the info window, and a box appears around it, indicating you have selected the icon. Now copy, paste, and cut the icon—in that order. If you are lucky, the correct icon will show its face.

Here's how it works: Copying the icon makes it possible to paste; pasting the icon causes the system to internally mark the file as one that has a custom icon; and cutting the icon causes the system to unmark the file and restore its standard icon. You can't do the cutting step unless you have done the pasting step, and you can't do the pasting step unless you have done the copying step. It doesn't matter what you copy; any graphic will do.

David G. Perkins
Schaumburg, Illinois

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**Name Only** You can hide desktop icons and fit more items on the desktop by pasting white space over the icon in each item's info window.

**Format property**. After clicking a button containing the following script, for example, you would expect to see the same number repeated twice in the message box. You see 1.4123562373095049 and 1.4 instead. (With a Put statement in the script puts the values of variables x1 and x2, whose values were calculated by equivalent formulas, into the message box.) To retain the precision, you must reset the NumberFormat property.

```
function f angle
put 2 * sin(pi/4) into x1
put pi/4 into x2
set NumberFormat to "0.####0000000000000000"
put x1 & " and " & x2
end f
```

```
on mouseUp
set NumberFormat to "0.##" 
put 2 * sin(pi/4) into x1
put pi/4 into x2
set NumberFormat to "0.####0000000000000000"
put x1 & " and " & x2
end mouseUp
```

---

**4D Draw Preferences Option**

**TIP** According to the manual for the 4D Draw Preferences module, the command 4R Set Preferences has five parameters. It actually has six. The sixth is Confirms, and it determines whether users see a dialog that asks "Do you want to save this drawing?" every time they switch layouts or close a drawing file. You would turn off this parameter if you are handling file saves with your own procedures or if you are displaying drawings as read-only. The correct command syntax is:

4R Set Preferences <param1> <param2> <param3> <param4> <param5> Confirms

The Confirms parameter can have one of three values: 0 for off, 1 for on, or -1 for unchanged. The Confirms parameter also works with the 4R Get Preferences function.

**David Green**

**Cannas, California**

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*Macintosh Compatible means we run our company completely on Mac. Everyone has at least one Mac in the back, equipped with 16 meg RAM, 40MB Hard Drive, 14" color monitor, connected via our Ethernet network to our custom-programmed database. The network literally runs all phases of our operation—product information, order taking, order processing, inventory control, accounting, and customer service, technical support. All of us also have complete desktop communications, connecting to online services and other corporate sites around the world via email, networked modems, and FAX modems. So you see, we don't just sell 600MB hard drives, high-speed networked modems, and System 7 applications—they're all an integral part of our day-to-day operation.
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Desktop Publishing Techniques

BY JIM HEID

TODAY'S DESKTOP PUBLISHING programs are capable of turning out top-quality publications. But are you? If you were a publishing professional before the Mac appeared, chances are you've made the transition to the desktop without too much pain. But if you're new to publishing, you might be overwhelmed by the array of options in programs such as Aldus PageMaker and QuarkXPress. Kerning, tracking, letter spacing, spot color, smart (curled) quotes— it's almost enough to make you long for the old Selectric.

Some publishing neophytes address this onslaught of features by ignoring it, relying on their program's default settings for page size, spacing, and the rest. As a result, many desktop publications look like desktop publications—the efforts of someone with a powerful program but without the knowledge to fully apply it.

Fortunately, it's not too difficult to take the "desktop" out of desktop publishing. This month, I spotlight several techniques for adding polish to publications. The instructions here apply to QuarkXPress 3.1 and PageMaker 4.2, but similar concepts apply to all publishing programs, and even to some word processors.

Page-Size Decisions

ONE OF THE MOST BASIC DECISIONS behind any publication is the choice of page size, or trim size. Chances are you frequently opt for portrait, or tall, the 8½-by-11-inch page size offered by QuarkXPress and PageMaker. After all, that's probably the largest paper size your laser printer can handle, and it's the most common size used by print shops.

But before okaying that New dialog box, consider the options. For starters, consider a landscape, or wide, orientation—11 by 8½ inches. It might work well for a small poster, for a publication with wide graphics, or for a calendar.

If you're a bit more ambitious, consider turning that letter-size sheet into a two-sided job. By folding the sheet two or three times, you can create an attractive booklet, menu, or brochure. A two-sided job costs more to print, but it's impossible to say just how much more. The cost of a print job depends on many factors, including the quantity you print, the paper you use, the number of printers in your area, and the type of equipment each printer has. It's a good idea to get several estimates. If you're printing a small run on your laser printer, investigate the wide selection of specialty papers available from mail-order houses such as Paper Direct (800/272-7377). Besides stiff card stocks, Paper Direct also sells paper preprinted with splashes of color and patterns around which you can structure your design.

You can produce tabloid-size or even billboard-size publications by using your program's tiling feature. Simply specify the final page size when setting up the document, and then activate the tiling option when you print. The program divides the large page size into a number of letter-size pages that you can tape together or paste up on layout board. A large size such as tabloid (11 by 17 inches) costs more to print than a letter-size publication, but again, it is impossible to provide specific percentages.

One more large-output tip: many copy shops have blueprint photocopiers that accept originals up to a few feet wide, with no length limit. You can produce some mighty impressive banners by using tiling and then photocopying the assembled page.

How to: QuarkXPress To specify a wide page orientation, type the appropriate dimensions in the New dialog box's Width and Height boxes. To use tiling, first specify the final page size in the New dialog box. When you're ready to print, choose Print and then click on the Manual or Auto tiling button, depending on the desired tiling scheme.

How to: PageMaker Click on the Wide button in the Page Setup dialog box. To use the tiling feature, first specify the final page size in the Page Setup dialog box. When you're ready to print, choose Print and then click on the Options button. Choose the Tile option in the Aldus Print Options dialog box. PageMaker is preset to overlap .65 inch of the publication on each page to help you assemble the tiles. You can change that overlap amount or specify manual tiling, which lets you determine how to divide the page. Manual tiling is useful when you don't want a graphic or line of text to be divided across two tiles.

Are You Typographically Correct? THE EASIEST WAY TO SPOT A DESKTOP published job is to look at the punctuation. Are the quotes and apostrophes "curled" (like these), or are they those tacky "typewriter" quotes (like those)? Are there two spaces after periods (the style taught in Typing 101) or just one (the typographically correct style)? Also look for double hyphens—how gauche—which should be true em dashes—that's better.

PageMaker and QuarkXPress translate typewriter quotes and double hyphens found in word processor files into their typographically correct counterparts. This translation occurs automatically when you import the word processor file.

But automatic punctuation conversion doesn't address text that you type directly within the publishing program, such as headlines and last-minute corrections. You can use PageMaker's smart quotes option to automatically convert quotes as you type, but that won't guard against double word spaces or double hyphens. That's your job. If you use QuarkXPress, you have to remember to use the fingertangling key sequences that summon quotes as well as dashes. Or give your tendons a break and use one of the keyboard-modifying system extensions available through user groups and on-line services (see "Smart Punctuation Made Easy").

How to: QuarkXPress To have QuarkXPress convert quotes and double hyphens when importing text, choose the Convert Quotes option in the Get Text dialog box. QuarkXPress has no option for converting quotes as you type or edit text, but it does have an option that automatically generates ligatures—connected character pairs such as fi and fl—as you type or import text. To use this option, choose Ty-
pographic from the Preferences submenu (in the Edit menu). In the ‘Typographic Preferences dialog box, choose the On option from the Ligatures pop-up menu.

How to: PageMaker Choose the Convert Quotes option in the Place dialog box. To specify that PageMaker convert quotes as you type or edit text, choose Preferences from the Edit menu and then check the Other Preferences dialog box. Finally, choose Use Typography’s Quotes.

Better Spacing, Part I: Tracking and Kerning

TO DETERMINE HOW MUCH SPACE TO put between words and characters, a publishing program relies on information built into a font. This spacing data is designed to (and usually does) produce attractive results within the range of body text sizes—roughly 8-point to 12-point. But with larger sizes, the spacing between characters and words can appear exaggerated. By using your program’s tracking and kerning features to tighten spacing, you can improve the legibility of headlines (see “Tracking and Kerning”).

A tracking feature automatically adjusts the spaces between selected characters. With small sizes, spacing is increased to open up the text and make it less dense. In large sizes, spacing is decreased to tighten up the text. It’s this latter aspect of tracking that is useful for headlines.

Kerning involves adjusting the spaces between only certain character pairs. Kerning features come in two flavors: manual (you specify how much space to add or remove from where) and automatic (the program removes space from certain letter pairs such as T0, based on information built into the font you’re using). Automatic kerning adds polish to body text, but for large headlines, you’ll want to use manual kerning to achieve the best look. But don’t kern too tightly; characters should not touch. You might need to zoom in on the characters you’re kerning to see the results.

Better yet, try printing a test page on the printer you’re using for final output, since resolution varies depending on the resolution of the output device.

How to: QuarkXPress QuarkXPress offers just one track—though it is customizable. To activate tracking, you must also turn on automatic kerning—choose Typographic from the Preferences submenu, then choose Auto Kern Above. (As with PageMaker, you can specify a type-size threshold for automatic kerning.)

To manually remove space between characters, place the blinking insertion point between two of them (or highlight a range of characters), and then press $shift-\$ or, to achieve finer kerning, $option-shift-\$ (see “Kerning from the Keyboard”). You can also click on the kerning arrows in QuarkXPress’s measurements palette, or type a kerning value in the area to the right of the kerning arrows. Type a negative value (for example, -2) to reduce the spacing.

How to: PageMaker PageMaker sports the best tracking features of any publishing program, offering five tracking commands ranging from Very Loose to Very Tight. (However, unlike QuarkXPress’s track, PageMaker’s tracks can’t be customized unless you buy a utility such as Edco Services’ PMtracker. What’s more, PageMaker includes tracks for only the 35 fonts built into most laser printers.) For tightening headlines and other larger-size elements, try the Normal track for starters. As for kerning, PageMaker is preset to automatically kern sizes above 12-point; you can change that size value using the Spacing Attributes dialog box—choose Paragraph from the Type menu and then choose the Spacing option. (Specifying a smaller value slows PageMaker’s performance at formatting body text.) In PageMaker, automatic kerning is a paragraph-level attribute—you can turn it on or off for a given paragraph. To use (or disable) automatic kerning for a range of paragraphs, select those paragraphs before choosing the Paragraph command.

For several methods of manually kerning two characters, see “Kerning from the Keyboard.” You can also kern a range of characters using the same techniques; simply select the characters first.

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Better Spacing, Part II: Justified Type

THE TYPE IN NEWSLETTERS AND MAGAZINES is often justified—aligned against the left and right margins. To justify text, a program adds space between characters and words. And therein lies the potential for poor spacing. With narrow columns, a program often has to insert too much space between words or characters, resulting in distracting rivers of white space (see “Clear the Rivers”).

With a word processor, there’s little you can do to avoid rivers aside from hyphenating the text so that more fits on each line. (You can also reduce the point size or increase the column width, but these measures may compromise the original design.) But publishing programs continue.
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give you far more control over interword and intercharacter spacing. By tweaking your H and J—hyphenation and justification—settings, you can keep those rivers within their banks.

Both QuarkXPress and PageMaker allow you to specify three characteristics for spacing: minimum, the least amount of space that can be put between characters or words; optimum, or desired; and maximum, the largest allowable amount of intercharacter or interword spacing. By adjusting any or all three of these settings for both word and character spacing, you can finely control how text is justified.

There are no specific settings that guarantee good justification. Increasing the maximum amount of letterspacing results in fewer large spaces between words, but too much letterspacing can make words appear to run together. Decreasing the space between characters allows more text to fit on a line, but the text can appear too dense. Experiment to find the ideal spacing settings for a specific job.

Another way to fix a spaced-out line is by hyphenating. QuarkXPress and PageMaker have automatic hyphenation features and also enable you to manually insert discretionary, or soft, hyphens. A discretionary hyphen tells the program, "If the letters to the left will fit on the pre-vious line, then divide the word here and insert a hyphen. If they won't fit, then don't divide the word." If reformating or editing changes the line break, the hyphen disappears but the discretionary hyphen code remains.

How to: QuarkXPress QuarkXPress calls a set of spacing and hyphenation specifications an H&J, and lets you create as many H&Js as you like. To edit the standard H&J (the default that's applied to text unless you specify otherwise), choose H&Js from the Edit menu and then double-click on the H&J named Standard. Specify the desired spacing settings in the subsequent dialog box. To create a new H&J, choose H&Js and then click on the New button. If you modify or create an H&J when no documents are open, your changes will be available in all future documents you create.

To create a discretionary hyphen, position the insertion point at the possible word break and then press the hyphen key.

How to: PageMaker To change the spacing settings for a given paragraph, select the paragraph and then choose Paragraph from the Type menu. In the Paragraph Specifications dialog box, click on the Spacing button. Type the desired spacing values in the appropriate boxes. To change the default spacing settings for an entire document, use the Paragraph command when no text is selected. To change the defaults for all new documents, use the command when no document is open. To insert a discretionary hyphen, position the insertion point at the possible word break and then press the hyphen.

PageMaker has a unique feature that highlights lines with bad spacing, making it easier to spot them. To activate it, choose Preferences from the Edit menu and then choose the Loose/Tight Lines option under Show Layout Problems.

A Spot of Color
A GOOD WAY TO ENLIVEN A PUBLICATION is with color. I'm not talking about full-color photographs or illustrations, which can be technically complex to work with and expensive to print, but spot color—adding color to elements such as headings, lines, and boxes that would otherwise be black. Using spot color is an easy way to add emphasis and pizzazz to a page, and it doesn't require any exotic hardware. You can even work with spot color on a monochrome Mac such as a Classic, although you obviously won't see the colors on screen.

When you print a publication containing spot color, you tell the program to print a separate page, or overlay, for each spot color you use. You then supply these pages to the printshop, which will create a printing plate for each color.

Because a multicolor job must be run through a press more than once (or through a press capable of printing more than one color at once), it costs more than if you use just one color. Costs for multicolor jobs can vary dramatically from one printer to the next. If one printer has a press designed to print two-color jobs, you'll get a better price than if you use a printer that runs the publication through a one-color press twice. If you're producing a limited run on a laser printer, you can add spot color by hand using Letraset's ColorTag color foils (see "Getting Started with Print-Output Media," Macworld, September 1991).

Just as paint stores use standardized swatch books, the printing industry uses standardized color-matching systems that let you choose hues. One of the most popular is called the Pantone Matching System. Both PageMaker and QuarkXPress let you assign Pantone colors and see them on a color monitor. When you take your artwork to the printer, you specify by number which Pantone colors you want—as in Pantone 350.

In both PageMaker and QuarkXPress you assign color to elements by clicking on a color palette. Normally, the palette lists only a few basic colors such as red, green, and blue. You need to use a command to add other colors to the palette.

How to: QuarkXPress To add a Pantone color to QuarkXPress's color palette, choose Colors from the Edit menu and then click on New. In the Edit Color dialog box, choose Pantone from the Model pop-up menu. Select the desired Pantone color and then click on OK. Finally, click on the Save button in the Colors dialog box. To assign a color to text or to a graphic element, select the text...
or element and then click on the color name in the color palette. (If the color palette isn’t visible, choose Show Colors from the View menu.) To print the separations for each color, choose Print and choose Make Separations. To help the printshop align the plates correctly, you might also want to choose the Registration Marks option.

How to: PageMaker  Choose Define Colors from the Element menu and then click on New. In the Edit Color dialog box, click on Pantone, and then select the desired color and click on OK. To assign a color to text or to a graphic element such as a rule, select the text or element and then click on the color name in the color palette. (If the color palette isn’t visible, choose Color Palette from the Windows menu.) To print the overlays for each color, choose Print from the File menu and then click on Options. In the Aldus Print Options dialog box, click on the Spot Color Overlays button.

Next Steps

IF YOU'RE COMMITTED TO MAKING publications look professionally typeset, you might want to investigate the expert sets sold by Adobe and other fonts vendors. Expert sets include special characters not found in most fonts, including true small capitals, old-style numerals, and fractions (see “Expert Characters”).

For more advice on using type, see the four-part series that appeared in Macworld last year, starting with the July 1991 issue. For general advice on publication design, I recommend Graphic Design for the Electronic Age, by Jan V. White (Watson-Guptill Publications, 1988).

Most publishing programs include a library of predesigned templates for common types of publications, including newsletters, brochures, invoices, and books. PageMaker includes an especially attractive template library; the Templates Guide manual has tips for modifying the templates to suit your needs.

Perhaps a future generation of publishing programs will have the smarts to handle many design and typographic chores for you. Until then, you must make the same decisions that designers and typesetters have been making for centuries, decisions aimed at one goal: conveying your message in an appropriate, aesthetically pleasing way.

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Connecting Your Mac with the Rest of the World

With a modem, your Mac can communicate with the rest of the world. White Knight (née Red Ryder and available from The FreeSoft Company, 412/846-2700; fax 412/847-4436) has been the definitive general-purpose communications program for the Mac. It became popular among power users because of its versatility, and it has also become a fairly easy program for beginners.

Both modems must communicate at the same speed. It should be fairly obvious that when two different modems are communicating, the slower of the two is the limiting factor—if a 2400-bits-per-second (bps) modem calls a 1200-bps system, the maximum data-transfer rate is 1200 bps.

Choosing Serial Port Settings

The Serial Port dialog box (Select under Com—Communications) includes a command that the Mac sends to your modem each time you run White Knight. This command typically is an exotic hieroglyphic like ATEcho. This particular command gives the modem three instructions. AT is the attention code used by Hayes-compatible modems to indicate that a set of commands follows. E1 instructs the modem to echo back each character that it receives. QO tells the modem to send back status reports. V1 instructs the modem to send the status reports as English text (for example, CONNECT 1200 instead of status 5).

White Knight uses these commands to monitor your modem's status; you shouldn't modify them, but you can add commands to make your modem more versatile. For example, to avoid disturbing others, use the command M0 to shut off the modem's speaker. Use it with care, though, since you won't be able to hear when a connection is made. The command 50=1 tells the modem to answer the phone on the first ring, and 50=0 tells the modem to ignore incoming calls.

Other commands can be used to set up international dialing protocols—getting the two computers to understand each other. There are dozens of different parameters, which combine in thousands of different ways and which must be set properly for two computers to communicate. Fortunately, it's easy to figure out the correct permutation if you know a bit more about the parameters.

Both modems must communicate at the same speed. It should be fairly obvious that when two different modems are communicating, the slower of the two is the limiting factor—if a 2400-bits-per-second (bps) modem calls a 1200-bps system, the maximum data-transfer rate is 1200 bps.

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parameters, control sequences, and a variety of other options. Better modem manuals include an explanation of the different AT commands.

When you are offline (not connected to another computer) you can type in AT commands directly from White Knight, and White Knight will show the modem’s responses, which are typically verifications of your changes. If you’re online with another computer, you can go to the command mode by waiting for a couple of seconds, typing three pluses (+++), and then waiting another couple of seconds until the modem responds with “OK?” The purpose behind the wait is to prevent three pluses in a normal document from accidentally putting the modem into the command mode. After you finish sending commands to the modem, typing ATO puts you back online.

One use for sending direct commands is when your modem is connected to another user’s modem and you want to temporarily shut off the modem to talk on the phone with that user, but you wish to continue sending data after you finish talking. Both users should instruct the modem to go into command mode, pick up the telephone, and instruct the modem to hang up (by typing ATH or choosing Hang Up from the modem submenu under White Knight’s Service menu). To continue sending data one user should type ATA to tell the modem to pick up the phone and give a carrier, and the other user should type ATO to respond to that carrier. Both of you should then hang up and proceed with the modem communications.

Besides calling other computers, you can have other computers call you. If you don’t have auto-answer (AT=MA) turned on, you can instruct the modem to pick up the phone manually by typing the AT(A command. Once you connect with another computer you should type a greeting message on your computer and verify the communications parameters.

### Using MacBinary

MacBinary is a file format that bundles the hidden portions of Mac files that help the Mac recognize the files. Most users never have to worry about resource forks or Finder information, but when you transfer a file from one computer to another, especially via a computer that’s not a Mac, some of the Mac-specific elements of the file can get lost. The most common symptom of an improperly transferred file is a blank icon that can’t be opened by any of your applications. Saving a file in MacBinary format ensures that all of the file’s elements remain intact, even if the file is uploaded from a Mac to a mainframe computer and then downloaded to another Mac.

White Knight supports the MacBinary format, but gives you the option not to use it (AT=OF). Why would you not want to use MacBinary? If you are transferring a generic file (such as a text file) for use on other computers, then you probably don’t want to use MacBinary. White Knight gives you the option to use MacBinary always, never, or with all files except text files.

### Talking to Non-Macs

White Knight can also communicate with other types of computers. They can connect to the Mac via modem or directly, with a special serial cable, if the systems are physically close enough. To connect two computers directly you need the normal cables used to connect each computer to a standard modem, and a modem eliminator with two female connectors. A modem eliminator lets two computers connect without a modem. Once the cables are hooked up, White Knight and the other communications program act like they’ve already called each other. Since the computers are connected directly, the programs can be configured for their fastest speeds.

Programs can only be shared by compatible operating systems (for example, a Macintosh HyperCard stack will not run on HyperCard on other types of computers), however, data files (word processor documents, spreadsheets, graphics, and so on) can be accessed by different computers using various applications. The simplest, most universal form of generic data is plain text. There are several variations of text formatting, though. The Mac Operating System does not want a line feed (an instruction to start on a new line) after each return, while line feeds are required for DOS computers. Some computers require a return to be sent at the end of each line, while other computers prefer returns only at the end of each paragraph.

It’s fairly easy to adapt between different formats. Most Mac word processors can read plain text files and include a Save As command to save plain text files, with or without carriage returns. White Knight’s Filters command (AT=FE) automatically strips extraneous line feeds following returns. When sending text files to DOS computers, White Knight can automatically send a line feed after each return via its Key Mapping dialog (AT=OM).

If you receive a DOS text file that has embedded line feeds, they will show as blank (box) characters in most fonts. They can easily be removed by using a word processor’s find-and-replace function to delete every control-J (line feed) character.

### Other types of data can be shared between different platforms.

Many Mac programs are intelligent enough to read foreign file formats (for example, Excel can read Lotus 1-2-3 files). Programs on other computers may have the ability to save files in a Mac-compatible format. In addition there are transportable formats that can be used by a variety of computers. TIFF (tagged-image file format) and GIF (CompuServe’s Graphic Interchange Format) graphics can be created and read by a variety of computers. These files should be transmitted directly from computer to computer without any translations or filters.

### The Phone Book

With earlier versions of Red Ryder you had to enter the AT command ATDT before dialing each phone number. With White Knight, just enter a phone number and the modem should respond appropriately. However, when using White Knight’s phone book you still need to enter a modem-dialing command before each saved phone number you enter in the phone book. Don’t forget to include prefixes needed for outside lines, pauses to wait for dial tones, or codes for features such as disabling call waiting.

If you’ve got a valuable White Knight tip, share it with other Macworld readers by sending it to Quick Tips, Macworld, 201 Second St., San Francisco, CA 94107.

*Author PHILIP CHIEN has used Macs since the original Lisa, and has been modemming since 1979. He is currently writing a book on telecommunications.*

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GRID Systems Corp 510/226-5345; fax 510/683-0903.

IBM Corp. 407/882-7376; fax 407/441-4469.

MicroSlice 514/444-3680; fax 514/444-3683.

Microsoft Corp. 312/802-8990; fax 312/904-9200.

Momenta Corp. 415/869-3876; fax 415/969-3877.

NCR Corp. 212/213-7005; fax 212/213-2199.

NEC Technologies 408/433-1350; fax 408/433-1890.

PentWord 415/674-7661; fax 415/922-8984.

Pl Systems Corp. 503/293-9585; fax 503/293-9590.

Pocket Computer Corp. 408/764-9400; fax 408/946-0609.

Sharp Electronics Corp. 210/529-9500.

Solaris Technology Corp. 800/313-8131; fax 800/313-8132.

TriGem Computer 408/870-0844; fax 907/870-0870.

Tusk 407/881-9009; fax 407/884-1851.

SIXTH ANNUAL WORLD-CLASS AWARDS


- Adams 408/666-7820.

- Acus 510/480-4395.

- Adams 510/480-4395.

- Aldus Corp. 510/480-4395.

- Alumac 510/480-4395.

- Amiga Technologies 510/480-4395.

- Berkeley Systems 510/480-4395.

- Broderbund Software 415/382-4400.

- Casar Corp.


- ChipSoft 415/453-8722.

- Clementsoft Software 510/480-0810.

- CocoaSoft 619/494-2424.

- Computer Software 617/944-7610.

- Cupertino Computing 510/480-6650.

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- **ABCD**
  - CARRY CASE C, C, K, S, M, W, W
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- **ARTICULATE SYSTEM**
  - VOICE NAVIGATOR II
  - VOICE IMPACT
  - VOICE IMPACT PRO
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  - MACRO PLUS
  - ORANGE MICRO
  - CRAPPYPI II
  - CRAPPYPI II B 5
  - CRAPPYPI II SP
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  - 5.6" X 4" STANDARD TABLET
- **OMEGA**
  - CH INON
  - SOFTY IARE VENTURES
  - COMPUTER PERIPHERALS
  - KEYTRONICS
  - WACOM
  - ORANGE MICRO

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- **FASTTRACK SCHEDULE 2.0**
  - This new version makes scheduling even easier:
    - Draw custom bar chats right on screen for scheduling anything from product launches to department priorities.
    - And for high powered presentations, add graphics, text blocks, logos, titles and more.
    - Finally...you can pay more attention to your projects and less to your software.

- **MASS MICRO SYSTEMS**
  - DATAXX 46 REMOVABLE HD
  - DATAXX 24 REMOVABLE HD
  - DIAMOND PORTABLE 2" 3 MAKE
  - DIAL Pad XPC 3 MAKE
  - HITCH HIKER 40 MB
  - HITCH HIKER 80 MB

- **MAXTOR**
  - 50 MB EXTERNAL
  - 50 MB EXTERNAL
  - 120 MB EXTERNAL
  - 213 MB EXTERNAL
  - 1.2 G EXTERNAL

- **OPTICAL ACCESS INTERNATIONAL**
  - ACCESS RD/RA

- **PLI**
  - INFINITY 39 SINGLE WICADITATE
  - INFINITY 39 OPTICAL 2MB

- **APPL ENGINEERING QUICKSILVER**

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**Storage**

- **OPTIMA 24 FOR THE MAC**
  - Best buy V 42/482 sins and MNP 6 error-control and data compression
  - An 8600 bps throughput
  - Mac-bi

- **COMPUTER PERIPHERALS**
  - V6A 24 TIME NO/6000 SENDREC V 2.12
  - V6A 24 TOWER DESIGN
  - HOODUP 2400 SE

- **CYPRUS**
  - FAXPRO II

- **HAYES**
  - HAYES CONNECT 3.0

- **OPTIMA COMM**
  - 1000
  - 2500
  - PERSONAL MODEM 2400 PLUS
  - SMARTMODEM 2400 A SMARTCOM
  - SMARTCOM II 3.3 for the MAC
  - ULTRA 1500 MODEM & SMARTVITES

- **SOFTWARE VENTURES**
  - MICROPHONE II E 4.0

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**Monitors & Boards**

- **APPL ENGINEERING QUICKSILVER**

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**Business**

- **KODAK DICONIX M150**
  - Plus Printer
  - Now you can print anywhere with the Portable KODAK DICONIX M150 Plus Printer and the MACINTOSH POWERBOOK.
  - So small it's light and it can be carried in a briefcase.
  - Small it's prints striking graphics and crisp text using Adobe Type Manager software.

- **LOTUS 1-2-3 FOR MAC**
  - Lotus 1-2-3 V3 for Macintosh exploits the full power of your Macintosh PowerBooks.
  - Great for creating reports, charts, graphs, and complex calculations with little effort.
  - It's simple to use and powerful enough for the most demanding tasks.

- **ACCTEX 3.0**
  - New with Interactive Verifier
  - Kerox Imaging Systems' Acctex 3.0 is an intelligent Character Recognition (OCR) software to convert scanned documents to Mac applications.
  - Features exclusive interactive Verifier which enhances accuracy on poor quality documents. System 7 compatible, format retention, on-screen help and support for ten languages.

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**Graphics & Publishing**

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  - DESIGN Interior/Landscape/Architecture
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The fastest, most feature-rich contact database manager for the Mac. Speedy access to all your contacts on your PowerBook and complete personalization of your address book in print form. DM and application versions are included. You can print double-sided address book pages to our Dynopaper (we’ve included 40 sheets for you to try), or print Rolodex cards, envelopes, labels or any other custom form. MacWEEK named DYNODEX the 1991 Target Award Winner for Best Contact Management software.

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ETC Repeater
The ETC Repeater is an economic and easy solution to expand your ethernet network. The ETC Repeater provides two BNC ports for connection to two thin-ethernet segments, IEEE 802.3 10 Base2 Thinnet standard, full multi-port functions, four LEDs indicate both segments' reception and transmission status and supports a maximum of five segments with a network length of 5005 ft, via four repeaters.

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- Allows seven additional SCSI devices to be added to your Mac.
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ETC PowerGlide 105 Keyboard!
Features:
- 105-key extended keyboard layout with full cursor control; 15 function keys, and numeric keypad
- Apple Desktop Bus (ADB) Interface
- Foreign Language keyboards are also available

ETC Tools 2.2 is a completely new version of the formatting utility that ETC now ships with their DataPort drives—there has never been anything like it before. Its worry-free graphic interface makes formatting and initializing cartridges and drives a snap. You'll never have to fear whether you are erasing the right drive again. You can even combine separate drives into what appears to be one giant hard disk on your desktop with ETC Tools' SuperVolume feature.

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- 8MB RAM 105 MB hard drive: $3,799
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<td>$1195</td>
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<td>SHARP IA &amp; MODEMAN II</td>
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<td>SEIKO PERSONAL COLORPOINT PS</td>
<td>$2000 or 140 per page</td>
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<td>$1555 or 45 per page</td>
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<tr>
<td>UMAX UC-630</td>
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<tr>
<td>MAC IISUPER SYSTEM</td>
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<td>MICROTEK 600ZS 24-BIT COLOR SCANNER</td>
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<td>SUPERMAC VIDEO SPOT</td>
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<td>Apple Design Systems</td>
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STORAGE SYSTEMS

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Disk Drives

Media

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<td>150 MB Tape for Teac</td>
<td>240 MB</td>
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<td>Syquest 45 or 56 MB</td>
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OptiDisk 600      600MB (Sony) 2065.00
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PRINTERS

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### Wacom Touch Sensitive Tablets

<table>
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<th>Model</th>
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<tr>
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<tr>
<td>12x12 Electrostatic</td>
<td>$710</td>
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<tr>
<td>18x24 Standard</td>
<td>$2549</td>
</tr>
</tbody>
</table>

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**Microtek 6002S $1229**
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### Turbo microLaser Plus PS/35 $1949
- RISC Processor
- Postscript Level 2
- AppleTalk Interface
- 16ppm Turbo microlaser PS/35 XL (3129)

### Touch Sensitive Tablets

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<thead>
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<td>$710</td>
</tr>
<tr>
<td>18x24 Standard</td>
<td>$2549</td>
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### Video Spigot starting at $399

**Thunder Cards = Call**

### Microsoft

**Microtek 6002S $1229**
600 DPI 24-bit Scanner with Photoshop 2.0
& ScanMatch Calibration Software

**Microtek 1850S $1489**
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- 1MB TI Upgrade $59 • Replacement Toner $55

### Video Spigot starting at $399

**Thunder Cards = Call**

### Scanner

<table>
<thead>
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<th>Model</th>
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<td>HP LaserJet</td>
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<td>Minolta DQG with PhotoShop E</td>
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<td>Minolta DQG with Photoshop</td>
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<td>Minolta 2600 Sberger</td>
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<td>Sharp JX200 w/Interface</td>
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<td>Sharp JX300 w/Intermediate</td>
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<td>Unix Color/Photoshop</td>
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<td>Unix 1200 w/Photoshop</td>
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### DRIVES & TAPES

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<td>Apple Express Plus Drive</td>
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<td>Benih HD/AV Interface</td>
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<td>HP Duplex Floppy/Turbo Floppy</td>
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<td>PL Quick SE/2 with Cable</td>
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<td>Quantum 425GB</td>
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<td>Fujitsu 60GB/120GB</td>
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<td>Fujitsu Drivers All Models</td>
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### CD ROM

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<td>CD-RW Drive</td>
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<tr>
<td>NEC CD/39 w/Type Generator</td>
<td>$499</td>
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</tbody>
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**$1269**

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<th>SYSTEMS</th>
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<tr>
<td>Mac LC II 4/40</td>
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<td>Mac Iici - 5 meg</td>
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<td>Mac Iici - 5/105 (Quantum)</td>
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<td>Mac Iisi - 3/40</td>
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<td>Mac Iisi - 5/80</td>
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<tr>
<td>Extended Keyboard</td>
<td>170</td>
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<tr>
<td>Mac Quadra 700 - 4 meg</td>
<td>4399</td>
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<td>Mac Quadra 700 - 4/105</td>
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<td>Mac Quadra 900 - 4 meg</td>
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<td>Mac Powerbook 140 2/20</td>
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<td>Mac Powerbook 140 2/40</td>
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<td>Mac Powerbook 140 4/40</td>
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<td>Mac Powerbook 170</td>
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**Monitors (cont.)**

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<th>Monitor</th>
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<td>Platinum Two-Page Display</td>
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<td>Super Match 19&quot; Color</td>
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<td>Super Match 21&quot; Two-Page Color Display</td>
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<td>Dual-Mode Trinitron 19&quot;</td>
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<td>Thunder/8</td>
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<td>Spectrum 8.24 PDQ</td>
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<td>Magnavox 14&quot; Color Monitor</td>
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**Drives**

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<td>Quantum 105 Pro</td>
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<td>Quantum 210 Pro</td>
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<td>Quantum 240 Pro</td>
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<td>Maxtor 120</td>
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<td>Maxtor 213</td>
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<td>Maxtor 340</td>
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<td>Maxtor 180 meg</td>
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<td>Seagate 1.2 gigabyte</td>
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<td>Syquest 44MB</td>
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<td>Internal Drive Kit</td>
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<td>Syquest 44MB cart.</td>
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<td>Road Runner 80 meg for Powerbook</td>
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<td>Fujitsu 425 meg 5yr. warranty</td>
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**Software**

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<td>Microsoft Word</td>
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<td>Microsoft Excel</td>
<td>309</td>
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<td>Aldus PageMaker</td>
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<td>Adobe Photoshop 2.0</td>
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<td>Quark Express 3.0</td>
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**Printers**

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<td>Microtek TrueLaser</td>
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<td>TI Microlaser PS35</td>
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<td>Apple LaserWriter IIg</td>
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<tr>
<td>IP I1004 Mac</td>
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**Scanners**

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<td>Logitech ScanMan 32</td>
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<td>Microtek 600ZS w/Photoshop</td>
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<td>Microtek 1850S Slide</td>
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<td>Scanner</td>
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<td>Umax UC-630 w/Photoshop</td>
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<td>Caere Typist</td>
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**MODEMS**

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<td>Modem MX 2400S w/SendFax</td>
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<td>v.32 Turbo w/v.42bis</td>
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<td>w/MPN software</td>
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<td>Dove Fax Modem 9624</td>
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**ACCELERATORS**

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<td>40 Mhz PowerCache</td>
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<td>50 Mhz PowerCache</td>
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<td>60 Mhz PowerCache w/68882</td>
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**MEMORY**

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<td>4 meg for LC/C1/S1</td>
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<td>Powerbook 140 &amp; 170 &amp; 4 meg</td>
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<td>Powerbook 140 &amp; 170 &amp; 6 meg</td>
<td>369</td>
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<tr>
<td>Envisio Powerbook Display Adapter and memory</td>
<td></td>
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<tr>
<td>Call</td>
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  CALL
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<th>Price</th>
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<tr>
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<th>POWERBOOK</th>
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<td>16 MH Accelerator Classic</td>
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<td>16 MH Accelerator SE</td>
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Minneapolis, MN 55401
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Fax: (612) 371-9342
AppleLink: ComCare

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CATALOG

Peripherals

SONY RICOH SUPERMAC PLI PINNACLE MICRO

REWRIITABLE MAGNETO OPTICAL STORAGE SPECIALS!

SONY 501
SONY 301
RICOH 9200EH

600MB 5.25" OPTICAL $2,499
128MB 3.5" OPTICAL $1,459
600MB 5.25" OPTICAL $1,799

Faster than E!

• 66 msec access!
• Sony 600MB cartridges
• Sony 600MB cartridges
• Sony 600MB cartridges
as low as $129!
as low as $129!
as low as $129!

• MO Cost Per MBbyte?

All drives include SW., cables and 1 cartridge!

MO Cost Per MBbyte?

• Sony 600MB = $0.198
• Sony 600MB = $0.215
• Sony 600MB = $0.235

MO Cost Per MBbyte?

- Sony 128MB = $0.305

MO Cost Per MBbyte?

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20 inch
256 Grayscale Package
$799

Complete package includes monitor, 8-bit video board, and cable!

Hurry! available only for a limited time!

SIMMS & Cards

All SIMMS are guaranteed and are covered by our limited
90-day warranty.

1 Meg.
64K x 8 - 109**
$29

16 Meg.
16M x 8/32Ms Mac Low Profile**
$49

2 Meg.
2M x 8/32Ms Mac**
$69

8 Meg.
8M x 8/32Ms Mac**
$149

4 Meg.
4M x 8 - 109**
$119

16 Meg.
16M x 8/32Ms Mac High Profile**
$199

256K Video SIMM***
$39

Classic - 3 Meg. Exp. Card w/16**
$49

Co-Processor - Classic II & LC*
$289

Powerbook - 2 Meg. Expansion Card**
$149

Powerbook - 4 Meg. Expansion Card**
$249

Powerbook 6 Meg. Card**
$349

** Minimum
*** Maximum + 4

24-Bit Color Scanner

$999

Available with Color Studio LE, and Scan-Do software.

In-millen colors/2-color grays $999 - 4600

Easy-to-use, easy-to-get, easy-to-sell. Made especially for business and professional applications. Prices low for less than color scanners. Price is per image only. In-millen colors is approximately 5000 colors at 9600 dpi. Anti-aliasing and many more can. There are many colors to choose from in the lower colors.

Océ Color Printer

$4,999

"A" & "A" Size Color printers

Brochure, postcard, letter size

- In million colors - Pantone Certified
- Four Adobe PostScript-300 DPI, Mac & Windows
- PI Week entry at "Best Printer"
- Personal Publishing's "Product of the Year"
- The most cost-effective color printer in the world

Océ C2421-PS A" x A" Mac. RAM... 2,999
Océ C2421-PS A" x B" Mac. RAM... 4,499
Océ C2421-PS A" x A" Mac. RAM.. 2,999

Demo Special: Océ Graphics "B" Color Printer... 1,999

Miscellaneous

9600 Xela S/V FAX 2400

$149*

Brochure, letter size

- Touch Memory Nub
- Custom-Manufactured for Macintosh
- 7000 pages at 3x1200 DPI

Powerbook Carry Case

$59

- Tough Removable Nylon
- Custom-Designed for Macintosh
- Weather Resistant

Larger Powerbook (all models)... 19
Larger Classic... 19
Larger SI..SI/10 lightweight keyboard... 19

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SyQuest Drives

2-Year Warranty

$439 $599
Mobile 44 Mobile 88

Includes: SyQuest cartridges, cables, and manuals!
Low Cost Additional Cartridges

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>44 Meg. SyQuest Cartridge</td>
<td>1.4 GB</td>
<td>$439</td>
</tr>
<tr>
<td>88 Meg. SyQuest Cartridge</td>
<td>2.8 GB</td>
<td>$499</td>
</tr>
<tr>
<td>60 Meg. Exe Compatible Tape</td>
<td>1.8 GB</td>
<td>$299</td>
</tr>
<tr>
<td>160 Meg. Exe Compatible Tape</td>
<td>4.0 GB</td>
<td>$299</td>
</tr>
<tr>
<td>256 Meg. DC-6258 Tape</td>
<td>5.1 GB</td>
<td>$399</td>
</tr>
<tr>
<td>600 Meg. Exe Compatible Tape</td>
<td>12.2 GB</td>
<td>$799</td>
</tr>
<tr>
<td>1.5 Gig. DAT 4 mm Data Tape</td>
<td>9 GB</td>
<td>$499</td>
</tr>
<tr>
<td>2.1 Gig. DAT 4 mm Data Tape</td>
<td>13.5 GB</td>
<td>$799</td>
</tr>
<tr>
<td>2/3 Gig. Exabyte Compatible B Tape</td>
<td>16 GB</td>
<td>$999</td>
</tr>
<tr>
<td>128 Meg. 3/4&quot; Optical Plastic</td>
<td>32 GB</td>
<td>$499</td>
</tr>
<tr>
<td>500 Meg. 5/4&quot; Optical Plastic Single</td>
<td>30 GB</td>
<td>$699</td>
</tr>
<tr>
<td>600 Meg. 5/4&quot; Optical Plastic Single</td>
<td>60 GB</td>
<td>$699</td>
</tr>
<tr>
<td>1.6 Gig. Optical Glass, Maxell</td>
<td>80 GB</td>
<td>$699</td>
</tr>
<tr>
<td>600 Meg. Optical - Plastic Pioneer</td>
<td>120 GB</td>
<td>$899</td>
</tr>
<tr>
<td>600 Meg. WORM Pioneer</td>
<td>240 GB</td>
<td>$1,199</td>
</tr>
</tbody>
</table>

Cartridges & Tapes

Pocket Portable & Transportable Drives

$429

120 Meg. Pocket Portable

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 Meg. Pocket - Maxtor, 17 ms.</td>
<td>20 GB</td>
<td>$299</td>
</tr>
<tr>
<td>80 Meg. Pocket - Maxtor, 17 ms.</td>
<td>30 GB</td>
<td>$399</td>
</tr>
<tr>
<td>105 Meg. Pocket - Quantum, 22 ms.</td>
<td>45 GB</td>
<td>$499</td>
</tr>
<tr>
<td>120 Meg. Pocket - Maxtor, 17 ms.</td>
<td>60 GB</td>
<td>$699</td>
</tr>
</tbody>
</table>

Hard Disk Drives - Internal & External

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Meg. - Quantum, 25 ms.</td>
<td>10 GB</td>
<td>$299</td>
</tr>
<tr>
<td>105 Meg. - Quantum, 25 ms.</td>
<td>20 GB</td>
<td>$499</td>
</tr>
<tr>
<td>129 Meg. - Maxtor, 17 ms.</td>
<td>30 GB</td>
<td>$699</td>
</tr>
<tr>
<td>240 Meg. - Quantum, 10 ms.</td>
<td>50 GB</td>
<td>$799</td>
</tr>
</tbody>
</table>

Seagate

5400 RPM 3.5" Thick

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Meg. - 2.82 GB</td>
<td>10 GB</td>
<td>$299</td>
</tr>
<tr>
<td>40 Meg. - 5.64 GB</td>
<td>20 GB</td>
<td>$499</td>
</tr>
<tr>
<td>80 Meg. - 11.28 GB</td>
<td>40 GB</td>
<td>$699</td>
</tr>
<tr>
<td>160 Meg. - 22.56 GB</td>
<td>80 GB</td>
<td>$1,199</td>
</tr>
</tbody>
</table>

Quantum

5400 RPM 3.5" Thick

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Meg. - 1.6 GB</td>
<td>10 GB</td>
<td>$299</td>
</tr>
<tr>
<td>105 Meg. - 3.2 GB</td>
<td>20 GB</td>
<td>$499</td>
</tr>
<tr>
<td>250 Meg. - 7.6 GB</td>
<td>50 GB</td>
<td>$1,199</td>
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</table>

Maxtor

7200 RPM 2.5" Thick

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>415 Meg. - 1.7 GB</td>
<td>17 GB</td>
<td>$299</td>
</tr>
<tr>
<td>830 Meg. - 3.4 GB</td>
<td>34 GB</td>
<td>$699</td>
</tr>
</tbody>
</table>

MicroScience

5400 RPM 3.5" Thick

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>425 Meg. - 1.7 GB</td>
<td>17 GB</td>
<td>$299</td>
</tr>
<tr>
<td>850 Meg. - 3.4 GB</td>
<td>34 GB</td>
<td>$699</td>
</tr>
</tbody>
</table>

Price -

Our size allows us to purchase at the lowest possible cost, and we manufacture in our own factory. Then we pass the saving on to our customers.

Service -

All products are 100% tested. You probably won't need our help - but if you do, our 12-month service program will have you up and running in 48 hours - guaranteed!

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Catalog Price, Service, Performance, Selection and Quality

We guarantee your complete satisfaction or your money back!

Archive DAT, Exabyte & Teac Tape Drives

Tape drives include: media, software, and cables!

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Price</th>
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<tbody>
<tr>
<td>60 Meg. Tape Vito - TEAC</td>
<td>72 GB</td>
<td>$499</td>
</tr>
<tr>
<td>160 Meg. Tape Vito - TEAC</td>
<td>288 GB</td>
<td>$799</td>
</tr>
<tr>
<td>250 Meg. Tape Vito - Archive</td>
<td>400 GB</td>
<td>$999</td>
</tr>
<tr>
<td>600 Meg. Tape Vito - TEAC</td>
<td>900 GB</td>
<td>$1,399</td>
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MicroScience 3.5" Thick

<table>
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<td>830 Meg. - 3.4 GB</td>
<td>34 GB</td>
<td>$699</td>
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Maxtor 3.5" Thick

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<tr>
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</tr>
<tr>
<td>830 Meg. - 3.4 GB</td>
<td>34 GB</td>
<td>$699</td>
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Save BIG in printing costs! Recycle your Jet & Dot Matrix Printer Cartridges

All Jet-Printers supported, single & multicolor with individual, re-usable Jet-Master kits. Each kit includes 1 ink bottle (4 for color kits). Then just buy ink as needed. Avg. ink cost per charge is 1-2 dollars.

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Bar Code

Bar Code Fonts

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- IFM
- IBM
- Macintosh
- 1011

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262 August 1992 MACWORLD
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VISA Accepted.

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**MACWORLD** August 1992 265
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Editor's Choice: ZyXEL U-1496E
Gormax Edition, 6/92

Comparison chart was completed in May, 1992.
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<thead>
<tr>
<th>Total Hardware, Media &amp; Software System Value</th>
<th>Annual Premium</th>
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<tbody>
<tr>
<td>$1,000-$2,000</td>
<td>$39</td>
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<tr>
<td>$2,001-$5,000</td>
<td>$69</td>
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<tr>
<td>$5,001-$10,000</td>
<td>$99</td>
</tr>
<tr>
<td>$10,001-$20,000</td>
<td>$129</td>
</tr>
</tbody>
</table>

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T-MW

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Best-Sellers

AUGUST 1992

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<table>
<thead>
<tr>
<th>Rank</th>
<th>Name</th>
<th>Publisher</th>
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<tbody>
<tr>
<td>1</td>
<td>Microsoft Word</td>
<td>Microsoft Corporation</td>
</tr>
<tr>
<td>2</td>
<td>Microsoft Office</td>
<td>Microsoft Corporation</td>
</tr>
<tr>
<td>3</td>
<td>Microsoft Excel</td>
<td>Microsoft Corporation</td>
</tr>
<tr>
<td>4</td>
<td>Microsoft Works</td>
<td>Microsoft Corporation</td>
</tr>
<tr>
<td>5</td>
<td>FileMaker Pro</td>
<td>Claris Corporation</td>
</tr>
<tr>
<td>6</td>
<td>QuickDraw</td>
<td>Apple Computer</td>
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<tr>
<td>7</td>
<td>MacDraw Pro</td>
<td>Claris Corporation</td>
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<td>8</td>
<td>ClarisWorks</td>
<td>Claris Corporation</td>
</tr>
<tr>
<td>9</td>
<td>Aldus PageMaker</td>
<td>Aldus Corporation</td>
</tr>
<tr>
<td>10</td>
<td>MacWrite II</td>
<td>Claris Corporation</td>
</tr>
<tr>
<td>11</td>
<td>Adobe Illustrator</td>
<td>Adobe Corporation</td>
</tr>
<tr>
<td>12</td>
<td>Microsoft Flight Simulator</td>
<td>Microsoft Corporation</td>
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<tr>
<td>13</td>
<td>SimCity</td>
<td>Maxis</td>
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<tr>
<td>14</td>
<td>Falcon</td>
<td>Spectrum Holobyte</td>
</tr>
<tr>
<td>15</td>
<td>Tetris</td>
<td>Spectrum Holobyte</td>
</tr>
<tr>
<td>16</td>
<td>Crystal Quest</td>
<td>Casady &amp; Greene</td>
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Entertainment Software

<table>
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<th>Rank</th>
<th>Name</th>
<th>Publisher</th>
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<tr>
<td>1</td>
<td>Microsoft Flight Simulator</td>
<td>Microsoft Corporation</td>
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<td>2</td>
<td>SimCity</td>
<td>Maxis</td>
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<tr>
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<td>Falcon</td>
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<td>5</td>
<td>Crystal Quest</td>
<td>Casady &amp; Greene</td>
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Utility Software

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<tr>
<td>1</td>
<td>After Dark</td>
<td>Berkeley Systems</td>
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<td>2</td>
<td>SAM</td>
<td>Symantec Corporation</td>
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<td>3</td>
<td>Virex</td>
<td>Microcom</td>
</tr>
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<td>4</td>
<td>Norton Utilities for Macintosh</td>
<td>Symantec Corporation</td>
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<td>5</td>
<td>More After Dark</td>
<td>Berkeley Systems</td>
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Network/Data Communications

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<th>Rank</th>
<th>Name</th>
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<tr>
<td>1</td>
<td>PhoneNet</td>
<td>Parallon Computing</td>
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<tr>
<td>2</td>
<td>AppleShare</td>
<td>Apple Computer</td>
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<tr>
<td>3</td>
<td>AppleTalk Remote Access</td>
<td>Apple Computer</td>
</tr>
<tr>
<td>4</td>
<td>MacLink Plus</td>
<td>DataViz</td>
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<tr>
<td>5</td>
<td>White Knight II</td>
<td>FreeSoft Corporation</td>
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Add-In Boards

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<th>Rank</th>
<th>Name</th>
<th>Publisher</th>
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<tr>
<td>1</td>
<td>NuBus Adapter Card</td>
<td>Apple Computer</td>
</tr>
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<td>2</td>
<td>Macintosh Display Card 8+24</td>
<td>Apple Computer</td>
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<tr>
<td>3</td>
<td>Radius</td>
<td>Radius</td>
</tr>
<tr>
<td>4</td>
<td>Macintosh II FDHD Upgrade</td>
<td>Apple Computer</td>
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Add-In Boards

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<tr>
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<td>Apple Computer</td>
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<tr>
<td>2</td>
<td>Macintosh Display Card 8+24</td>
<td>Apple Computer</td>
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<tr>
<td>3</td>
<td>Radius</td>
<td>Radius</td>
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<tr>
<td>4</td>
<td>Macintosh II FDHD Upgrade</td>
<td>Apple Computer</td>
</tr>
</tbody>
</table>

The AmCoEx Index of Used Mac Prices

<table>
<thead>
<tr>
<th>Machine/RAM/ Hard Drive</th>
<th>Average Sale Price</th>
<th>Monthly Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mac Plus/1MB/none</td>
<td>$350</td>
<td>$0</td>
</tr>
<tr>
<td>Mac Plus/2MB/20MB</td>
<td>$500</td>
<td>-$50</td>
</tr>
<tr>
<td>Mac SE/2MB/20MB</td>
<td>$787</td>
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Index provided by the American Computer Exchange of Atlanta, Georgia. It reflects sales during the week of May 26. Configurations include keyboard and exclude monitor and display board for noncompact models.

Source: Exclusive Audits & Surveys research from more than 250 Macintosh retailers and selected mail-order vendors. Covers sales during April 1992.
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MacUser, December 1991
MacWeek, January 27, 1992

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MacWorld, April 1992

"Editor's Choice. The overall best buy is the Mirror 210 hard drive."
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MacWorld, February 1992

"...[Mirror] offers better support...you'll get more with the Mirror 210."
MacUser, April 1992

"...an excellent combination of value, speed, service and package. The Mirror 105 is inexpensive, well-packaged...with good service and warranty."
MacUser, November 1991

The Mirror 1 GB Hard Drive "Includes excellent software."
MacWorld, May 1992
• The smallest 11 x 17 printer available. True 400 dpi resolution and a rugged 15 pages-per-minute print engine.

• Automatic switching between three interface ports (AppleTalk, parallel, and serial).

• 4 MB of RAM, upgradeable to 16 MB.

• RISC processor and genuine Adobe PostScript Level 2; handles the toughest jobs with ease. Your work will look great and print fast.

• 35 Adobe fonts built in, plus SCSI port for connecting font drives.

• Manual feed tray

• Two high capacity paper trays. Easy to use tray selector software lets you keep tabloid and letter size paper loaded all the time.

MirrorImage 415
$4,499

Seen The Fine Print.

ing environments; the three interface ports (AppleTalk, serial, and parallel) can be active simultaneously so you can hook up Macs and PCs to the same printer.

The MirrorImage printers are easy to afford, easy to set up and easy to live with. We even include an installation videotape that guides you, step by step through the setup.

The MirrorImage 309 is a 300 dpi, 9 pages-per-minute printer for letter or legal size paper. It comes with 2 MB of RAM, upgradeable to 10 MB, for faster printing of extremely complex documents. The MirrorImage 309 is an outstanding value for only $1,699.

The MirrorImage 415 has all the features of the 309, plus 11x17 paper capacity, true 400 dpi printing (horizontal and vertical) and a heavy duty 15 pages-per-minute print engine. Priced at only $4,499, the MirrorImage 415 is the smallest tabloid size printer available, so it fits small offices as well as small budgets.

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Mirror's philosophy is simple: build high quality products and sell them at a great price. No product illustrates this better than the new MirrorImage Laser Printers. Both the MirrorImage 309 and the MirrorImage 415 give you more features, more functionality and higher performance than printers costing hundreds or thousands more.

We started with the state-of-the-art Wietek RISC processor, for the best possible throughput. Then we added Adobe's PostScript 2 to print even complex documents effortlessly. We chose high speed print engines that deliver hundreds of thousands of pages at the lowest cost-per-page. And because you don't have time to waste, we designed the most flexible and convenient paper handling of any laser printer. Our optional second paper tray and Mirror's sophisticated tray selector software help eliminate those trips to the printer to change trays! Both printers come with 35 genuine Adobe typefaces, and a built in SCSI port so you can add a hard drive for convenient storage of hundreds of fonts. The MirrorImage Laser Printers are perfect for mixed computer environments.

**LASER PRINTER PRICE/PERFORMANCE RATIO**

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<th>MirrorImage 309</th>
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<td>Personal LW NT</td>
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<td>LaserWriter 11g</td>
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<td>LaserWriter I1NT</td>
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**MirrorImage 309**

- $1,699
- Then You Haven't...
While the cursor may hop or skip with some trackballs, Turbo Mouse has always been known for its ultra-smooth movement.

Now, the latest version of Turbo Mouse is known for something else—jumping. Our new Brilliant Cursor technology makes it possible.

With it, you can move the cursor instantly to predefined HotSpots on the screen, such as the File and Edit menus and the Trash icon.

First, you define your HotSpots. Then, click a button and move the ball in the direction you want to go. The cursor automatically jumps to the predefined HotSpot. You can even program different HotSpots for different applications and for different users.

And Brilliant Cursor technology is not all that’s new with Turbo Mouse 4.0. Also new is advanced acceleration with three levels of control and Enhanced Mouse Buttons that let you execute one of seven programmable commands. For example, send a Print command with just one click using Send String. Or move the cursor with ultra precision using Slow Cursor. Even save different combinations of commands for each of your favorite programs.

Then there’s the award winning Turbo Mouse hardware. Hardware that has won more awards than any other input device. Hardware that has consistently been voted “Best Input Device” by Macintosh users worldwide. Features include a large comfortable ball, “easy-click” buttons, long-lasting precision stainless steel bearings, and two ADB ports for chaining other devices.

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