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The benefits of using the pen-based system were spectacular. The system cut short our evaluation time (despite several system crashes). Besides eliminating nearly all manual copying of data, it prompted the technicians for the next step in the process, so they didn’t have to refer to notes or track down a supervisor. If we had spent as little as an hour per person to train the system to better recognize each technician’s writing, we could have boosted our performance even more.

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If you order now, you’ll learn even more memory secrets with a free copy of The Macintosh Memory Guide. It’s the booklet MacWEEK thinks, “No Macintosh manager should be without.” But hurry, this offer is only good while supplies last.

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CIRCLE 62 ON READER SERVICE CARD.
Sam Dwarkanath of Warren, New Jersey, is suffering from future shock. "I just spotted a small computer that's smaller than the Classic! And what's that printer, a LabelWriter? God forbid that a Mac has a 2-inch screen and printer!"

Alas, Sam, the smaller the machine, the smaller the screen. A truly portable — even wearable — computer requires some sacrifices. Of course, input won't be a piece of cake either. That's why we need Casper, the friendly host (see the "Say What?" letter on this page).

Write to Letters to the Editor, c/o MacUser, 950 Tower Lane, 18th Floor, Foster City, CA 94404, or post your letter on the MacUser Forum of ZiffNet/Mac, also known as Znae, our on-line service.

All letters become the property of MacUser, and we reserve the right to edit any letters we print. Please include a return address and a daytime phone number.

Say What?

As usual, Jon Zilber wrote something worth reading ("Three Little Macs," April '92, page 23), but I have misgivings about voice input as a substitute for the keyboard. There is simply too little control over ambient noise — that is, any sound not deliberately addressed to my computer. Imagine this scenario:

I'm flying home from the 1993 MacSochism Conference. I've spent three hours and two batteries on my trip report. Suddenly the overhead speaker blurs, "Hello, folks. This is Captain Nemo. It's a really clear day for flying. Clear, clear, CLEAR!"

And my PowerBook's screen goes blank, and the report is wiped out. Fortunately, I've saved the file. My sympathetic neighbor leans close and says, "Well, at least he didn't say 'Erase the hard drive.'" Click, whirr, ...

Jon has the right idea — using voice to augment a clever system of menus — but clearly the opportunities for doing it wrong are extensive.

Paul F. Doering
Rochester, NY

Not to worry. In Apple's demonstrations of the Casper voice interface, the system requires that you begin commands by addressing it by name ("Casper, erase the hard drive") to prevent just this kind of disaster. You might feel self-conscious, though, if your name happens to be Casper. — JZ

Shareware Goodies

In your excellent article "Graphics Glossary" (April '92, page 165), you mention Adobe Photoshop and its ability to import and export a variety of graphics file formats. Kevin Mitchell's shareware utility, GIFConverter, can do much the same thing for just $40. You can use it to view, save, and print Paint, PICT, EPS, TIFF, RIFF, GIF, ThunderScan, RLE, and Startup screen files. GIFConverter also has more-technical details on the various formats than are included in your article.

Charles A. Reeves, Jr.
Knoxville, TN

Sheesh! In your strategies for using large monitors ("The Big Screen," April '92, page 206), how could you overlook Mason Lancaster's great shareware utility, Scroll2? It puts two arrows at each end of a scroll bar — nice for any size screen but essential for a big-screen monitor. You only have to move the cursor a quarter of an inch to switch from scrolling up to scrolling down. Ditto for left and right scrolling.

Robert C. Leedom
Glenwood, MD

Thanks for the reminders. Both utilities are available in the Download & Support Forum of ZiffNet/Mac, MacUser's on-line service. GIFConverter is GIFCON.CPT in Library 1 (Applications), Scroll2 is SCROLL2.SIT in Library 3 (INITs, Cdevs, FKEYs).

On the last page of "The MacUser 100" (December '91, page 129), the eight shareware and freeware offerings are referred to as "public-domain software."

"In the public domain" refers to anything that is not protected by copyright or patent and that may be used, sold, or appropriated by anyone.

Dear Mr. Sculley . . .

QuickTime is this year's hottest technology, but does Mac video have practical applications for the average user or is it just hype?

Speak Up:

What are the best — and worst — uses you've seen of QuickTime?

In April '92, we asked what consumer electronics you'd like to see with the Apple logo. Kris Hill of Petaluma, California, had a pressing need: "Do you even have to ask? VCRs! I won't buy a VCR until they have an intuitive GUI!"

Several readers clamored for a chord-based portable note taker. Joe Sandoval of Elkeview, West Virginia, is clearly pinning for such a gadget. He sent us a wooden prototype of his invention, a supercharged GameBoy, along with a complete set of specs. "I call it a MacMan. I envision a device 7 inches wide by 10 inches high. At the top is a backlit LCD screen. At the bottom are two recessed areas for your thumbs."

You twist one thumb to move the cursor and the other to select an item.

"The QWERTY keyboard is an impossible interface for a portable computer, so MacMan has four keys placed along each side of the back, where the fingers are naturally placed when you grip it with both hands. By pressing combinations of the eight keys (chording), you can reproduce every keystroke on a normal keyboard. This could be the most significant user-interface change in decades. Apple could bundle a tutoring program to teach people how to use this novel keyboard.

"Finally, give the MacMan 4 megabytes of static RAM; a hard drive; and ports for a floppy drive, a printer, and LocalTalk. Price it less than $300, and I bet every college student will be begging for one to take notes."

Nifty idea, Joe. Until the MacMan becomes a reality, we suggest a low-cost, pen-based alternative. It's called a notepad, and it retails for about $1.25 (pen included).
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CIRCLE 97 ON READER SERVICE CARD.

LETTERS

anyone. So, if Microsoft liked a nifty text processor that you wrote and released specifically into the public domain, it could put its copyright label on the program and sell it with Word.

Shareware — software for which the author expects payment after a trial period — is obviously not in the public domain. Although freeware programs require no payment, they are always copyrighted unless specifically released into the public domain by the authors. (Under federal copyright law, anything you create is protected once it's in "readable form," be it on disk or on paper, unless you specifically waive your rights to it.)

Ganir Miller
Rexon, VA

Visual Reality

Andy Ihnatko left out a big player in the visual-programming arena in "Let's Get Visual" (April '92, page 213). For the past four years, I've been programming in a purely graphical way by using National Instruments' LabVIEW. Contrary to the comments in your article, creating complex visual programs that run as fast as compiled C is quite possible. Indeed, they can be created and debugged more quickly by using LabVIEW. This application fits very nicely into my arcane world of engineering and science on the Mac.

David A. Moschella
Boston, MA

LabVIEW is a spiffy product, Dave, and if you want to write software that checks the fluctuations in a phased-ion chamber, LabVIEW is No. 1. But most folks want to create common, widely used applications that will make them multimillionaires. That's where Prograph and series Programmer come in. —AI

Simulated Science

I enjoyed Michael Swaine's February '92 column ("Newton's Virtual Apple," page 37), despite two errors. He claimed that Allen Newell's Soar architecture for artificial cognition doesn't run on the Mac yet. This is untrue. Soar is LISP-based and runs on any machine that runs Common LISP.

Newell's a smart guy, but his theory of cognition is far from being the first candidate for a unified theory of cognition, as Swaine claims. I'd give the credit to Aristotle, who wasn't right in detail (in fact, he didn't even figure out that the brain was involved in cognition), but I'm willing to bet that Newell isn't right in detail either.

Chris Westbury
Montreal, Quebec
Canada

In his February column, Michael Swaine says, "What is needed are programming environments for people who are not professional programmers, and to make these work, software must become more modular." Extend, from Imagine That!, is a good example of an open-ended simulation environment. The software's modular library organization allows people to concentrate on a problem, not the method or language of describing a problem.

Simulation is not limited to scientific studies. At the Educational Testing Service, Extend's built-in libraries and visual-programming approach have let us model business situations in a way that would have been impractical by other means, such as using a spreadsheet program. Our use of Extend has also given us insights into how to run things more efficiently.

Paul SooHoo
Princeton, NJ

Memory Loss

With the advent of System 7, there's very little use for the 1-megabyte Mac. The once-ubiquitous 256K SIMMs are now as useless as side pockets on a toad, and they eventually find their way into the trash. We're cluttering the environment with these relics. Do you know where to send these fine memory modules, so they can be used for their intended purpose?

Lionel H. Layton
Brigham City, UT

A quick poll of the MacUser staff revealed that the most popular use for antiquated 256K SIMMs is jewelry — earrings, brooches, barrettes, and tie clips. Other recycling efforts include bookmarks, Christmas tree ornaments, high-tech mobiles, coasters (in sets of four), table settings, box openers, and fishing lures (for when they're really byte-ingo).

For a more practical approach, Computer User (800-950-2273 or 612-371-0061) offers two products for reusing 256K SIMMs. Owners of the Mac II, IIx, Ile, and Ilec can use Softstep III ($199.99) to transform four SIMMs into one large memory unit that occupies a single SIMM socket on the Mac motherboard. You can
Fast cars. Bungee jumping. Triple chocolate cheesecake. Seems like all life’s really satisfying stuff comes faced with danger. Or at least cholesterol. • Our drawing program on the other hand, is an exception to the rule. • A peak experience that’s actually good for you. • Good how? • Good by souping up your productivity. With Canvas, you won't need to hop around as you work, passing your piece from program to program to get things done. And you won’t find yourself face to face with significant built in compromises, either. Because Canvas puts every tool and effect you’ll need for just about any design job together in a single coherent package. It’s all there. And it’s all good. • How good? • Good enough to generate a slew of rave reviews and positive comparisons with programs costing much more. • And good enough to capture virtually every significant industry award there is - from a MacUser Eddy for Best Drawing Program to a MacWeek Target for Best Business Graphics Program to the Infoworld Buyers Assurance Seal. • Canvas 3. No fat. No side effects. No shin splints. Just supreme drawing satisfaction.
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also resuscitate a 128K or 512K machine with the Mac Rescue board ($249), which gives these moldy oldies six more slots for 256K SIMMs. — AA

More on Model Names
In response to Keith Luscher's letter in the April issue ("Apple's Alphabet," page 18), you said that according to Apple, the letters in the names of Mac models don't stand for anything. You then added that MacUser rumor suggests that a stands for compact and i for internal video. Let me add the following conjectures:
• r probably stands for single slot, because the IIi has only the one PDS.
• r means the CPU uses a 68030 chip. This code was used prior to Macs with is.
• i means fast. The IIfx was the fastest Mac and has a 68030 processor.
• Thus, the Ilecx is a "68030 in a compact case"; Ilico means "compact case with internal video"; and the IIi is a Mac with a "single slot and internal video."
• Furthermore, L means low cost and C stands for color. Put them together, and you've described the Mac LC. The four in 68040 is consistent with the quad in Quadra, and it conveniently avoids the dreaded word three.
• SE stands for system-enhanced. The SE/30 was aptly named because it was an SE with a 68030 processor. I guess it was beyond Apple's marketing strategy to use the name Macintosh SEX!
• Robert Otani
Chino Hills, CA

Selling (Out) the Dream?
When I first met Guy Kawasaki (at a user-group meeting), he was the ultimate evangelist. He sold the dream of Macintosh — not the computer but the untapped abilities of the average person that were realized through use of the Mac. In his book The Macintosh Way, I found helpful tips that I applied to my consulting business; in fact, The Macintosh Way led me to start that business in the first place.

A year or so later, I noticed that Guy was appearing in more advertisements, recommending a lot of products. "More power to him," I figured.

But soon afterward, his MacUser columns seemed to have almost nothing at all to do with the Mac. Guy was no longer an old-fashioned Macintosh evangelist — supporting things because they were great, not because he was paid to say they were.

To my amazement, Guy's February '92 column actually had something to do with Mac users. "Masters of Macintosh" (page 33) almost recaptured the lost Kawasaki flame. In his March column ("Help!", page 29), he again almost redeemed himself as a real evangelist, right up to the very last sentence, when he seemed to grab me by the shirt and say, "Hey! I get paid to evangelize now! I am popular. I am rich. I don't have time to deal with you any more."

Come on, Guy. Get off the soapbox and give us unpaid evangelists what we want most from our leader — the old Guy Kawasaki! — David Pipgras
Vancouver, WA

The good news is that the old Guy Kawasaki is back. The bad news is that this month's column marks his farewell. Guy has decided to concentrate on product evangelism and his next book (which, although it might have little to do with Macintosh, the computer, will surely keep the spirit of the Macintosh, the Way').

We'll miss him greatly, and we wish him success with both endeavors. — JB

Dvorak's Class Act
John C. Dvorak writes that "the Apple II won't get junked until educators figure out that they're apparently the only group in the country that isn't benefiting from computer technology" ("Failing Grades," February '92, page 372). Perhaps he's unaware of how educators struggle to transform outmoded materials into productive experiences for children.

When Apple withdrew its support from the Apple II, it became just that much harder for educators to use what meager equipment they had to provide quality instruction.

The fault, Mr. Dvorak, lies not with the educators who always struggle to make do with less but with the legislators who fail to fund education and the public that fails to demand quality instruction.

Rebecca Ann Penso
Los Angeles, CA

John C. Dvorak's column about education is totally out of date with what's happening at Ouzinkie School, located on Spruce Island in the Gulf of Alaska. Ouzinkie is an isolated community, and
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Letters

The Mac Is Not a Ferrari

As a member of the Ferrari Club of America since 1969, I was intrigued by John C. Dvorak's column equating Macs with Ferraris ("The Ferrari Phenomenon," March '92, page 308).

Mr. Dvorak seems to have misunderstood how the Ferrari company operated during Mr. Ferrari's lifetime. Unlike Porsche, whose main product was sports cars for the public, Ferrari's main product was racing cars. Street-automobile production was never really important to the Ferrari factory, so most hardware on their street models was cheap mass-produced stuff. File and hammer markings were clearly evident, and paint wouldn't hold to the uneven bodywork. When a Ferrari's body rotted off, you ordered up a replacement or had a new one built. Many older Ferrari engines are now on their third or fourth body.

If John Sculley really wants to emulate Ferrari's success, he should do as Mr. Ferrari did: use cheap, disposable, fragile components; make Macs difficult to use and operate; price them exorbitantly; and keep the same CPU for 20 years.

Sandy Untermyer Moodus, CT

Mirror, Mirror

Although I found John C. Dvorak's April column (page 322) to be pretty "flipped out," it failed to be a real inconvenience. By using a scanner, I was quickly able to straighten things out. Nice try, though.

Paul Lucchese Hopewell Junction, NY

I did not attempt to read John C. Dvorak's April column, because it was apparent he didn't care if we read it or not. This is the kind of thing I would expect from a grade-school child, not a professional magazine. I have not been a subscriber for very long, but it is bad enough putting up with Dvorak's "big machine" ideas without having to put up with this nonsense.

David G. Smart Alva, OK

Then you missed the part where I talked about you (paragraph 6). — JCD

Clarifications

The new address and phone number for Pastel Development, maker of DayMaker (Quick Clicks, May '92, page 71), are 113 Spring Street, New York, NY 10012; 212-941-7500.

The correct toll-free phone number for inquiries about Microsoft Excel 4.0 ("Excel 4.0 Blazes Ahead," May '92, page 42) is 800-426-9400.

The Kodak Ektaplan 7016, listed in the directory on page 62 of the May '92 "Color Buyer's Guide," is actually a monochrome laser printer.

The telecommunications program 2Term, mentioned in "Have Data, Will Travel" (May '92, page 187), is a Mac-only shareware product. You can get a copy for $40 (or register an acquired copy for $30) from Alverson Software, 6535 Cross Creek Court, Mason, OH 45040.
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MacWEEK ProductWatch 2/90

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Circle 81 on reader service card.
The 29¢ Crusades

A simple letter to Apple could get you the help you need to prevent downtime disasters.

Chances are, your car contains a computer that tells your mechanic what's wrong when the car breaks down. Your office copier may contain a gizmo that automatically calls for service whenever some bozo tries to run stapled pages through the auto-feed mechanism. You can even get a clock with a built-in satellite downlink to automatically adjust the time every time the season for Daylight Saving Time rolls around.

About the only digital device that doesn't have built-in diagnostics is the one that needs it most: your computer.

If you've spent at least a few frustrating hours trying to figure out why your Mac won't do something simple it did yesterday — such as open an application or print a document — you should know there's a tool that can solve most of your problems. But it's going to take a unified effort to get Apple to adopt this solution. Your end of the bargain will take just five minutes — five minutes that may save you hours or days down the road.

First, a little background.

The Myth of Productivity

Recent studies have uncovered an astonishing fact: Personal computers, despite all their supposed time-saving benefits, haven't boosted white-collar productivity in the U.S. by a single percentage point. Although desktop computers may have improved the quality of working life, they continue to fail at what most of us really want them to do: reduce the number of hours in our working day.

Every minute saved by smoothly reflowing a page layout or recalculating a complex spreadsheet gets eaten up by another minute's worth of troubleshooting an extension conflict or by an hour-long ordeal coaxing a printer to deliver the goods.

For all its impressive capabilities, the Mac's operating environment — System 7, the Finder, AppleTalk, and the rest of the infrastructure — is on shakier ground than the San Andreas fault.

When your system goes down, it's next to impossible to track down the cause of the crash. Generally, the only assistance you get, if any, is a cryptic error message or a mockingly sympathetic sad Mac.

Bounce the Checker

At the pinnacle of Apple's inadequacy stands the Compatibility Checker. Apple led users to think the Compatibility Checker was actually diagnosing your system to identify existing or potential problems you might face when you upgraded to System 7. In reality, the Compatibility Checker simply checked the names of your applications, utilities, and hardware drivers against a flimsy and inaccurate database of information supplied by software vendors.

Some vendors prematurely claimed compatibility, figuring that their software would probably be compatible by the time System 7 actually shipped. others took a conservative stance, declining to claim the full-compatibility status they deserved, simply because they had not yet finished rigorously testing their software.

The net result is that some users continue to hold off on System 7 out of unwarranted paranoia while others, buoyed by an imaginary safety net, have rushed headlong into a nightmarish upgrade experience that tainted Apple's credibility.

But behind every failure on Apple's part lies an opportunity for third-party companies to shine. Although Apple's Compatibility Checker was but a hollow shell of false hope, Help! (from Teknosys, of Tampa, Florida) is a solid solution.

Help Yourself

Help! is a thorough and stylish application that analyzes the contents of your Mac — system files, installed hardware, fonts, and so forth — and compares them with a database of known incompatibilities, conflicts, and other trouble spots. The database contains information on more than 2,100 products and presents you with a comprehensive and quite readable report that lets you know exactly what you have on your Mac and specifies the nature of any potential pitfalls.

Although Teknosys has done an impressive job, it relies on the voluntary support of users and other third-party vendors to keep its database comprehensive and current. Apple clearly needs Help! — but Teknosys also needs Apple's help. Apple ought to use its position of leadership to make Help! an industry standard.

In addition to alleviating many problems right off the bat, Help! could simplify more-complex diagnoses by defining an industry-standard format for profiling your system. Whenever you called for tech support from Apple or third-party vendors, you could fax or modem your system's profile to them.
enabling them to provide faster and more accurate diagnosis. Your downtime would be minimized, and vendors’ costs for technical support would plummet, resulting in a significant reduction in hardware and software costs.

If you’re frustrated by the lackluster nature of Apple’s efforts at solving your downtime dilemmas, let Apple know that you demand action. Send us your letters demanding that Apple incorporate a diagnostic tool such as Help! into the Mac’s system software, and we’ll relay them to Apple.

While you’re in a crusading mood, we’ll make it easy for you to join two more campaigns, all for a few minutes of your time and the price of postage. Send your missives to The 29¢ Crusades, c/o MacUser, 950 Tower Lane, 18th Floor, Foster City, CA 94404. We’ll forward your letters to each organization.

TAXING MATTERS

Round about April 15, there’s only one thing worse than being a taxpayer: being a tax collector. However, the Internal Revenue Service is gradually moving into the 1980s in its use of computer technology to streamline its operations (squarely putting it a decade ahead of the rest of the federal government).

This past year, the IRS implemented a trial program that allowed taxpayers to submit their returns electronically, for faster and more accurate processing. Unfortunately, the test program paid for by your tax dollars was limited to PC users. If you object to taxation without Mac representation, let the IRS know that you demand Mac-friendly tax reform.

AUDIT THYSELF

Software piracy is wrong, unethical, and ultimately self-destructive. The final cost of software piracy is as hard to pin down as the cost to humanity of the destruction of tropical rain forests. Each rain forest that vanishes takes with it dozens of species of plants that are unique to that rain forest. When a species becomes extinct, the planet loses an invaluable resource — whether it’s the raw material for a miracle medical cure we’ll never harvest or simply a flower of exquisite beauty. And every time a software company goes down, we can only guess what unique contribution will now never be realized.

If these arguments aren’t enough to get you to go legit, there’s one more that might: You just might get caught. The Software Publishers Association is successfully prosecuting an increasing number of piracy cases. For those who want to go straight, the SPA offers a self-audit kit to help them compute with a clean conscience. And if you’re frustrated by software licenses that imply you’re not allowed to use the package you paid for on both your desktop machine and your PowerBook, the SPA is the group that needs to hear your gripe.
That's easy. According to the experts at PC Week (1992 Analyst's Choice) and Macworld (1992 Editors' Choice Award), the #1 Multiplatform E-mail system is QuickMail. They agreed that, for ease-of-use, flexibility and connectivity, no E-mail communicates better across the most sophisticated environments—Macintosh®, DOS and Windows™ 3.x. And once you start using QuickMail, you'll agree—no other E-mail system works so well for your entire organization. Here are some more numbers you should know: call 1-800-523-7638 and ask for Dept. CE21 to receive more information on QuickMail, or for the name of a dealer near you. For more information on the QuickMail International Distributor network, call 515-224-1995, or fax us at 515-224-4534.

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Computing From Digital.
October 22, 1991

Dear Ellen:

If there is anything better than being loved by you...it is loving you.

And you are so easy to love. You’ve brought such wonder into my life and have touched my heart with your love.

I just want you to know, my darling, that it feels so good being in love with you and I want to love you for a very long time.

You are a wonderful woman and I love you dearly. If I’m dreaming, please don’t wake me up— I don’t want this to end.

Monogamously yours,


Your Mac can say a lot about you.

If somebody sat down at your Mac and started snooping around your disk, which would embarrass you more?

The details of your love life? Your resume? Your adjusted gross income?

How about the Confidential Employee Evaluation you were working on when the Boss hauled you into his office for a chat?

What? You never thought about this before? Then read on and you’ll never have to think about it again.

All you’ll have to think about is your password.

That’s the key to DiskLock“, the painless, yet powerful, System 7 savvy way to keep other people’s noses permanently out of both your personal and professional data.

You can password-protect selected files, folders or your entire hard disk. And encrypt everything to U.S. Government DES specs.

You don’t even have to be there. DiskLock blanks your screen and secures your system for you — without interrupting your applications — whenever you wander off.

When you return, it asks for your password and lets you know if anyone got curious while you were away.

If you’re curious about DiskLock, or about our one-year money-back guarantee, call 1-800-666-2904.

We’ll give you all the juicy details.
Just Undo It

This is the last column I’ll be writing for MacUser. I’m giving it up, because the editors of the magazine felt that my investment and involvement with After Hours Software and Salient were inappropriate. Specifically, MacUser requested that I cease and desist using my picture in ads for After Hours Software.

I tried to go along with this separation of Guy the columnist and Guy the huckster, but after a couple of months, I concluded that it was a farce. I informed the editors that I was going to allow After Hours Software to use my picture, and the editors and I decided that it would be best for me to ride off into the sunset.

I see the editors’ point and their perspective, and life goes on. Maybe it’s the best thing for both of us — for me, anyway, because it is going to force me to go beyond Macintosh and the computer industry in my writing.

Beyond Macintosh

When you make a big decision like this, your mind goes through many gyrations: Should I give up my column to sell a few more copies of TouchBASE and DateBook? Will people forget who I am? Will this be a mistake I’ll regret?

This got me to thinking about other decisions I’ve made and the hindsights I’ve accumulated in 38 years of existence on this planet. If I could do my life over again — if I could just undo it — what would I do differently? What truths have I discovered? What insights can I pass on to others?

This got me to thinking about decisions other people have made in their lives. What would they have done differently? What truths have they discovered? What insights would they like to pass on to others? What can we garner from the knowledge of our senior citizens (that is, anyone older than 38)?

This got me to thinking that the hindsights of people would be a great topic for a book. All kinds of people: rich, poor, powerful, powerless, famous, unknown. Teachers. Waiters. Clerks. Mechanics. Criminals. Billionaires. Ministers. What oral history and lessons could they leave so that people wouldn’t make the same mistakes and could optimize their own lives?

So I decided to start another book. Its working title is Hindsight (however, the marketing mavens at my publisher may change that). I’m going to interview people around the United States to document their hindsights about life:

- education, family, money, love, and work — whatever they want to talk about and pass on.
- All modesty aside, I’ve written two books about how to change the world. Now I’d like to write one about how to understand it.
- My role model is the writer Studs Terkel. He concentrates on interviewing blue-collar workers and describing how they feel about their lives. I want to interview a broader cross section of people and find out how they feel about their past. To give you an idea of what I’d like to do, here are some of my hindsights about high school and college.

High School

I was a diligent Oriental in high school. I studied hard. I never cheated. I took college-level classes and earned college credits, so that I could graduate early and work the rest of my life. I studied Latin, because it helped me more easily expand my vocabulary, in that many English words are derived from Latin.

I played football. I loved football. (All you Gloria Steinem wannabes should skip this paragraph.) Football is macho. I was a middle linebacker, arguably one of the most macho positions in a macho game. Very few feelings are equal to a good “stick” when you blitz the quarterback or when a wide receiver comes across the middle. (Getting System 7 to work on the first try is one of them.)

French, Music, and Tennis

Hindsight #1. Machismo aside, if I could do high school all over again, I would learn a foreign language, because today it’s very difficult to have a conversation in Latin other than at the Vatican. And despite all my efforts to evangelize evangelism, the Pope has yet to call for my advice. You never know: If I had learned French, maybe I would still be at ACIUS. If I had learned French, maybe I would never have started ACIUS.

Hindsight #2. I would learn to play a musical instrument. My only connection to music today is that I was named after Guy Lombardo. (Trust me: It’s better than being named after Guy’s brother, Carmen.) If I’d learned to play a musical instrument when I was in high school, I could be playing it now and enjoying it for a long time. Instead, I have to buy CDs and be at the whim of the Tower Records buyers.

Hindsight #3. I would play a noncontact sport such as tennis. That is, I would play a sport that you can play as you cross over into
the golden years beyond 38. Today it’s difficult to get 22 guys together in a stadium to play football — probably as difficult as having a conversation in Latin. On the other hand, all the guys who wore cute white outfits and played tennis in high school can still play tennis. Meanwhile all the macho football players are sitting around watching television, drinking beer, and worrying about arthritis in their knees.

College

I was a diligent Oriental in college too. I rushed through in three and a half years. I never attended any of the overseas campus programs, because I didn’t see how doing so would help me make money and it would delay my graduation. I hardly ever traveled except to return home for vacations and to meet my mother and father in Las Vegas for hands-on training in statistics and probability. I never even went to a Grateful Dead concert.

Hindsight #4. If I could do college over again, I would stretch my college education, travel as much as my parents could afford, and live off them as long as possible. I would take whole semesters off to travel after attending the overseas campuses in Italy, France, Germany, Japan, and any other country. This program would probably extend college to at least six years.

This means I would delay for as long as possible the inevitable entry into the work-place and the lifetime of servitude to bozos who knew less and worked less but made more money than I did but were still unhappy. Most people have to work for the rest of their life — what’s the rush? I still wouldn’t, however, go to a Grateful Dead concert.

Macintosh Hindsight

This is a Macintosh magazine, so I have to include some Macintosh hindaights. Here are two:

Hindsight #5. You can’t give software developers too much RAM. We should have shipped the first Macintosh with 256K of RAM. It would have made software development easier and accelerated the availability of software by 9 to 12 months. We mistakenly thought that everyone could program like Andy Herzfeld.

Hindsight #6. Creating a “closed” system was one of the smartest things we did. By closed, I mean that the first Mac didn’t have slots and didn’t have Apple II or IBM PC compatibility. This meant a shortage of software for a while, but it forced developers to create pure from-the-ground-up Macintosh software. Thank God for Steve Jobs’ insistence on purity.

Hindsight #7. A columnist has an obligation to his readership. In the past several months, my mood has become arrogant and detached. (Some people may dispute has become.) Thankfully, a reader made me aware of this by telling me that he was disappointed that my column about technical support communicated the feeling of “don’t bother me with your technical-support problems.”

Then I was crushed when my mother told me that my column about programming was “wrong and we don’t like it” because I told people to send their software directly to my church instead of to me. My father was also on the phone, and he said that I had a noblesse oblige to the readers to show more class than that. (Where he learned French, I don’t know; I never did.)

They were right, of course. I should not have written those columns that way. On the other hand, I have no regrets about my columns about Singapore; Microsoft; the National Rifle Association; John Sculley; and, especially, being a wife.

A Little Help from My Friends

I hope this column made you reflect on your life and come up with hindaights and insights. Perhaps you would like to share some of your hindaights. Also, I need referrals to people to interview. If you know extraordinary people whose hindaights would be valuable, please tell me about them.

Extraordinary does not mean rich, famous, or powerful. It means people who have contributed to society and who can contribute more by telling their story. They don’t need to have any connection to Macintosh and computers. In fact, I prefer that they didn’t. Here’s how to get in touch with me: P.O. Box 471090, San Francisco, CA 94147; 415-921-2478; 415-921-2479 (fax); 76703,3031 (CompuServe), Kawasak2 (AppleLink), or MacWay (America Online).

You take care of yourself. And as Arnold said at the police station. “I’ll be back.” While I’m gone, just remember a few things:

• Do the right thing, the right way.
• No job is worth a marriage.
• Enjoy your family and friends before they are gone.
• Buy any software I endorse.

GUY KAWASAKI
Video Training Becoming Most Popular, Least Expensive Way to Learn Macintosh Programs

Macintosh Programs Can Now Be Learned in a Few Hours With A Unique MacAcademy Video Speed Learning System

Over the past five years I've been associated with over 100,000 people attempting to learn the Macintosh computer. I've watched as each one waged their own personal, private battle trying to master the Mac and the most popular Macintosh programs.

I've felt their frustration, have empathized with their confusion and have understood their computer fears. I've talked to employees who had new computers and new programs dropped on their desk with the directive to "learn this." I've listened to people who struggled night after night trying to read and understand a computer manual. It's amazing how a computer manual can make a fairly bright person feel totally inept.

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

Hard Earned Money Wasted

Can you imagine how much money has been wasted on programs and computers that are sitting abandoned? Right now think of the people working on Macs in your office. Do they really understand the computer? How many programs are each of your people using? Have they really mastered the programs? Do they know the shortcuts and valuable techniques that will save you time, money and increase your professionalism?

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

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MacAcademy training is successful for one reason - it works!

The Video Answer

Three years ago we introduced the MacAcademy Video Training Library. This library now includes over 80 different titles. Each video is 2 hours long and offers clear, concise, effective training. In some cases you can receive up to 8 hours of training for one program.

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

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Here is a partial list of over 80 MacAcademy Video training tapes now available. To order, simply send check, credit card information, or purchase order to MacAcademy Videos Dept. MU 792 477 S. Nova Rd. Ormond Beach, FL 32174 or call the numbers listed below. Now is the time to start training. Thank you for allowing MacAcademy to help you in that effort.

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<td>Auto Doubler</td>
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<td>Norton Utilities 2.0</td>
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<tr>
<td>Techways, Inc.</td>
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<td>Thought I Could</td>
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I'm not saying I was wrong, but . . . .

When Apple first released HyperCard in 1987, I poked fun at those who tried to shoehorn it into existing software categories. Clearly, I pontificated, HyperCard is a new category unto itself, a "software erector set," as Bill Atkinson described it. Now, five years later, I find myself urging that it be repurposed, shoehorned into a clear-cut existing software category.

What's changed is ownership. In 1987, HyperCard didn't need to be sold: It was Apple system software, bundled with every new Mac. In 1992, HyperCard is a Claris product with profitability expectations, and the once-sacrosanct bundle agreement with Apple is in question. To survive as a commercial product, HyperCard needs a clear definition, which means that it needs to fit into an existing product category, which means that it can no longer be all things to all people. Which means that Claris has to make some choices.

I made such a choice in positioning my HyperCard-oriented publication, HyperPub, as a developer journal, and I haven't regretted it. So my recommendations for Claris are these:

1. Make HyperCard a serious platform for software development and nothing else.

Focusing on developers means treating users as a tool for market development rather than as potential customers. That makes sense. You can't make any money selling a formerly free, ill-defined product to users. (Developers are something else.) And any characterization of HyperCard except as a development platform will necessarily be ill-defined, because HyperCard actually is (at least) a development platform.

Nor will you make any money selling users HyperCard add-ons. Although the stackware/stack-tools market has been lucrative for some small vendors and could be for many more, it's not an opportunity that a company the size of Claris can exploit. That leaves developers. "Developers" doesn't mean just commercial developers. There are many development audiences, and you have to decide which to support most aggressively. You have strong customer bases in education, in-house corporate programming, CD-ROM and multimedia development, the design of certain kinds of help systems, and commercial stackware development. Those are good places to start.

2. Keep the Apple bundle deal. You must do this. How are you going to sell HyperCard to developers if you let their captive market get away?

Just what gets bundled is the question. You do have to differentiate what users get free from what developers won't mind paying for. But the bundled version had better not seem crippled. It also needs to be stable in the sense that the current version will read future stacks. Developers shouldn't have to ask users which version they have. And it needs to be rich enough and come with enough examples to make users feel it's worthwhile.

3. Support developers. Apple is taking an interesting direction with system software, selling modules that enhance core functionality. But that's nothing new for development platforms. You should follow that model — rather than producing new versions of HyperCard for users — and generate a stream of plug-in modules for HyperCard developers — rather than producing a lot of new versions of the basic product. Your goal should be to keep the user platform stable and the user investment low while providing developers with tools that allow them to differentiate their products and also tapping them regularly for money.

Among the modules you feed developers should be niche tools for the aforementioned established HyperCard markets. With the new Macs that are coming out with built-in CD-ROM drives, it would be a shame to lose the lead you have in multimedia to third-party companies such as Macromedia (or to PCs).

4. Port it to Windows. You've already demonstrated your commitment to doing Windows products — but will you do them right?

Port both the run-time and the developer versions, of course. To fail to do a Windows developer version would be to ignore a potentially much larger market than you now have, snub your primary customers, and saddle HyperCard's business plan with the job of pulling developers back to the Mac.

Of course, stacks should run without conversion on both platforms, and a developer ought to be able to modify a Mac-created and -resident stack across a network from a PC running Windows.

5. Port it to other platforms as soon as they arrive on the scene. The new object-oriented operating system now under development at Taligent is an obvious example. But also consider ports to UNIX-based systems such as the Sun and NeXT workstations,
which are now price-competitive with high-end Macs. Don't get bogged down in thinking that HyperCard is its user interface or its application-programmer interface; it's a market wedge, like Windows. And you know that Microsoft is ready to graft the Windows name onto whatever new technology comes along.

Of course, there is an Apple II version of HyperCard. Whether or not you should pursue that version depends on how seriously you take the Apple II education market.

And by all means, port HyperCard to pen systems and Apple's soon-to-be announced personal digital assistants. Pen-based machines are going to open entirely new markets for computers. But do it by adding real pen modules for developers, not by grafting on a HyperCard interface in which pen actions get mapped to code that was designed for mouse moves.

6. Make it either competitive or symbiotic with other development environments. HyperCard needs to survive in a market that already contains stacklike products such as Aldus' SuperCard, Spinnaker's Plus, and Asymetrix' ToolBook; visual development systems such as TGS Systems' Prograph and Macromedia's Authorware; shells such as Apple's MacApp; scripting systems such as UserLand's Frontier and Apple's own AppleScript; and serious development systems such as Symantec's THINK C and THINK Pascal and Digitalk's Smalltalk.

Scripting systems need not be a threat if HyperCard meets a clear and unique need and works well with these systems. That probably means that HyperCard needs to be truly IAC-compatible; needs to have exemplary ability to send and receive Apple events; needs tools to let developers at all levels of sophistication use IAC; and needs explicit hooks to scripting systems and a clear story on HyperCard's advantages for IAC, with sample tools showing how to exploit these advantages.

HyperCard won't coexist with visual programming languages; it needs to compete directly with them. Authorware is a serious competitor in the corporate-training market and, if it weren't so expensive, could be a formidable competitor in the education market as well. HyperCard is already probably easy enough to use for these markets; perhaps competing here means upping the performance, adding more debugging and other developer-support tools, and making it easier to develop XCMDs.

HyperCard does need to coexist with MacApp and C and Pascal and other serious development platforms. The key here is to let HyperCard developers generate efficient code and connect with other languages. How do you do that? Fold in an XCMD compiler such as Heizer Software-distributed CompileIt? Create a mechanism that turns existing C and Pascal code into XCMDs? Listen to the developers; they'll tell you.

Coexisting with established development systems and competing with stacklike tools means that you'll need to change several things about HyperCard. First, you'll need to deal with its GUI eccentricities. It's not that the familiar HyperCard interface needs to be changed; it's just that you need to allow developers to circumvent it to write real applications. A small but telling example: Make it easy to change the icon of a HyperCard-developed file so it doesn't have to announce that it is a stack.

And please add the three things that remained on my wish list after you released 2.0: full color, draw graphics, and object buttons.

Support new technologies as soon as they arrive: the way you handled QuickTime, not the way you dealt with Apple events. And make the support smooth and full.

Most critically, improve performance. HyperCard can't swim in developer waters unless it can move faster than it does now.

7. Promote it adequately. If you do all these things, HyperCard will be an essentially new product with new and revitalized markets but with built-in name recognition. Be ready to invest in it and in the third-party developers who can make it succeed.

Particularly invest in the Windows market. In ToolBook, you have an established competitor, with a bundled runtime version, that will take some work to displace. And Plus is not inconsequential; Spinnaker's got the multiplatform thing working, and users know it. You'll have to sell a lot of cheap razors in this market to create the market for the blade makers to whom you plan to sell blade-making tools. That's a business plan that requires some faith. But HyperCard currently is a better product than ToolBook or Plus. The competition is vulnerable.

Anyway, that's what I'd do.
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You’re next!
IBM will soon start selling IBM clones in Europe through an IBM-owned Asian subsidiary. The clones will ship under the subsidiary’s name, but at this writing, IBM still hadn’t announced what that name would be. Although Big Blue hasn’t announced any plans to sell its clones in the U.S., you can be sure that the execs in Armonk will be watching those European sales closely.

By Russell Ito

**Apple events:** Apple has recently launched several initiatives you might not have heard about. So here’s a brief rundown on the latest news from Cupertino: © **Version 1.1.1 of System 7**

**Tune-Up** is now shipping. This latest update to System 7’s first update fixes the famous — and mysterious — “missing files” problem that plagued some users. Under Systems 7.0 and 7.0.1, a directory item could become corrupted so that the Finder couldn’t display it or any other item that followed alphabetically. Tune-Up 1.1.1 prevents this from happening. The latest version also includes a new LaserWriter driver for the Personal LaserWriter NTR and fixes some incompatibilities with the LaserWriter Plus, II, and IIg. Tune-Up 1.1.1 is available from user groups, bulletin-board services, and resellers. It will also come in the System 7 Upgrade Kit and preinstalled on all new Macs. © **The Apple Clean Earth Campaign** provides Apple LaserWriter users with a convenient — and free — way to recycle spent toner cartridges. Apple will now pack a prepaid return label with every cartridge, so users can recycle their cartridges free. (U.S. customers can get labels by calling 800-776-2333; customers outside the U.S. should return their spent cartridges to their Apple dealer.) Apple will also donate 50 cents to the National Wildlife Federation and the Nature Conservancy for every cartridge that’s recycled. This should sound familiar, because it’s the same program Hewlett-Packard launched late last year. © **The Apple Exchange Program** is intended for buyers at businesses and institutions who want to trade their obsolete Macs or DOS machines for new Apple stuff. Through Electro Rent Corp. E.S.D., a third-party remarketer, Apple USA customers can now receive cash from their Apple dealers toward the purchase or lease of new Apple equipment. The trade-ins must be made in 10- to 100-unit lots and can include selected Apple, Compaq, and IBM computers plus HP laser printers. © **There’s more** to the Apple gestalt than just brown boxes.

**Up to Date . . .**

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Speak Up: Your Mac Is All Ears

If you’ve ever wondered if there was a constructive use for the sound-input capability in the newer Macintoshes (other than for inflating file sizes with huge voice annotations or creating dumb beep sounds), ASI (Articulate Systems, Inc.) may have come up with an answer: voice recognition. The maker of the Voice Navigator II has just introduced Voice Navigator SW, a software package that makes any Macintosh with audio input on-board — the Classic II, LC II, IIIi, Quadra 700 and 900, and PowerBook 140 and 170 — voice-controllable.

Voice Navigator SW is identical to the software that ships with the Voice Navigator II hardware package, so the process of setting up an application for use with voice is still a little complicated. Nonetheless, once an application has been set up, the productivity gains can be tremendous. Voice Navigator SW ships with languages for 75 leading applications. Users who buy now will be able to upgrade at no cost to ASI’s revised software, which promises a significantly easier-to-use interface, when that package ships this fall.

Because the Apple microphone is omnidirectional and unsuitable for voice recognition, Voice Navigator SW ships with one of two microphones: a desktop model or a headset (especially useful for PowerBook users).

With the release of Voice Navigator SW, ASI also announced that it is cutting $200 from the list price of the Voice Navigator II, which will now list for $699.

HP’s Color Surprise

Would a RISC-based PostScript Level 2 color printer for less than $5,000 surprise you? Maybe not. OK, how about a RISC-based PostScript Level 2 color paintjet? Now that’s surprising, but that’s exactly what Hewlett-Packard has introduced: the PaintJet XL300.

The XL300 offers 300-dpi color printing on plain paper or on any of HP’s special media, including glossy and coated paper and transparency film. It uses cyan, magenta, yellow, and black cartridges, so you don’t have to worry about the registration problems associated with creating a process black for your text. It can print on a medium as large as 11 x 17 inches (B-sized), and because the medium enters and exits on the same side, the XL300 can fit on a bookshelf. To keep all that paint from smearing, the XL300 incorporates a heater that dries the print before it leaves the printer. Using HP’s supplied software, you can adjust the heater to suit the medium you’re printing on, a bit like adjusting the “doneness” setting on your toaster.

Intended for networked environments, the XL300 comes with Centronics parallel and LocalTalk interfaces and can automatically switch between the HP PCL 5C (the color implementation of PCL 5) and Adobe PostScript page-description languages. For faster networking, the XL300 accepts the same HP JetDirect interface cards used in HP’s network laser printer, the IIiSi. An Ethernet interface will be available this summer.

The printer comes in either a QuickDraw version with 2 megabytes of RAM and 13 scalable fonts or in a PostScript configuration with 6 megabytes of RAM and the standard 35 Adobe fonts. An Intel 80960 RISC chip powers each printer, and HP predicts printing speeds of approximately 1 to 2 minutes per page for text and 1.5 to 6 minutes per page for graphics.


Pivot for Less

Radius’ Color Pivot monitor has been ideal for users who want an adaptable monitor. Unfortunately, at a price of $2,198 (including a video card), it’s been out of reach for some buyers. So in keeping with the times, Radius has introduced a lower-priced model, the Color Pivot LE.

Unlike the original Color Pivot, the Color Pivot LE doesn’t support Mac internal video, so you have to use it with a Radius Color Pivot Interface card. But even with the card, the system is $400 less expensive than the original Color Pivot.

The Color Pivot LE can display 256 colors at a resolution of 832 x 642 pixels, which is identical to that produced by Apple’s 16-inch color display. And the Color Pivot LE costs $400 less than the Apple unit.

Radius will continue to sell and support the original Color Pivot.

Radius, Inc., 1710 Fortune Drive, San Jose, CA 95131; 408-434-1010. Color Pivot/LE, $1,199; Radius Color Pivot Interface, $599.
MacDraw Pro: Faster and Savvy

When Claris introduced MacDraw Pro last summer, two questions were immediately shouted from the audience: "Where's all the System 7 stuff?" and "Why is it so slow?" Claris took its lumps and licked its wounds and has now issued a version designed to answer those very questions.

Version 1.5 of MacDraw Pro is the first System 7-savvy version of the program. It supports publish-and-subscribe, Apple events, Balloon Help, and TrueType. You can also import QuickTime movies. The implementation of publish-and-subscribe is significant, because MacDraw Pro is the first object-oriented application we've seen that lets you choose what you're going to publish: either a layer or a whole object. Other drawing programs publish not only the object but also anything else that might appear within the bounded region the system publishes to the edition file.

As for speed, the new MacDraw Pro is faster than the previous version but how much faster depends on what you're doing and the complexity of your document. Still, Claris has paid special attention to text entry and printing, especially on non-PostScript printers, so you can expect to see significant improvements in that area. Claris predicts speed gains of as much as four times for text entry and as much as ten times for printing.

A few other improvements include the ability to select objects by color and the inclusion of a sample HyperCard stack that lets you control a slide show composed of MacDraw Pro screens. Claris has also put some time into improving MacDraw Pro's memory handling as well as redraw and scrolling speeds.

Claris Corp., 5201 Patrick Henry Drive, P.O. Box 58168, Santa Clara, CA 95052; 408-727-8227; $399.

Quadra Video Gains MultiSync Support

A Quadra's internal video is a great addition to any configuration, but if you own one of NEC's MultiSync FG series color monitors, you really haven't been able to take advantage of the display's capabilities, because there hasn't been a way to access its multiple resolutions — until now, that is. NEC has just announced a free software upgrade that lets users of FG color monitors switch resolutions on the fly while using a Quadra's internal video circuitry.

A control panel, NEC's software lets the 5FG (a 17-inch display) and the 6FG (a 21-inch display) switch among three resolutions and two refresh rates: 640 x 480 pixels at 67 hertz (Apple 13-inch timing), 832 x 624 pixels at 75 hertz (Apple 16-inch timing), and 1,152 x 870 pixels at 75 hertz (Apple 21-inch timing). Owners of the 4FG (a 15-inch model) can switch between 640 x 480 and 832 x 624 pixels.

NEC Technologies, Inc., 1255 Michael Drive, Wood Dale, IL 60191; 312-622-7427.

Apple Lawsuit Finis?

SAN FRANCISCO, CA — In a ruling that effectively cuts the heart out of Apple Computer's multibillion-dollar "look and feel" lawsuit against Microsoft and Hewlett-Packard, U.S. District Judge Vaughn Walker ruled that most of the elements in Apple's suit were either covered under the company's 1985 licensing agreement with Microsoft or were simply not protected under copyright law. Walker's ruling left only a few interface items still in dispute. The remaining items include Hewlett-Packard's use of a trash-can icon in its NewWave interface and Microsoft's use of color, movable icons, and overlapping windows. Judge Walker was expected to rule on these remaining issues by the end of May, but the main battle over GUIs appears to be over. At press time, Apple hadn't announced any specific intention to appeal the ruling.

Microsoft Bags Fox

SAN FRANCISCO, CA — If you thought Redmond's software giant had enough feathers in its cap, then think again. Completing the triad of word-processing, spreadsheet, and database applications, Microsoft has announced its biggest acquisition ever: Fox Software. Microsoft exchanged 1.36 million shares of its common stock for all the outstanding Fox shares, putting the purchase price at approximately $173 million. Fox Software, maker of FoxPro, the dBASE-compatible cross-platform database-management program, will provide Microsoft with a significant boost in desktop database technology, offering serious competition to Borland International for the lion's share of the database-manager market. Microsoft still plans to release a relational-database manager (currently code-named Cirrus) for Windows in the second half of this year. Microsoft says that it will use parts of the FoxPro technology in the future to build new database engines that will work across various computer platforms. As part of the merger, David Fulton, the president of Fox, will join Microsoft to head up the database side of the company's newly formed Database and Development Tools division. Eventually, the Fox development team will relocate to Microsoft's headquarters in Redmond, Washington.
HE SAID AS HE SCOOPED UP A HANDFUL OF FRESHLY MADE

DISKETTES AND FANNED THEM LIKE A

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ONLY MEASURE OF PERFORMANCE IS

PERFECTION. MAYBE THAT'S WHY WE'RE

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The Quadra Turns 33

The top of the line has been topped! The 33-megahertz Quadra 950 is the fastest Mac yet.

Apple used to have a simple policy when it came to introducing new high-end CPUs: new high-end machine, new high-end price. But times have changed. The Personal LaserWriter NTR we told you about in May ’92 (see “Personal Power,” page 78) helped establish a new philosophy for Apple: higher performance, same price.

The Quadra 950 is the fastest Mac ever, beating the Quadra 900, which it replaces, by about 30 percent on average, but the best news is that the Quadra 950 costs exactly the same as the Quadra 900 does—in every configuration.

A Familiar Face

Although the Quadra 950 looks the same as the Quadra 900, Apple has made some significant internal improvements.

The biggest change is the move to a 33-megahertz 68040 microprocessor, a chip that’s a third faster than the 25-megahertz 68040 used in the Quadra 900 and 700. But Apple has done more than just swap chips. The I/O bus’ clock speed has been increased from 15.66 megahertz to 24.28 megahertz, and Apple has installed a faster Ethernet chip, which it says can result in as much as a 20-percent performance improvement. Unfortunately, because of time constraints, we weren’t able to check this claim.

In addition, the Quadra 950’s VRAM is faster than that of the Quadra 900 (80 nanoseconds versus 100 nanoseconds), and there’s more of it: The Quadra 950 comes with 1 megabyte of VRAM standard, which means you can get 16-bit color on Apple’s 16-inch display and 8-bit color on its 21-inch model (the video circuitry also supports SuperMac’s video timings). By increasing the VRAM to the maximum capacity of 2 megabytes, you can get 24-bit color on 16-inch monitors, but you still need a video card for 24-bit color on monitors larger than 16 inches.

The Quadra 950 has more storage and memory too. Unlike the Quadra 900, which came in an anemic 4-megabyte configuration, the Quadra 950 starts with an 8-megabyte/SuperDrive model. In fact, Apple has added 4 megabytes of RAM to

Figure 1: Quadra 950 Speed

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<th>Excel 3.0a recalculation</th>
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Figure 1: We performed our tests on 20-megabyte versions of a Quadra 950, Quadra 900, and ilfx and found that the Quadra 950 lived up to all of Apple’s claims. It was consistently faster than the model it’s replacing, and the 30-percent performance increase doesn’t cost you a penny more.
SNEAK PREVIEW

Stop chuckling. Believe it or not, Apple isn’t charging a premium for the additional memory — not one penny. Every configuration of the Quadra 950 costs exactly the same as the comparable Quadra 900 configuration, which is especially impressive when you look at the new hard drive Apple is introducing.

Instead of the 160-megabyte unit that Apple used to ship as its base Quadra 900 hard drive, you now get a faster 230-megabyte drive — but for the same price. The numbers break out like this: The 8-megabyte/160-megabyte drive costs $7,199; the 8-megabyte/230-megabyte drive, $8,499; and the 8-megabyte/400-megabyte drive, $9,199. An upgrade kit will be available, but as of this writing, Apple hadn’t decided on the price.

Fast Times

In our tests of a preproduction model, the Quadra 950 performed every bit as well as Apple had predicted. In all of our application tests, we saw performance improvements of at least 20 percent over a similarly equipped Quadra 900. Although the Quadra 900 had the slower 160-megabyte drive and the Quadra 950 used the faster 230-megabyte drive, we found that the drive had no effect on the test results, other than the predictable impact in the Finder-duplicate test.

In the 5-megabyte Finder-duplicate test, the Quadra 950’s 230-megabyte hard drive really shone. We found that it was nearly 70 percent faster than its 160-megabyte predecessor. Considering its performance, higher capacity, and identical price, the 230-megabyte drive represents an incredible value.

The Quadra 950’s peak performance was in the Word find/replace test, in which it sped past its predecessor by more than 50 percent. The test results for the Excel recalculation, the Illustratork preview, and the Photoshop spherize were more consistent, delivering results that were on average 33 percent faster than those of the Quadra 900.

Lonely at the Top

Based on our test results, the Quadra 950 lives up to Apple’s claims. It delivers significantly better performance than the model it’s replacing, and it does so without costing one penny more. Considering that users are now being offered a more powerful machine that has more memory and a larger, faster hard drive — all for the same price — the Quadra 950 should be an easy choice for any high-end user. The Quadra 950 occupies a unique niche: It’s on top in its class and offers outstanding value and performance. Apple has come a long way.

— Russell Ito

To Go Forward, You Must Backup

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With **MUSE** at the helm, exploring and analyzing reams of corporate data is no daunting chore.

If you’re looking for a way to make sense of complex business data, **MUSE** may be the tool for you. **MUSE** blends elements of spreadsheet and database software into a unique program that lets you explore multidimensional data in a variety of ways. Not only does **MUSE** allow you to manipulate your data but its natural query language also lets you find the data you need, with a surprisingly simple ad hoc method.

### Musing Over Data

**MUSE**’s extraordinary flexibility makes it useful for the exploratory phase of data analysis — when you’re not quite sure what you’re looking for. By contrast, canned reports from traditional database programs generally offer too much or too little information at this stage.

Moreover, **MUSE** lets you analyze and manipulate your data without ever thinking in terms of traditional database reports or complex spreadsheet formulas. If you’re a marketing manager, for example, you can import several spreadsheets containing multiproduct sales data and easily compare sales of one product line with another, or last year’s sales with this year’s sales of a particular line. **MUSE** accomplishes these tasks with ease; the same tasks in a traditional database or spreadsheet program would require users to expend considerable time and effort.

The most fascinating aspect of **MUSE** is its natural query language. In the previous scenario, the marketing manager could simply type, “What are sales for cashmere for Barney’s for January?” **MUSE** is able to interpret such a query and provide the appropriate data.

### Play by the Books

To acquire and manipulate data with **MUSE**, you work within five environments. You’ll spend most of your time manipulating data in the **WorkBook**, which uses a spreadsheetlike row-and-column format. In corporate sites (the primary market for **MUSE**), **WorkBooks** generally acquire their data from **DataBooks**, **MUSE**’s database environment, which stores data in tables. You can also import data into a **WorkBook** from spreadsheet programs in Excel 3.0, WKS, WK1, DBF, DIF, and SYLK file formats and from database programs in text-file format (fixed-field or comma-, tab-, or single-space-delimited).

The third environment is a script-writing window, in which you enter English-language queries and view the results. A charting window lets you chart data in a variety of basic 2-D, 3-D, and animated formats. The fifth environment is the program’s dictionary, an internal language reference that enables **MUSE** to interpret your queries.

In addition to basic language elements, the **MUSE** dictionary includes definitions of virtually every unit of weight, measure, and currency on earth. If you want to know how much change you’ll get back in lira if you pay for a $1.25 item with 50 francs, for example, **MUSE** can tell you (9,359.45 lira). You can beef up **MUSE**’s query-interpreting powers by supplementing its central dictionary with your own context-specific dictionaries.

### The Hard Part

The ease with which you can acquire and manipulate data from within **MUSE** is impressive. However, getting data from your company’s database into the program’s **DataBooks**, where users can access and manipulate it, is difficult. Typically, this process requires a good deal of planning and record organizing and at least the assistance, if not the total involvement, of systems professionals and consultants.

Organizations are likely to collect data in a central database; peel off summaries; and load them into **MUSE DataBooks**, which are made available on network servers (**MUSE** gives you the option of password-protecting sensitive company information). Corporations with SQL databases can take advantage of **MUSE**’s Clear Access scripts, which let users load data directly into **DataBooks** from a mainframe database.

Several **DataBooks** can be open simultaneously and shared on a network. For this to occur, however, users must open **DataBooks** in read-only mode. The drawback to this approach is that when it comes time to update a **DataBook**, you have to bring down the entire system.

A powerful linking feature lets you create connections among tables in a single **DataBook** as well as among **DataBooks** themselves. By linking a table of sales data by city to a table of cities by sales region, for example, users can query **MUSE** to generate a list of sales by region. **MUSE** searches the **DataBooks** and answers simple queries in the script window.

More complex data analysis occurs in the **WorkBook**s. Although **WorkBooks** outwardly resemble spreadsheets, their internal structure is quite different. Because row and column labels in **MUSE** define data categories rather than cells,
you can rearrange your data in a variety of ways simply by dragging rows and columns around.

Because WorkBooks are multidimensional, you can assign data to rows, columns, pages, and chapters. Each of these dimensions can be "primary" or "secondary," resulting in as many as eight dimensions per Workbook.

English-language queries make data acquisition easy, but you must structure queries correctly. Fortunately, the syntax is straightforward, and MUSE’s QuickStart, tutorial, and handbook do an excellent job of explaining the procedure. Designing complex queries that pull data out of multiple tables in a DataBook, however, is probably a task better left to developers, because syntax-related problems are likely to occur.

Confusing Quirks

MUSE provides a host of powerful features, but the program is not without its weaknesses. One is that text items are limited to 999 characters each — considerably fewer characters than the text fields in 4th Dimension and other Mac database programs are equipped to accommodate. This can cause problems if you try to import large text fields from these programs into MUSE DataBooks and WorkBooks.

In addition, several MUSE interface elements are a bit strange and confusing. Using brackets or braces around the name of a category as you create a query script causes MUSE to display a pick-list window that contains all the data items in that category, a valuable shortcut that saves you from creating a separate script for each category item. Unfortunately, the pick-list window doesn’t indicate the category of information you’re selecting. If the script isn’t visible (and scripts are often covered by other windows), you can’t always be sure what you’re clicking on. Moreover, when you select pick-list items, the original query is altered, so you must reenter brackets or braces into the script before you can use the pick list again.

One of the program’s most frustrating traits is its unconventional use of dimmed objects. In MUSE, they’re frequently active, and the manual instructs you to use them, even though Macintosh interface guidelines dictate that dimmed objects are for indicating options that are not relevant in the current context.

MUSE is a strong tool for users, but from a developer’s point of view, it needs improvement. The program limits an application designer’s ability to completely automate tasks or to insulate the innards of a MUSE system from users. In addition, developers can’t create their own buttons, entry screens, or menus.

The Bottom Line

MUSE is sure to open up new vistas to business users looking for a manageable way to access and explore corporate data. Once data has been properly laid out and organized in DataBooks, users can take advantage of a level of flexibility and ease of use that hasn’t been available in traditional database and spreadsheet programs. With a bit of polish on MUSE’s interface, Occam Research is guaranteed a winner.

— Louis Benjamin, Jr.

In addition to data-access and manipulation tools, MUSE provides a variety of basic 2-D and 3-D chart types.

MUSE uses a natural query language to help you retrieve the data you need. A comprehensive dictionary, which contains definitions for virtually every unit of weight, measure, and currency, enables the program to interpret the queries.

Get Info

MUSE

Published by: Occam Research, 42 Pleasant Street, Watertown, MA 02172; 617-923-3545.
Version: 1.01
List Price: $695.
With its ability to animate Persuasion and PowerPoint slides, Cinemation offers the fastest and easiest way to create simple but lively presentations. The package also provides a good selection of its own design templates.

**Cinemation**

Vividus' easy-to-use animation tool brings your presentations to life.

In the beginning, there was MacroMind Director, and it was good. But there was a catch. Director was impossible to use unless you invested a considerable amount of time and effort in learning to use the program. Enter Cinemation, a new tool for creating animated business presentations that’s easy enough for novices to use, yet powerful enough to satisfy the needs of savvy presenters and trainers.

**Making Movies**

Cinemation takes its cue from the movies. It’s a frame-based animator that combines motion, sound, and QuickTime video into interactive presentations and training materials. You edit your presentations with Cinemation’s tools in much the same fashion as you would edit a film.

You can create presentations with Cinemation in one of two ways. If you’re in a hurry and need to turn your work around in a matter of hours, you can use the AutoMotion feature to animate existing presentations from Aldus Persuasion or Microsoft PowerPoint. Simply import a presentation, select a Cinemation template, and activate a few commands. Cinemation does the rest.

The ability to work with existing Persuasion and PowerPoint files is especially useful if your organization has accumulated a substantial library of presentations created with these programs. No other multimedia presentation program, including Macromedia’s Magic, comes close to this level of ease of use for creating simple animated presentations. Cinemation comes packaged with a variety of design templates, including backgrounds and borders, that you can incorporate into your animations by using the program’s AutoMotion feature.

For more-original and more-sophisticated presentations, you can build movies from scratch, using Cinemation’s excellent animation and painting tools. The program’s clean and well-crafted interface makes this a fairly painless process. Unlike Magic, which constantly shuttles users among four different modes, Cinemation sticks to two modes — animation and painting.

**Take One**

You create your movies one frame at a time in the Movie window and edit them — either frame by frame or by ranges of frames — in the Filmstrip window. The Filmstrip window displays numbered thumbnail versions of each movie frame. To view the fruits of your labor, you play movies in this window, using the program’s VCR-like Controls palette.

You can use Cinemation’s painting tools to create objects for your movie, or you can import objects from other programs. Cinemation imports PICT, PICS, and QuickTime files as well as Scrapbook files from applications such as Persuasion and PowerPoint.

You can also attach sound to any object or frame in a movie, either by recording sounds with a Mac LC or IIsi microphone (Cinemation does not support the MacRecorder) or by importing sound resources and SoundEdit files.

If the objects for your movies aren’t already animated, as they would be in PICS and QuickTime files, you can use one of three animation methods to set them in motion. The easiest is to click on Cinemation’s Record button and drag an object across the screen (you can smooth the action later). Alternatively, you can set a beginning and end frame for an object and have Cinemation fill in the motion between them, a method called tweening. The third and most advanced method — and which gives you the most control over your animation — requires you to work one frame at a time.

You can create motion by scaling, cropping, and rotating objects as well as by dragging them. To vary the rate of motion, you specify a percentage of inertia with the Fill In Motion command.

Control over the objects in your movies begins and ends with Cinemation’s Tools palette, which you can toggle between the animation and painting modes. In animation mode, the palette provides tools for creating circular or rotating motion, moving all the objects in a frame, tagging (naming) frames and objects, adding sound to frames and objects, and creating links within or among movies. Pop-up hierarchical menus let you select named objects and frames.
Cinemation provides tools for creating fairly sophisticated animations from scratch. Here, we placed a QuickTime video in frame 1 of our movie and attached a link to the frame that allows the QuickTime video to finish playing before the movie goes to frame 2.

Cinemation's Ghosting feature displays grayed-out images from other frames, letting you align and trace objects precisely for more-professional-looking animations.

In painting mode, the Tools palette holds a paintbrush, a bucket, and a pencil as well as object tools, an eraser, a dropper for picking up color from the screen, a lasso, a marquee, a tool for creating custom-sized easels, and tools for creating patterns and fills.

Once you've put the pieces of a movie together, you can edit your presentation by cutting and pasting frames (including frames from other movies). Although you can't set movies to run for a specified duration, you can speed up and slow down the action by specifying the number of frames to run per second.

Ghostly Features

With the program's professional-level Ghosting feature, you can display grayed-out images from other frames within the frame you're working on, so you can align and trace objects for precise editing. This capability is particularly useful when you're creating animations frame by frame. Cinemation also lets you create movies within movies, allowing for some fairly impressive effects, such as a planet revolving around a sun as a moon revolves around the planet. You can even go a step further and import and place animated clips within the frames of your movies.

You don't have to use a programming language to make your presentations interactive either. Cinemation's link tool and a simple dialog box can turn any object into a clickable button that takes viewers to another frame in the same movie or to a different movie altogether. You can also program Cinemation to branch automatically to another frame as the movie plays. Branches can be set up so that they're one-way or round-trip, returning viewers to the frame they branched from.

The link tool also lets you create pauses and transition effects between frames. You can pause a movie at a designated frame for a number of seconds or until a specified event occurs. The package provides 20 transition effects in all, including fades, wipes, and reveals.

If you want to modify a movie, you can use Cinemation's Customize window to mix and match objects (objects can be images, text, movies within movies, and QuickTime clips) as well as change objects globally. You can maintain a library of movies and mix and match sections or entire movies to quickly create tailor-made presentations.

The Cinemation package comes with nearly 9 megabytes of AutoMotion and custom design templates, clip animations, music, and sounds. A selection of XCMDs allows you to play your movies back from within HyperCard and attach HyperCard scripts to buttons, and you can use CinePlayer, a playback utility provided with the package, to distribute your movies.

The Bottom Line

Although Cinemation isn't sophisticated enough to substitute for Director at the high end of the animated-presentation-program scale, it is a superior midrange tool for creating polished presentations quickly and easily. A few minor bugs mar Vividus' otherwise outstanding first effort; nonetheless, we found Cinemation easier to use than Magic, by virtue of its fewer modes and easier method for building transitions. Cinemation's performance is also better than Magic's for loading and playing movies, and the program's ability to animate Persuasion and PowerPoint slides is a real plus.

Overall, creating animated presentations has never been so easy, and even skilled professionals may find Cinemation a useful tool for fast prototyping of work destined for a more sophisticated program.

— Michael Miley

Get Info

Cinemation

Published by: Vividus Corp., 651 Kendall Avenue, Palo Alto, CA 94306; 415-494-2111.
Version: 1.0.
List Price: $495.
PageMaker 4.2 and QuarkXPress 3.1
The Mac's two venerable page-layout programs play a game of catch-up.

If you believe imitation to be the sincerest form of flattery, then we've seen a lot of flattery in the world of Mac-based DTP lately. Both of the Mac's industrial-strength page-layout programs, PageMaker and QuarkXPress, have recently undergone maintenance overhauls that address some key weaknesses. Interestingly, each program has added several enhancements that mimic those of its rival. Overall, however, PageMaker retains its longtime edge for versatility and QuarkXPress' strengths continue to lie in super-precise design tools and professional-level color handling.

PageMaker 4.2
Of the two programs, PageMaker seems the more eager to imitate its rival. QuarkXPress has supported color separation for some time, for example, but it's only with the current PageMaker release that Aldus has provided this capability as part of the PageMaker package. Version 4.2 has bundled with it Aldus PrePrint 1.51, an excellent stand-alone application (formerly sold separately) that's capable of separating PageMaker documents, most TIFF files, and PostScript files created in any application that supports the Open PrePress Interface.

But color handling aside, the hottest new PageMaker features include interruptible screen redraw, so you can modify pages over and over without waiting for the screen to refresh each time (QuarkXPress still doesn't offer this time-saving feature); the Control palette, for improved precision; links to other programs via System 7's publish-and-subscribe; and Aldus Additions.

PageMaker's new Control palette is similar to the Measurements palette in QuarkXPress. It lets you enter precise positioning and dimensioning information for selected objects. However, you can't use the palette to format text (as you can with QuarkXPress) or rotate objects, and its "nudge" arrows would be more useful if they didn't move objects in screen-pixel increments, which vary when you change the page view or your measurement system.

In addition to the powerful linking and automatic-updating features included in previous versions of PageMaker, the new System 7-savvy version lets you subscribe to an edition file in another graphics or word-processing program and then launch the source program from within PageMaker. Once you've modified the file and saved it, the linked file is updated in PageMaker. The new edition is then automatically imported into PageMaker.

A specially implemented hot link for FreeHand 3.1 and ColorStudio 1.5 bypasses publish-and-subscribe altogether by using System 7's powerful IAC capabilities to directly modify and update graphics without an intermediate editions file.

Aldus Additions provide a way to extend PageMaker's capabilities in much the same way as do QuarkXTensions for QuarkXPress. However, the chief advantage of the Additions is that they include a simple scripting language that lets users as well as developers automate many of PageMaker's functions. QuarkXTensions, in contrast, are programming tools available only to licensed developers.

The PageMaker 4.2 package supplies a total of six Additions: Balance columns, Display pub info, Drop cap, Make booklet, Run script, and Sort pages. Most are useful, but all need further refinement, particularly Drop cap.

New indexing features further strengthen PageMaker's lead over QuarkXPress for long-document processing, because QuarkXPress still lacks any kind of facility for creating an index or table of contents. PageMaker 4.2 is 32-bit clean and Quadra-compatible.

QuarkXPress 3.1
With version 3.1, Quark has upped the price of QuarkXPress from $795 to $895, but most users will find the program's enhancements make this version worth every penny.

The QuarkXPress Data file is dead, and no one is likely to mourn its passing. No longer does QuarkXPress create a
The new version of QuarkXPress features several interface enhancements, including the floating Style Sheets and Colors palettes shown here. The Colors palette lets you specify two-color blends for background colors.

separate file for kerning, tracking, hyphenation exceptions, and custom frame information that must be included with the documents you send to service bureaus — version 3.1 saves this information in the document files.

Many interface features formerly included in the Freebies XTensions are now built in to the program, including the page-grabber-hand tool and custom settings for pasteboard width.

Floating palettes for Style Sheets and Colors (an idea that originated in PageMaker) contain functions that were inconveniently scattered among a variety of menus and dialog boxes in the previous version. In addition, the Colors palette lets you specify a two-color background blend for text and picture boxes. However, although the Style Sheets palette is a great improvement, QuarkXPress style sheets aren’t as easy to use or modify as PageMaker’s.

Another improved interface feature lets you continue to view objects as you drag them across the screen, as you can with PageMaker — the previous version of QuarkXPress displayed only dotted outlines of objects as you dragged them. You can also select an object that’s hidden behind another, a feature that PageMaker has included for years. In addition, enhanced layer control lets you move an object forward or backward a single layer at a time rather than simply to the back or front layer. Finally, the new Accurate Rulers feature is a very useful tool for dragging and resizing objects accurately, regardless of screen magnification.

Version 3.1 includes a variety of type enhancements. You can display a document’s baseline grid and opt to snap objects to it and convert all your fi’s and fl’s to proper ligatures as you type them. And even though the character pair displays and prints as a single-character ligature, you can still click your insertion point between the characters and split them. You can even delete backward over the i or l, and QuarkXPress won’t delete the fi! Em-space width is modifiable, and you can justify a line comprising a single word.

For high-end users, QuarkXPress 3.1 provides superior trapping controls. Automatic trapping has been enhanced, and the Process Trap setting subtly traps each process color (cyan, magenta, yellow, and black) differently. Best of all, the new Trap Information floating palette lets you override settings on an object-by-object basis.

Although QuarkXPress 3.1 still doesn’t separate RGB, TIFF, or PICT files, it can process CMYK TIFFs created by programs such as Photoshop 2.0. In addition, high-end publishers will be delighted with version 3.1’s ability to import and separate Scitex CT image files, a feature that PageMaker and PrePrint currently lack.

QuarkXPress 3.1’s System 7 support includes Balloon Help and the ability to subscribe to PICT edition files. As with PageMaker, you can modify files within a document by launching the source application, but QuarkXPress lacks PageMaker’s slick hot-link implementation with FreeHand ColorStudio files. Like PageMaker 4.2, QuarkXPress is 32-bit clean and Quadra-compatible.

The Bottom Line
If you’re in the market for a jack-of-all-trades publishing program, PageMaker 4.2 is just the ticket. Add version 4.2’s significant enhancements to the program’s superb indexing features, logical and powerful style sheets, and simple scripting language, and you have a well-rounded and powerful page-layout program with broad appeal. However, many of PageMaker’s shortcomings remain. You’re limited to one open document at a time, you must specify color tints by using inadequate and predefined ranges, you can’t group page elements, and you can rotate text only in 90-degree increments (graphics can’t be rotated at all!).

QuarkXPress 3.1, on the other hand, continues to be the high-end publisher’s program of choice. Its precision tools for manipulating objects are unmatched, and its color handling is superb. It remains the Mac’s premier professional-level page-layout program.

— Eric Taub

Get Info

PageMaker 4.2

Published by: Aldus Corp., 411 First Avenue S., Seattle, WA 98104; 206-622-5500.
Version: 4.2.
List Price: $795.

QuarkXPress 3.1

Published by: Quark, Inc., 300 S. Jackson Street, Suite 100, Denver, CO 80209; 303-934-2211.
Version: 3.1.
List Price: $695.
External Charger/Conditioner for the PowerBook Models 140 & 170

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REVIEWS

GRAPhICS & DESIGN

StrataVision 3d
Strata’s Eddy Award-winning 3-D-design package gains Bézier splines and enhanced rendering speed.

Among 3-D-design packages, StrataVision 3d is a standout for high-quality photo-realistic rendering. Version 2.0 added an elegant rendering interface and plug-in extensions that provide an almost unlimited upgrade path. With version 2.5, the most recent release, Strata has improved StrataVision’s redraw and rendering speed and added a variety of important new tools for modeling, rendering, and animation.

A Better Model
StrataVision provides separate tool palettes for modeling, lighting, texture application, and animation. Most work is done in the program’s Modeling window, in which you build 3-D models and then apply textures and lighting. If your model comprises several individual objects, you can build each object in a separate window, but all components exist within the same file. You can draw 3-D objects in wire-frame or shaded views, and objects can intersect without requiring any special procedures. Essentially, rendered images are 2-D snapshots of 3-D models that “develop” in their own rendering windows.

To create smoother curves, StrataVision version 2.5 supports Bézier splines in its polygon-modeling environment. You can convert polygons to splines, using the 2D Reshape command in the Modeling window. Other objects, such as Type 1 and TrueType fonts, are created as Bézier splines, so text as well as other 2-D objects can be extruded to create 3-D objects.

Another new tool, the Skin Modeler, lets you wrap a surface around a series of cross sections called ribs. You can create your own ribs, using the program’s 2D Sculpt window, or import them from programs such as Adobe Illustrator. The Skin Modeler can also create FlexObjects—3-D objects that can twist and bend in animated sequences.

You set up your animations before you render images. StrataVision provides a variety of sophisticated animation techniques, including metamorphosis, which causes objects to change scale, proportion, and surface characteristics over time. The QuickTime and PICS animation formats are both supported for output.

StrataVision 3d’s modeling environment works, but it’s more difficult to use than that of Infini-D, a less-powerful 3-D design package from Specular International that features an exceptionally good interface. Fortunately, you can avoid
modeling in StrataVision by importing objects in a variety of file formats, including PICT, TIFF, EPS, DXF, and IGES, and in native format from graphics programs such as Swivel Pro and MiniCAD.

StrataVision 3d excels in texture mapping, which gives objects the look of wood, glass, stone, or other materials. StrataVision offers surface maps as well as solid textures (these look as if they go all the way through an object). You can also create your own surface and bump maps, using imported PICT images.

New with version 2.5 is environment mapping, a feature that provides a variety of simulated environments (or you can create your own), which you map to reflective objects such as a glass bottle. This is a tremendously valuable shortcut, because it saves you from the time-consuming process of modeling complex scenes that serve no other purpose than to provide a reflection in the object.

To check the progress of your designs, you can render them in one of several preview or draft modes. All rendering can occur as a background task, so you can work with other applications as StrataVision processes your designs. You can also set rendering to occur at a specific time or interrupt it and save the results as a partial render. When you come back to the program later, the rendering will begin where it left off.

StrataVision gives you lots of options for controlling the rendering process itself. You can choose to turn on a slew of parameters, including anti-aliasing, glowing surfaces, shadows, reflectivity, and refraction. You can also choose among rendering algorithms, such as phong shading or ray tracing. StrataVision also offers radiosity, the slowest but most advanced rendering method.

The rendering process requires a lot of memory: too little can slow or even prevent rendering. The minimum memory requirement for StrataVision 3d is 4 megabytes of RAM, but the manual recommends at least 8 megabytes for optimal performance.

Rendering can be an extremely time-consuming process when large, complex images are involved. Strata is one of several companies that have recently developed a way to divide the rendering process among several Macs on a network. The company’s Render Pro, which works with StrataVision 3d version 2.5, speeds the rendering process by dividing an image into hundreds of individual rendering calculations. The calculations are distributed among several Macs on a network and processed simultaneously in the background.

The Bottom Line
Unlike rival MacRenderMan, from Pixar, StrataVision 3d puts a friendly interface on texture-mapping and rendering. The addition of Bézier splines in version 2.5 greatly strengthens the program’s modeling environment. It may take you a while to master StrataVision 3d, but the photo-realistic images it produces make it well worth the effort.

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Office 3.0 (the Mac version's number matches that of its DOS counterpart, although 3.0 is the first version for the Mac) consists of five DA:s: the groupware-oriented Mail and Calendar DAs and three single-user utilities. WordPerfect's recommended maximum number of users per Office Mail server is 100, and because Office can run in the background, you don't need a dedicated server.

Office's Administrator lets you manage and maintain Office from any Mac on the network, but we encountered a few problems. You can't perform administrative tasks while users are logged on to the system, for example. In addition, Office servers on the same network can exchange mail, schedules, and user lists, but only after a network administrator has registered them with each other manually and generated master lists at each server.

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The core of Office is its Mail module. Mail efficiently stores single copies of messages on the server, no matter how many recipients are listed. Users manage their mail in an attractive, adjustable split-screen window that resembles the one in CE Software's QuickMail, in which incoming messages are listed on top and outgoing messages are on the bottom. Mail provides flexible message handling with numerous user preferences, including RSVPs with messages, delayed delivery, message-expiration dates, and the ability to modify the font and style of message text. The package also includes a spelling checker with a user-definable 80,000-word dictionary.

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REVIEWS

Office's three single-user utilities include a basic flat-file-database module, an excellent forms creator, and an undistinguished file manager.

Calendar manages group scheduling with an In/Out dialog box that displays the meeting requests you've sent and received. To schedule a meeting, users select proposed attendees from the server's name list, add resources to the meeting request, and mail the request to the proposed attendees. Calendar's Busy at a Glance feature lets you see when prospective attendees are free to attend a meeting. Attendees can accept or reject meeting proposals, and once a meeting has been accepted, it's automatically entered into each user's calendar. With Auto Dates, you can set up recurring events in Calendar, but you must use WordPerfect's nonintuitive cryptic formulas and codes.

The Calendar module also serves as a personal scheduler, providing a memo pad, a to-do list, and reminder alarms. Unlike Meeting Maker and Schedule+, Calendar doesn't require your Mac to be connected to the server in order for you to access your personal calendar. You can save calendars to your hard disk, modify them, and merge them later with the server copy, which is especially handy for PowerBook users.

In addition to the primary calendar...
window, which displays two months for date selection, an appointments list, a memo pad, and a to-do list, you can opt for weekly or monthly views to display your schedule in detail. You can also expand the calendar window to view two months (five months if you have a 20-inch monitor), and you can print your schedule in a variety of formats.

In addition to Mail and Calendar for network use, Office provides three utilities for individual use. Notebook is a single-user flat-file-database module that serves as a basic tool for building personal address books, but its bare-bones approach prevents it from competing with full-Blown address-book managers such as TouchBASE. Forms Maker, however, is an excellent tool for creating forms for Office’s Mail, Calendar, and Notebook modules. It provides a wider range of forms options than do QuickMail or Microsoft Mail, and it includes an assortment of drawing tools, lines, and shapes that you can colorize by using color palettes. File Manager is the least impressive module, offering basic controls (copy, move, rename, delete, and create) over files and folders as well as the ability to search for files by filenames or strings.

The Bottom Line

With its full-featured E-mail and group-scheduling modules, Word Perfect Office poses stiff competition for QuickMail and Microsoft Mail. Its E-mail capabilities compare well with those of the other packages, its group calendar is superior to the one in Schedule+ and is easier to use than ON Technology’s Meeting Maker, and its Forms Maker provides more features than does Microsoft Mail or QuickMail. Particularly for Mac/PC networks, Office is an excellent choice.

—Michael Miley

Get Info

WordPerfect Office

Published by: WordPerfect Corp., 1555 N. Technology Way, Orem, UT 84057; 801-225-5000.

Version: 3.0.

List Price: $149; 5 users, $495; 20 users, $1,495; 100 users, $5,995.

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**VideoSpigot**

SuperMac's low-cost hardware/software package captures home video to QuickTime.

SuperMac has zeroed in on the burgeoning QuickTime market with the release of the VideoSpigot, an inexpensive QuickTime video-digitizing board that's taking the market by storm. And for good reason — street-priced at about $500, the VideoSpigot may be the best hardware bargain going for QuickTime videophiles.

**Plug-and-Play**

Prior to the VideoSpigot, frame-grabber boards such as the RasterOps 364 weren't optimized for capturing video in QuickTime format — in general, their frame rates were too slow or configurations that produced acceptable frame rates were complicated to set up. The VideoSpigot, however, was conceptualized as an easy-to-use, plug-and-play product for capturing video from any consumer video source in QuickTime format. Its frame sizes are tailor-made for QuickTime (the maximum capture size is 320 x 240 pixels in NTSC), it can handle NTSC as well as PAL video sources, and it's versatile enough to work with different window sizes (160 x 120, 240 x 180, and 320 x 240 in NTSC; 192 x 144 and 384 x 288 in PAL).

The VideoSpigot board comes in a variety of flavors: a Mac LC and IIsi version, a NuBus version, and a Pro version that's bundled with the SuperMac 24-bit PDQ display board. Also announced, but not yet available, is a bundle of the VideoSpigot with the Macromind-Paracomputer MacRecorder sound digitizer. For this review, we looked at the NuBus version of the board.

Installation is a snap — the board simply plugs in to any available NuBus slot, and the VideoSpigot extension drops into your System Folder. After you restart your Mac, you run ScreenPlay, software that's supplied with the board. It's a small, streamlined program that lets you preview incoming video and then record it to RAM or to disk once it's been digitized.

Finally, you attach your video source...
to the VideoSpigot’s composite video-in jack. The board lacks a higher-quality S-Video input capability, however. If you want to record sound, you’ll need a sound digitizer such as the MacRecorder, or if you own an LC or a II, you can use the built-in sound-recording microphone.

Video Capture
When your video source is connected, you select Play mode and the video appears in color within the ScreenPlay window (minus the sound). To record the video, you click on the ScreenPlay Record button and the video appears in grayscale in a smaller window as it’s captured directly into available RAM or to disk. You can increase the VideoSpigot’s frame-capture rate by recording directly to RAM. A fast CPU such as a Mac IIIX or a Quadra or a fast hard drive can optimize the VideoSpigot’s frame rate for record and playback. One thing missing from the record function is feedback on the amount of RAM or disk space you have available as the recording process takes place, although the software does display the frame rate of the recording.

You can adjust color and saturation (but not the brightness or contrast) of live or recorded video as well as crop QuickTime frames before saving movies to disk. The full range of QuickTime compression options is available, and you can set in and out points to save a portion of a video to disk. In the next upgrade to the ScreenPlay software, SuperMac plans to include a new codec (compressor/decompressor) that will improve the video frame rate and offer a larger window than is available with the standard QuickTime video codec.

The image quality of the VideoSpigot’s captured video is quite good, considering the limited frame size and the effects of QuickTime compression. Although you can find hardware that supports larger QuickTime window sizes, be prepared to spend $10,000 for 640 x 480 thirty-frame-per-second QuickTime frame grabbers. On a price/performance basis, nothing comes close to the VideoSpigot for capturing home video to QuickTime.

The VideoSpigot’s main drawback is that you can’t change the sampling rate of the MacRecorder when you’re working within ScreenPlay: The rate is always 22 kilohertz in mono. Although this is the highest-quality audio setting, it isn’t necessarily the most desirable. To optimize QuickTime sound/video synchronization, you want to be able to digitize sound at 11.025 or even 7.056 kilohertz, which you can’t do from within ScreenPlay. You can correct this problem with some painstaking postediting work (in Adobe Premiere, for example), but we hope to see this issue resolved in a future release of ScreenPlay.

The Bottom Line
Whether you’re an amateur or a professional videophile, you’ll find the VideoSpigot to be inexpensive, simple to set up, and convenient to use for capturing clips from consumer video devices to QuickTime format. If you’re like us, you may find your hard disk filled with QuickTime movies within hours of installing the VideoSpigot — a testimony to its ease of use. Aside from a few problems with sound recording, the VideoSpigot is a compelling product that’s well worth the asking price.

— David Biedny

Get Info

VideoSpigot

Manufactured by: SuperMac Technology, 485 Potrero Avenue, Sunnyvale, CA 94086; 408-245-2202.

List Price: VideoSpigot NuBus, $599; VideoSpigot LC, $499; VideoSpigot si, $499; VideoSpigot Pro NuBus, $1,599; VideoSpigot Pro si, $1,499.
Now Up-to-Date scores high as a personal and workgroup appointment scheduler.

Riding the wave of success generated by its versatile utilities package, Now Software has come up with an ambitious entry in the calendar-software arena that promises to be every bit as successful as its Now Utilities. Now Up-to-Date is a full-featured but elegantly simple program that not only lets you schedule appointments and set reminders for your own personal schedule but also allows workgroups to schedule events over an AppleTalk network.

What distinguishes Now Up-to-Date (NUD) from other appointment-scheduling programs is its network strategy and superb interface. Unlike On Technology's Meeting Maker, for example, which was designed specifically as a workgroup scheduling program, NUD was built primarily as a personal scheduler that can also be shared over a network. As a result, unlike Meeting Maker, NUD doesn't require you to connect to a server to use the program. You can save a copy of your calendar to your PowerBook, for example, make changes while on the road, and then connect to the NUD calendar server when you return to the office and update your calendar.

In addition, although NUD is feature-rich, it's easy to learn and use. Its well-designed interface is intuitive and uncluttered, and even novice users can have the program up and running immediately. NUD comes closer than any other program currently available to mimicking the process of using a paper appointment book, but it has all the added software conveniences of easy updating, reminders, and workgroup sharing.

When you open NUD, the default view is of the current calendar month, but...
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you can also opt for a daily, weekly, or yearly view. To enter appointments, you
double-click on a day and NUD pops up
a scrolling page that lists the hours of the
day. You click and drag through the
duration of your appointment (3 P.M. to
4 P.M. for example) and type in its name.
NUD handles event durations in 15-
minute increments, beginning on the hour.
When you return to your monthly calendar,
you can see the time and as much of
the event’s name as fits on a single line in
the date square.
If you want to enter details on an event,
you can call up an Event Info box that lets
you enter descriptive notes, set up recur-
ring events, and add audible and visual
reminders. Double-clicking on an event
brings up the Event Info box that de-
scribes it. NUD even lets you schedule
any number of overlapping events and
display them graphically.
With NUD, it’s easy to customize
the look of your calendar. You can create
and save various styles that define fonts,
text styles, and text color for calendar
headers, date numbers, events, and other
elements. This feature makes it easy to
set up visual indicators that tell you at a
glance which events on your calendar are
personal and which are business-related,
for example. In the month view, you can
also create banners to label events that
span several days.
NUD supplies numerous printing op-
tions. You can print any of the on-screen
views, and a pull-down option spreads
one view over 4, 9, or 16 sheets of paper.
If you use an appointment book, NUD
provides a wide range of formats, page
sizes, and layout options for the Day-
Timer, DayRunner, Franklin Planner, and
FiloFax.
With its ease of use, customizable
features, and straightforward design, NUD
shines as a personal scheduler. However,
with a few minor exceptions, it also
works well as a group scheduler,
allowing users on a network to set up and
share public-event calendars that display
such things as project schedules and staff
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information displayed in your personal calendar (it can add up, especially if you’ve subscribed to several calendars), you can use a different text color and style for each public calendar. Another handy feature lets you set NUD to mark with a bullet each new event you haven’t read. When you elect to “unsubscribe” from any public calendar at any time, the events associated with that calendar are automatically removed from your file.

What makes NUD so versatile, especially for users who travel, is that it lets you save public events to your personal calendar file, work with the file off-line (although you can’t modify public events), and then reconnect to the server and have NUD automatically update your calendar with public-event information.

From a network administrator’s point of view, setting up a NUD calendar server is a no-brainer. You simply drop an extension into the server’s System Folder. The extension can run in the background on any Mac on the network. Once it’s been installed, the calendar server requires no maintenance.

The flip side of NUD’s minimal administration requirements is its lack of adequate access controls. Because serialization is handled at the application level rather than from the server, site administrators can’t control which users and groups can access public calendars. Moreover, NUD lacks a warning device for flagging events that conflict with one another in public calendars.

**The Bottom Line**

To be truly useful to business users, a calendar program must succeed first as a personal scheduler and second as a network group scheduler. With its accessible interface, flexibility, and well-designed features, NUD works supremely as a personal calendar program, and it will have special appeal to users who frequently need to work with their calendar off-line. Its technique for automatically updating personal calendars when users reconnect to the server is a real plus.

NUD’s network implementation is also noteworthy for its simplicity and maintenance-free design. Users will have no trouble deciphering the concept of shared public calendars, although administrators at large sites will find NUD somewhat lacking when it comes to adequate access controls. This drawback aside, NUD is the best business solution we’ve seen to date for managing busy schedules — both personal and shared.

— Susan Janus

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**Get Info**

**Now Up-to-Date**

Published by: Now Software, Inc., 319 S.W. Washington Street, 11th Floor, Portland, OR 97204; 503-274-2800.

Version: 1.1.

List Price: for single users, $99; for five users, $399; for ten users, $599.

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MacGlobe

If an atlas and an almanac are your favorite books, MacGlobe is for you. A sibling of PC Globe's successful product for the PC market, MacGlobe combines a database of information on 190 countries (which registered users can have updated yearly) with substantial map-creation and reporting capabilities at the country and regional level.

MacGlobe lets you create four types of maps for each country, although not simultaneously: a "base" map of the country's shape (it has population and area statistics as well as a picture of the country's flag), a city-location map, an elevation map, and a map showing geographic and tourist features. Political divisions below the country level, such as the boundaries of the French provinces, are not included on these maps. Pressing the Play button next to a country's base map produces a stirring, Nintendo-quality rendition of its national anthem.

When you create a map of a region, such as Europe, you can have MacGlobe "paint" it with as many as 15 colors or patterns to detail groups of countries that you select or that MacGlobe recognizes as economically, regionally, or politically related (such as the EEC, the OAS, or NATO).

You can use MacGlobe's comparison maps, charts, and reports to see variations among countries for 108 data elements such as economics, education, manufacturing, demographics, health, agriculture, mining, and energy production. (You can't, however, add your own data, such as sales figures, for different countries.) A comparison map for any one of these elements paints countries that have different value ranges with specific patterns — for example, a solid color for a country with a high population value and dots or stripes for countries with lower values. You can also create bar charts for the 10 lowest (or highest) values for a data element or for the values for 11 countries you select.

MacGlobe's export capabilities and printing features are weak. The Copy function, which provides the only means of exporting data, allows you to copy only a small subset of data at a time. For example, exporting energy-production data for all the countries in a region, such as Africa, is a laborious task that's best done with paper and pen. Printing in MacGlobe can be very slow, unless you disable Adobe Type Manager.

MacGlobe's cartography isn't completely current — the program doesn't reflect the breakup of the USSR, for example — and it contains some minor misnomers such as United Germany instead of the Federal Republic of Germany. Ideally, subscribers to MacGlobe's yearly update service should receive corrections in these areas.

Aside from these drawbacks, MacGlobe is a polished product. It offers excellent value for the K-12 education market, for interested home users, and for business professionals looking for a compendium of relevant worldwide information (and for those with more local interests, PC Globe recently released a similar product called MacUSA).


— Jeffrey Steinberg

MasterJuggler

Suitcase II

If you think System 7 gives you the ultimate in easy resource management for fonts, DAs, Fkeys, and sound, you haven't used MasterJuggler or Suitcase II — both of which now support System 7. Since their introduction, MasterJuggler and Suitcase II have been leapfrogging each other in the competition to be the best in this field. At the moment, Suitcase II is ahead.

A resource-management utility is a boon to anyone who's operating with more than just the standard system resources. With either MasterJuggler or Suitcase II, you can take fonts, sounds, or Fkeys out of your System file and organize them into folders. Furthermore, each utility lets you load only the resources you need for your current project, so your font and DA menus are less cluttered and your applications launch more quickly; compresses font and sound files, which conserves valuable hard-disk space; and offers on-the-fly transparent decompression.

Like earlier versions, MasterJuggler 1.57 provides a variety of additional features; some are entertaining, others are time-savers. For example, you can assign sounds (such as Curly of "The Three Stooges" saying he's "tryin' to think, but nothin's happening") to several different Mac operations. You can also link applications and then launch them with one command.

Suitcase II 2.0 is a more substantial upgrade and edges out MasterJuggler in its ease of use. This new version introduces a menu bar that has a standard Edit menu and a special Suitcase II menu that lets you access the two windows where you make all your modifications. This ultracovenient two-window scheme is Suitcase II's greatest advantage over MasterJuggler; MasterJuggler's features are scattered across several windows that you have to, well, juggle. Even with its handy pop-up menus, MasterJuggler can't match the elegant simplicity of Suitcase II.

Another of Suitcase II's improvements is its new Sets feature, which lets you group suites into logical sets so you don't have to remember each suitcase you need for a particular project. Although both MasterJuggler and Suitcase II resolve name/ID conflicts, Suitcase II includes an easy way to avoid font conflicts when you open your files on another Mac.

Suitcase II's documentation and HyperCard tutorial are superb, guiding you in plain English through the maze of TrueType versus PostScript fonts, System 7 resource management, and Suitcase II's operation. You don't have to read everything, but it's all there if you're curious.

Both Suitcase II and MasterJuggler are excellent utilities. The features in MasterJuggler are substantial, and if you're also in the market for disk-management and data-recovery utilities, you can get MasterJuggler as part of the ALSOFT Power Utilities package ($129). But for the greatest ease of use in resource-management packages, this time the nod goes to Suitcase II.

MasterJuggler, ALSOFT, Inc., P.O. Box 927, Spring, TX 77383; 713-353-4090. Version 1.57. $49.

Suitcase II, Fifth Generation Systems, 10049 N. Reiger Road, Baton Rouge, LA 70809; 800-873-4384 or 504-291-7221. Version 2.0. $79.

— Shelley Cryan
How are you organized? How does it work? How is it done? Flowcharts provide the best answers to important questions like these. And the highest-rated solution (5 Mice – MacUser) for fast, clear flowcharts is MacFlow.

Use MacFlow to produce top-quality charts and diagrams without tedious drawing. Why waste hours drawing a chart with a draw program when you can develop your chart up to ten times faster with MacFlow? Graphically organize complex programs, projects, and structures—fast...

Simply drag predrawn symbols onto a page and connect with lines. Place text in symbols and lines, and even include your own custom symbols. Change the chart as desired; lines stretch and stay attached. Create stand-alone flowcharts that can be freely distributed. MacFlow is also System 7-savvy, letting you publish your charts. Translate to/from text, Acta, and MORE outliners.

Get MacFlow today for better charts tomorrow.

When will it happen? When is break-even? How much will it cost? Gantt chart schedules with integrated financial data provide the best answers to important questions like these. And the best solution for fast, clear project schedules is MacSchedule.

Use MacSchedule to plan projects and keep them on track and within budget. MacSchedule automatically creates and manages a project calendar. Just specify tasks and indicate task timing with the mouse. Status tracking is also as easy as a click of the mouse.

Integrated spreadsheet and graphing capability ties data to schedule tasks. Include budget and manpower requirements and project trends. Automatically develop calendarized cost estimates and cost/schedule variance with the Earned Value Analysis feature in MacSchedule PLUS. Place schedules in documents for proposals and reports or create slides, overheads, and wallcharts.

Get MacSchedule today for better schedules tomorrow.

For a free demo disk and catalog, phone, write, or fax Mainstay today. CIRCLE 76 ON READER SERVICE CARD
MultiPort

The two serial ports on the back of most Macs are sufficient for connecting a modem and a printer or network, but if you also want to connect other serial devices such as digitizers, bar-code readers, and label printers, you'll need some hardware help. Silicon Valley Bus Company's MultiPort and Applied Engineering's QuadraLink each provide a way to get four extra connectors so you can use as many as six serial devices simultaneously.

Although they provide similar results, the two products use different approaches. The QuadraLink occupies an internal NuBus slot, cleanly adding four 8-pin mini-DIN RS-422 serial connectors to the Mac's back panel. The MultiPort is an external device that plugs in to the two serial ports and an ADB (Apple Desktop Bus) port on your Mac — giving you six new serial ports and four ADB ports. Three hard-wired 5-foot cables give you room to move the MultiPort to where you can access it easily, but they can create a rat's nest on your desk.

To access the extra ports, you either need the Mac's Communication Toolbox (built in to System 7 and available from Apple as a free INIT for System 6) and software that supports it or you need a way to fool the Mac. For programs that don't support the Communication Toolbox, the QuadraLink and the MultiPort each come with "shadowing" software that makes extra devices appear to be connected to one of the Mac's standard serial ports.

For switching among your serial devices, the QuadraLink comes with a control panel called AE Shadow. Just click on the port you want and specify which of the Mac's standard ports you want to emulate (the modem port or the printer port). For easy reference, you can name the extra ports to specify the connected devices. The MultiPort comes with a DA that works much the same way. With the MultiPort, you can tell which ports are currently selected by looking at the LEDs on the device's front panel.

An optional feature of AE Shadow lets you share connected devices with other users on your AppleTalk network — effectively turning single-user devices, such as the Apple StyleWriter, into networkable devices. This option costs $100 for the first five users and $49.95 for every five thereafter.

The MultiPort lets you share devices with other Macs in a more limited fashion, using direct serial connections rather than a network. With this method, you give up one of your extra ports for each Mac with which you want to share devices, and all the Macs must be in close proximity.

However, the MultiPort offers something the QuadraLink doesn't: four additional ADB ports. Although the standard ADB can address as many as 16 devices, Apple discourages daisy-chaining more than 3, because of connector resistance and signal degradation. The MultiPort overcomes this limitation with an optional $39.95 power supply. You don't need this supply to use the extra ADB ports, but if your total power consumption on the bus is too great, you'll risk blowing a fuse in your Mac.

Deciding between the QuadraLink and the MultiPort is tough, because they work similarly and come from companies with good reputations. If you want to reduce cable clutter or share devices with networked Macs, the QuadraLink gets the nod despite its higher cost. However, if you want the extra ADB connectors or easier access for switching devices and can overlook its excess cabling, the MultiPort is an excellent value.

AutoDoubler

Most people have a love/hate relationship with file compression. They love the increased space but hate the extra time and menu commands required for launching and saving files. AutoDoubler represents a new generation of compression software — it's designed to eliminate the parts you hate.

Once AutoDoubler is installed, the
One of the critics, Macworld, recently said, “As a group, the RasterOps boards made the best video captures—with truer colors, better resolution, and fewer artifacts than all of the other boards.”

MacWeek honored our 24STV video adapter with its Target Award. And Presentation Products handed us its Readers Choice Award. We could go on, but you get the point: RasterOps makes the most highly acclaimed multimedia/video products you can buy.

It’s no wonder. Apple® developed QuickTime with RasterOps products. And today, the RasterOps QuickTime Presentation Theater is the only complete multimedia family available.

In its price range, it’s the only one offering video output to an NTSC source or a video recorder. The only one with a full screen video window that can display and capture at 30 frames per second. And the only one that includes CD quality sound and video digitizing on one board. All these functions are enhanced by each product’s easy interactivity.

We’ve prepared a video about the RasterOps QuickTime Presentation Theater. To order your $5.00 video, find out about our special VideoSpigot Trade-In Program, or get more information, please call us at 1-800-SAY COLOR.

And let RasterOps take you to the movies.
program’s operation is completely automatic and transparent. The icons, type, creator, and speed of compressed files are identical to those of the uncompressed versions, but their size is smaller.

Previous compression software always wrote an uncompressed version of a compressed file elsewhere on-disk before opening the compressed file. The wait was painful, especially for large applications. AutoDoubler, in contrast, decompresses files directly into RAM, so they open almost as quickly as the uncompressed versions do. When you save a previously compressed document, AutoDoubler writes it uncompressed and compresses it later, when your keyboard and mouse are idle.

AutoDoubler installs as a control panel. At startup, it reserves a RAM cache in which to do its work. If RAM is at a premium or if you routinely compress very large files, you can tweak the cache size.

AutoDoubler gives you various means of controlling the extent and frequency of compression. You can exclude volumes, folders, and files from compression or limit compression to files that are older than a specified date. You can also specify a target percentage for the free space you want to keep on your volumes, and AutoDoubler will stop compressing when it reaches that limit. To prevent compression from kicking in at any idle moment, you can specify a time interval after the last keyboard or mouse activity before AutoDoubler begins working.

In testing, we found that AutoDoubler sometimes prevented subsequent extensions and control panels from loading. You can sidestep this problem by forcing AutoDoubler to load last, either by using an INIT-management utility, such as INITPicker, or by adding a tilde before AutoDoubler’s name.

For stretching hard-disk space, AutoDoubler beats DiskDoubler and SuperDisk. It’s faster than either program, and it’s completely automatic. However, AutoDoubler doesn’t let you select a file and compress it onto another disk for sharing with someone else—for that purpose, you still have to use DiskDoubler, StuffIt, Compactor, or SuperDisk.

Salient Software, Inc., 124 University Avenue, Suite 300, Palo Alto, CA 94301; 415-321-5375. Version 1.0.4i. $79.95.

— Darryl Lewis
It'll remind you bought a Macintosh

When you take one look at this Lotus® spreadsheet, it will all come back to you.

All those feelings of power and control that surfaced when you first sat down in front of a Mac. You were feeling rather impressed with yourself because now you could operate something as complicated and mysterious as a computer.

With 1-2-3® for Macintosh, you'll experience this same feeling of accomplishment. That's because 1-2-3 for Macintosh takes full advantage of the friendly Macintosh environment. And all those funny looking icons that go with it.

For example, you'll find our graphing tools embarrassingly easy to use. With just a point and a click of your mouse, you can preview, create and change all graphs. And the icon palette offers you every type of graph imaginable—3-D pie charts, bar charts, area and scatter graphs—literally hundreds of variations are available to you in an array of colors.

You probably first bought your Macintosh because it would make life easier for you. You'll buy this spreadsheet for the same reason. You see, 1-2-3 for
Macintosh is the only Mac spreadsheet to provide true 3-D technology so you can link files and consolidate data or create multi-page reports all in a single worksheet file. You can view and work with up to 256 worksheets simultaneously. In short, 3-D makes the job of analyzing and organizing your work fast and easy.

1-2-3 for Macintosh also offers in-cell editing, a feature that lets you edit text, formulas and data directly in the cell. So you can focus on the worksheet, instead of the formula bar above. Makes sense, doesn't it? Because the program captures the true spirit of Macintosh, it has recently earned the Editor's Choice Award from Computer Reseller News as well as praise from Apple Chairman and CEO John Sculley, who has called it, "a spectacular product." (He doesn't throw comments like that around every day.)

So pick up a copy of 1-2-3 for Macintosh from your favorite dealer. Or call 1-800-TRADEUP, ext. 6682 for a free** working model. (Excel users, be sure to ask about our special upgrade price.)

1-2-3 for Macintosh. It'll bring back fond memories.

Lotus 1-2-3 for Macintosh

For information on registering for LotusWorld '92, please call 1-800-524-1857.

*Boston Globe article. **There is a $5.00 fulfillment handling charge when ordering the working model direct from Lotus. Please have your credit card and product package ready when you call. In Canada, call 1-406-60-LOTUS. ©1992 Lotus Development Corporation. All rights reserved. Lotus, LotusWorld, and 1-2-3 are registered trademarks of Lotus Development Corporation. Ciasis is a registered trademark licensed to Lotus Development Corporation. Macintosh and Mac are trademarks of Apple Computer, Inc. The Apple logo is a registered trademark of Apple Computer, Inc. used under license. This product includes Adobe Type Manager. Adobe Type Manager and the ATM logo are registered trademarks in the United States, of Adobe Systems, Incorporated. LotusWorld is a trademark of Lotus Publishing.
A picture is worth a thousand numbers.

DeltaGraph Professional and GraphMaster star among the current crop of charting packages.

BY RON HIP SCHMAN

If one out of every five Americans is functionally illiterate, you could probably quadruple that number for those who are numerically illiterate. Some people just don’t understand numbers. Fortunately, most do understand pictures, which is why clear charts and graphs are so important.

Although a baffling array of packages is available to help you turn your numbers into graphs, we’ll concentrate in this article on the four dedicated charting packages for the Mac: CA-Cricket Graph, from Computer Associates; DeltaGraph Professional, from DeltaPoint; GraphMaster, from Visual Business Systems; and MacGraphX, from Bravo Technologies.
Of course, these aren’t the only packages that can produce graphs. All spreadsheet programs have at least rudimentary charting capabilities, and even illustration packages, such as Adobe Illustrator, have charting functions. But spreadsheet programs are primarily for working with numbers, not creating charts. Illustration packages are meant for creating graphics, not for numerical accuracy or flexibility. When you need maximum control over a chart, a dedicated charting package is the only way to go.

All graphing programs have a similar method of operation. You enter the data into a spreadsheet-like structure of cells. Of course, you don’t want to have to type in all your data, although most programs let you do this, so you’ll want to import the numbers.

All the packages let you import data in tab-delimited format. Other common formats include CSV (comma-separated values, a common mainframe format), SYLK (produced by most spreadsheet programs), Lotus 1-2-3’s WK3 and WK1, and Excel’s BIFF.

Most packages reserve the first row and column for labeling each data series and the categories within the series. A data series is usually a group of data points taken at given times or places or according to any other logical criteria. The categories define the times, places, or situations when the data is actually taken. This article’s example charts have three series of data, each series being a year’s worth of attendance figures. The categories are the 12 months of the year, and each category value within each series contains the attendance for one month.

Once you have your data within a charting package, you may want to massage the numbers. This can take the form of performing mathematical operations, data sorting, data transposition, smoothing, curve fitting, data recoding, and frequency analysis.

Mathematical operations apply mathematical functions to one or more cells or perform tasks such as summing or averaging cells. Transposing data is a convenience feature that lets you switch rows for columns and vice versa. If your data is very noisy, smoothing sets the value of each point to the average of the points surrounding it. Curve fitting lets you fit a curve with a specific mathematical description (which you choose) to your data. The nature of the curve (linear, polynomial, log, exponential, and so forth) and the associated coefficients give you the relationship among the data points. Data recoding reassigns the values of cells based on their contents. An example might be, “Turn all the cells with the word Monday into 1.”

Frequency analysis is what your teachers did when making up a bell curve.

**Picturing Your Numbers**

You’ve entered or imported your data and sorted and polished it to perfection, and now you want to see a picture. What awaits you is a mind-boggling array of chart

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**Table 1: Pros and Cons of Charting Packages**

<table>
<thead>
<tr>
<th>Package</th>
<th>Pros</th>
<th>Cons</th>
<th>Ideal Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA-Cricket Graph 1.3.2</td>
<td>• Quality-control charts.</td>
<td>• No 3-D charts.</td>
<td>• Educators.</td>
</tr>
<tr>
<td></td>
<td>• Good mathematical-manipulation capabilities.</td>
<td>• Cannot adjust bar/column spacing.</td>
<td>• Scientists.</td>
</tr>
<tr>
<td></td>
<td>• Direct plotter output.</td>
<td>• Very simple color capability.</td>
<td></td>
</tr>
<tr>
<td>DeltaGraph Professional 2.0</td>
<td>• Best variety of charts and editing tools.</td>
<td>• No combination graphs or data recoding.</td>
<td>• Graphic artists.</td>
</tr>
<tr>
<td></td>
<td>• Good data import and graphics export.</td>
<td>• No pictograms.</td>
<td>• Educators.</td>
</tr>
<tr>
<td></td>
<td>• Frequency analysis.</td>
<td></td>
<td>• Business presenters.</td>
</tr>
<tr>
<td></td>
<td>• Presentation capabilities, including slide show.</td>
<td></td>
<td>• Scientists. and researchers.</td>
</tr>
<tr>
<td>GraphMaster 1.31</td>
<td>• Good editing and graph variety.</td>
<td>• No frequency analysis.</td>
<td>• Graphic artists.</td>
</tr>
<tr>
<td></td>
<td>• Pictograms.</td>
<td></td>
<td>• Business presenters.</td>
</tr>
<tr>
<td></td>
<td>• Good data import and export.</td>
<td></td>
<td>• Scientists.</td>
</tr>
<tr>
<td></td>
<td>• Built-in programming language.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MacGraphX 1.0</td>
<td>• Good data labeling.</td>
<td>• No 3-D charts.</td>
<td>• Educators.</td>
</tr>
<tr>
<td></td>
<td>• Chart editing.</td>
<td>• Only PICT and Clipboard export.</td>
<td>• Researchers.</td>
</tr>
<tr>
<td></td>
<td>• Spreadsheet math.</td>
<td>• No pictograms.</td>
<td></td>
</tr>
</tbody>
</table>

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Frequency analysis is what your teachers did when making up a bell curve.

**Picturing Your Numbers**

You’ve entered or imported your data and sorted and polished it to perfection, and now you want to see a picture. What awaits you is a mind-boggling array of chart
types from which to choose. The number of types is large, but it can be broken into a smaller number of basic forms.

The most common charts are area, bar, column, line, pie, and scatter. Each chart has appropriate uses, and it's important to pick the correct type to convey the information you want to get across. A chart of the wrong type may tell a completely different story from the one you intend.

Aside from the six types just mentioned, there is a good variety of specialized charts you may need every once in a while.

High-low-close charts, as their name implies, are used mainly for stock-market graphing, although they can often be used without the Close option when you need to display the range over which a set of values occurs within a category (daily temperature range during a month, for instance).

Polar charts, like x,y charts, plot two variables. In this instance, the data pairs represent \( r \) (the radius, or distance from the center of the chart) and \( \theta \) (the angle \( r \) makes with some arbitrary 0-degree radius). This type of chart is used when the variables in your data have an angular dependence.

Contour charts take a 2-D array of numbers and substitute a pattern or color for each number, depending on its value. Just as a geographic map may assign different colors to differing altitudes, a contour chart lets you look at how your data changes according to its position in the array.

Combination charts let you see more than one chart at a time. You might want to overlay a column chart of sales figures with a line chart showing expected profits. Another type of combination chart, the double-y, lets you have two charts with independent and unique value (y) axes. One y-axis, with its labels, is displayed on the left side of the chart, and the other is displayed on the right side.

Charts that add the third dimension have become all the rage recently. However, only in rare cases (usually wireframe and surface charts) can a 3-D chart display data more accurately than a normal flat chart can. Most of the time, the use of 3-D charts actually obscures information. Figure 1 shows an example. Take a regular grouped-column chart. Once it's three-dimensional, you have to decide which angle to view it from and then you add perspective to give it even more of that 3-D look. It may be beautiful, but just try to figure out what numbers the columns represent. Because of the chart's tilt and perspective, there's no way to compare the height of any column with the grid on the back wall — and this chart isn't tilted that much!

Most 3-D charts are actually overblown 2-D charts, because the third dimension rarely contains any information. When pondering whether to use 3-D or not, ask yourself if you really have three dimensions' worth of data.

**Touching It Up**

There are two broad areas in chart editing: features that let you edit the information portion of the chart and features that let you edit for aesthetic appeal.

Informational editing includes editing axes, tick marks, grid lines, and exploding pies as well as adding error bars, data labels, and editable plot symbols.

All four packages let you edit axes, tick marks, and grids. You can place the axes arbitrarily within the chart, not necessarily only at the bottom and on the left, and you can determine the starting and ending values on an axis and how many divisions or major tick marks and grid lines to place between them. All the packages let you choose whether the value (y) axis has a linear or a logarithmic scale, and all let you choose the plot symbol used to identify the points of a series in line and scatter charts.

In the case of experimental data, error bars indicate possible deviation in the data. All the packages can generate these bars automatically, according to various statistical methods.

For aesthetics, all the packages let you decide the font and the style of chart labels, legends, and titles.
Charting Packages

If you read USA Today, you’re familiar with its famous picture charts, in which pictures, or pictograms, of appropriate items are stacked, stretched, or scaled. Only GraphMaster can create these.

If you want to add notations and other artwork to your chart, you’ll need a set of basic drawing tools (lines, rectangles, round rectangles, ovals, and so on). All four of the packages give you the tools you need.

Sharing Your Vision

Here’s where the ugly truth about color on the Mac smashes you in the face. There are few reasonably priced options for color output. The best way for anyone to view your charts is on the screen itself, but what formats can our charting packages produce? Most popular is the good-old PICT format. DeltaGraph Pro and GraphMaster can also save charts as Illustrator files.

Now let’s take a closer look at each of the four packages in the areas of input and importing, data manipulation, chart editing, chart export, and number of chart types.

CA-Cricket Graph

The great-grandparent of them all, Computer Associates’ CA-Cricket Graph, is still around, and it still looks pretty good (see Figure 2), considering its age. Although most people roll their eyes when you mention this package, it’s still strong in many ways and is probably used by far more people than are all the others combined.

CA-Cricket Graph is fairly robust for importing data, lacking only the abilities to accept CSV files and to read Excel files directly. It is a bit weak in its data export, however, producing only tab-delimited text files. This problem is minor, though, because most spreadsheet and database programs can read tabbed text.

CA-Cricket Graph is the best package of the four in the area of data manipulation. It sorts, recodes, transforms, smooths, curve-fits, does frequency counts, and performs simple math — just about anything you may need. The other packages should have followed CA-Cricket Graph’s good example in this area.

Being the oldest program, CA-Cricket Graph can perhaps be excused for its lack of spiffy chart types and fancy editing tools, but when you really look closely, the only missing chart types are 3-D, multiple pies, and some kind of contour or surface charts. Because CA-Cricket Graph was originally designed for scientists and the display of scientific data and not for graphic artists doing layouts for board meetings, the package does not supply the now-familiar gradient fills, pictograms, or graphics fine-tuning. But still, Computer Associates should add the ability to vary bar/column spacing and overlap.

Once you’ve finished your charts, you can export them as PICT files or through the Clipboard. Although the package’s exporting ability is a bit weak, CA-Cricket Graph is the only package that lets you output your charts directly to Hewlett-Packard pen plotters.

At the time you read this, Computer Associates will be releasing version 2.0 of CA-Cricket Graph. The company says that the new version will have column formulas, dynamic updating, new statistical functions, faster charting, better chart editing (including unequal error bars), new curve-fitting options, and larger data sheets (1,000 columns by 32,000 rows). It wouldn’t say whether version 2.0 will offer more chart types.
DeltaGraph Professional

DeltaPoint’s DeltaGraph Professional 2.0 (see review, June ’92, page 50) was worth the wait, being a major improvement over its predecessor, the venerable DeltaGraph 1.5. It imports many data formats, including tabbed text, CSV, SYLK, Excel 3.0, Lotus WKS, and even its competitor CA-Cricket Graph’s files. It also lets you define specially delimited text. System 7’s publish-and-subscribe is fully supported, as are Balloon Help, TrueType, and Apple events. You should have no trouble getting data or graphics into DeltaGraph Pro. (You can even import QuickTime movies!)

Its data-exporting ability, on the other hand, leaves much to be desired. DeltaGraph Pro can export data only as tabbed text. Even though most other packages can read this style of data, all your formatting is lost.

DeltaGraph Pro’s data-manipulation capabilities fall slightly below those of its competitors, but not by much. It does, however, offer frequency analysis, which is a big plus if you want to “grade on a curve.” The package’s curve fitting is breathtaking.

For sheer number of chart types, DeltaGraph Pro will set your head spinning. All the basics are here, with a wealth of additional types, including 3-D, multiple scaled pies, x,y and x,y,z contour and surface, polar, double-y, ternary, spider, and bubble charts. The package can even produce organizational, bullet, table, and time-line charts.

DeltaGraph Pro has excellent chart-editing features but lacks the pictograms that GraphMaster can give you. In 3-D graphs (see Figure 3), DeltaGraph Pro (and GraphMaster) can label the three axes with letters and numbers that are tilted and rotated to align with the 3-D-ness of the chart axes — a nice touch. DeltaGraph Pro’s drawing tools are the best of any in the four packages and include editable Bézier curves, polygons, and text with tabs, justification, a true ruler — the works! The color choices for objects are somewhat limited (88 shades), but you can design 16 custom colors, using the RGB, CMY, CMYK, or HSL color models. You can assign styled color gradients to objects and text.

Once you’ve finished with your chart, DeltaGraph Pro can export it through the Clipboard or in a variety of formats, including PICT, EPS, and Illustrator. The package has a built-in slide-show sorter and “projector,” so you can create a presentation and then other users can play it back even if they don’t have DeltaGraph Pro.

DeltaGraph Pro has the most extensive manual of the four packages, and it devotes a full chapter to detailing which chart types are best for which types of data.

GraphMaster

A relatively new entrant into the presentation-graphing market, GraphMaster comes to us fighting, with the gloves off. For a version 1.0 (well, actually 1.31), Visual Business Systems has obviously taken a good hard look at the competition and built a product that tries to beat them all (it succeeded, until DeltaGraph Pro was introduced).

GraphMaster imports data in all formats that DeltaGraph Pro imports (except that it can’t read CA-Cricket Graph’s native format), so entering data is a snap. It exports its data as tabbed text, CSV, or SYLK files, so this area is well covered too.

The package has excellent data-manipulation capabilities. It’s important to note here that although it may not have many built-in functions for data manipulation, it goes the extra distance and offers a powerful built-in programming language with REPEAT and IF structures.

GraphMaster runs a close second to DeltaGraph Pro in the number of chart types it offers and the finesse with which you can edit a chart’s aesthetics. It’s the only one of the group that offers pictograms.

Besides the normal blocks for its 3-D columns, GraphMaster lets you use flat plates, floating cubes, or pyramids to indicate column height. Only DeltaGraph Pro also offers column shapes. These shapes make it easier to peek around front columns to see other columns that would otherwise be hidden. GraphMaster also has lovely gradient fills. It exports charts via the Clipboard or as PICT or Illustrator files.

For sheer number of chart types, DeltaGraph Pro will set your head spinning. The basics are here, with a wealth of additional types, plus great chart-editing features.

Figure 4: MacGraphX has the most-complicated — and versatile — data-import capabilities of the four packages, but its range of chart types doesn’t match those of its competition. Still, it is a capable package, as this stacked-area chart demonstrates.
Charting Packages

MacGraphX

Bravo Technologies’ MacGraphX is a capable package that, alas, lacks some of the sophisticated features of its cousins. It does, however, have some abilities that make it a package you may want to consider.

MacGraphX has the most complicated, and hence the most versatile, import interface. It lets you import all or only a specified range of cells from a file. It also lets you offset and combine data from several spreadsheets into one of its worksheets; all the others simply let you import a complete file. The MacGraphX package includes a separate program that lets you read in data from files that contain fixed field lengths. This feature makes the package invaluable if you import data from mainframes. MacGraphX’s data-exporting ability is adequate; you can export data in the tabbed-text, SYLK, and WKS formats.

Most people will be satisfied with MacGraphX’s data-manipulation features and happy to find that the data-entry worksheet can contain formulas as well as numeric data. This makes for a much more powerful package, because you can plot not only raw data but also numbers derived from the raw data.

MacGraphX falls behind on the number of chart types it offers. It’s completely missing 3-D charts as well as multiple pie, frequency-histogram, polar, contour, and surface charts. Hopefully, Bravo will beef up this area in future versions, but MacGraphX still contains the correct chart for 99 percent of most users’ charting needs (see Figure 4). MacGraphX’s chart editing gives you the tools to do just about anything you need. It can export your finished chart only through the Clipboard or as a PICT file, though.

The Bottom Line

If charting is one of your primary tasks, buy a dedicated charting package. Of the ones reviewed here, DeltaGraph Professional is the clear winner. It produces the widest variety of charts, has the best editing tools, and has adequate output flexibility. And with its presentation capabilities, it’s an excellent choice, whether you’re creating complex technical charts or organizational diagrams, text charts, or presentations. GraphMaster is also a good choice, especially if you need pictograms. CA-Cricket Graph and MacGraphX virtually tie. CA-Cricket Graph is slightly better for mathematical tasks and scientific charts, whereas MacGraphX has the slight edge for aesthetic editing.

Until recently, most of the attention in the presentation market has been on creating electronic versions of traditional flip-chart presentations. But people need more than just bulleted text these days, so numeric data to back up your points is just as important as those boring text slides. Nothing makes a point as clearly as a well-designed graph. Communicating the message of your numbers is often more important than the numbers themselves, and clear, effective charts and graphs are some of the best weapons we have in the fight against innumeracy.

Ron Hipschman works at the Exploratorium, San Francisco’s world-famous science museum, where he mothers Macs, writes, and teaches.

### Table 2: Charting Packages

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<td>1.3.2</td>
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<td>Computer Associates</td>
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<td>Professional 2.0</td>
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<td>GraphMaster</td>
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<td>Visual Business Systems, Inc.</td>
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<td>MacGraphX</td>
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<td>Bravo Technologies</td>
<td>P.O. Box 10078, Berkeley, CA 94709, 510-841-8552</td>
<td></td>
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Look it up! Your next set of reference books may not be books at all.

BY KEN GRUBERMAN

Some images are so powerful that they've forever burned themselves into our collective consciousness. There's John-John Kennedy saluting his father's casket, the Challenger explosion, and Diane Sawyer picking her jaw up out of her lap when Stephen Sondheim told her that he uses a rhyming dictionary and a thesaurus. Sawyer shouldn't have been shocked, of course. Writers write, and as Sondheim pointed out, there's no point in a writer's trying to come up with every word that starts with a *p* and ends in a *ch* when someone else has already taken the time to collect all that information into a few choice volumes.

Reference books are an essential part of every writer's arsenal, and in recent years, a new breed of reference book has emerged: the electronic edition. Unlike interactive aids such as spelling and grammar checkers, which are designed to improve your existing work, reference tools provide access to information you need while you work, such as "all the single-syllable words that start with a *p* and end with a *ch*.”

Few electronic reference products are as complete and thorough as their paper counterparts, however. On the other hand, a computer-based book doesn't take up any shelf space. And there's one other thing electronic books have going for them: a brain. Almost all electronic reference programs support wildcard searches, which means that you don't even have to know how to spell what you're looking for in order to find it.

**Encyclopedias**

The clear winner here is Grolier's New Electronic Encyclopedia: 1991 Edition. With 33,000 articles and more than 10,000,000 words, this CD-ROM is a cogent source of up-to-the-minute information. How up-to-the-minute? The latest version has articles on fetal alcohol syndrome, optical computing, and Planet X, to name a few.

The encyclopedia's information is current, certainly, but not necessarily complete. The Academic American Encyclopedia, on which the CD-ROM is based, is a midsized encyclopedia, so the average article is only a few paragraphs long at best. Major subjects have the expected amount of verbiage, but the rest of the entries are trivialized down to just a paragraph or two.

What the encyclopedia may lack in comprehensiveness is more than made up for in innovation. The 1991 edition includes more than 200 high-quality, full-color maps; more color paintings, drawings, and photographs than ever before; and sound, a unique and valuable addition. For example, you can look up the life of Martin Luther...
Writer’s Tools

King, Jr., see a full-color picture of him, and then hear an excerpt from his famous “I have a dream” speech. The disc’s other sounds are mostly associated with famous historical figures and events, birds and mammals, composers and compositions, and musical instruments.

Unfortunately, because of budget and time constraints, a sampling synthesizer was used to mimic most of the included instruments (see Figure 1). The Mac’s 11K playback rate makes these instruments sound phony and unconvincing. That shortcoming aside, the rest of the sounds are first-rate, as is the software that accompanies the encyclopedia. The search routines are sophisticated yet easy for anyone — adult or child — to use.

Microlytics has issued an electronic edition of The Random House Encyclopedia as a DA, but the only thing this DA has in common with the much superior book version is the name. The encyclopedia is another in Microlytics’ InfoDesk series and follows the company’s previous effort at a reference work, a reverse dictionary called Inside Information. Like that product, the Random House Encyclopedia DA is really a glorified dictionary of terms, people, places, and things. At only 5 megabytes’ worth of information, it can’t be much else.

As Microlytics sees it, a key selling point is that users don’t need a CD-ROM player. True enough. If your information needs are satisfied by one-to-two-sentence descriptions, the Random House Encyclopedia may be your cup of tea. The longest entry is only a paragraph. This product is more of a “thought provoker” than an encyclopedia, so it’s not much of a reference tool.

The Random House Encyclopedia DA includes a Reverse Dictionary function, but it doesn’t work too well. With this function, you can find things in the encyclopedia by describing them, but you must describe them in exactly the same way the program does. For example, Egyptian paper gets you papyrus and a lot of other things vaguely associated with papyrus, but primitive paper gets you nothing.

There are notable inconsistencies in the DA’s information as well. For example, Leisure and Entertainment includes a listing for Oprah Winfrey and Humphrey Bogart but not for the terms movie, film, or cinema. There is, however, a listing for canasta. If you currently own The Random House Encyclopedia in book form, keep it and use it. You’re not missing anything here.

Dictionaries

There are several electronic dictionaries to choose from: Webster’s Ninth New Collegiate Dictionary, from Highlighted Data; Funk & Wagnalls Standard Desk Dictionary and The Concise Dictionary of 26 Languages, from Inductel; and The American Heritage Electronic Dictionary, from WordStar International. In contrast to the encyclopedias, the dictionaries’ strengths and weaknesses are not so evident at first glance.

Among the dictionaries, as with the encyclopedias, the CD-ROM product — Webster’s Ninth New Collegiate Dictionary, in this case — is the winner. This time the reason isn’t just the CD-ROM’s capacity but also that the electronic version is a perfect replica of its source. The disc contains exactly the same material as the paper version of the dictionary and has room left over for unique extras.

You can toggle the font size from regular to large. The search engine is first-rate, and the word heading at the top of each “page” changes to reflect the word you’re searching for. The user interface is easy to grasp, and pictures and illustrations appear in their own pop-up windows (see Figure 2). With a single command, you can copy and paste...
a word, complete with its definition.

The most noteworthy new feature of this electronic edition is sound: This is the first dictionary that talks. A professional announcer pronounces every one of the 160,000 root words, and you can turn this feature on and off. Don't get too excited, however; the idea is better than the execution. All the words were recorded at the lowest sampling rate possible, and they sound like it.

Inductel's Funk & Wagnalls Standard Desk Dictionary doesn't have the style or completeness of the Webster's CD-ROM, and its Mac interface is downright abysmal, but it does have optional, specialized dictionaries that deal with biology, chemistry, computer terms, electronics, mechanical engineering, and physics. Its definitions are more cursory than Webster's or the American Heritage Dictionary's, and etymologies, histories, and usage suggestions, when they are present, are shorter as well.

The only innovation in the Funk & Wagnalls dictionary is the adjunct volume, The Concise Dictionary of 26 Languages. You can type a word in English and see translations of it in 26 other languages. (Wouldn't pronunciation be nice here?) You can also type a word in any of the 26 languages and see how it is spelled in English. All the languages are represented on the same screen at the same time, inviting comparisons. Unfortunately, the word list for this section of the dictionary is very limited and sometimes inaccurate. For example, there is no listing for hello in any language, and goodbye is spelled goodby.

Of the three, the least desirable is The American Heritage Electronic Dictionary. It comes with a thesaurus, but neither the dictionary nor the thesaurus are as good as ones you can buy separately. On the positive side, this dictionary's thesaurus button is active when you're using the dictionary, so it's easy to shuttle between the two. If you want, you can have both screens open at once — the dictionary on the top and the thesaurus on the bottom, so you can browse both files at the same time. But because neither

file is especially extensive, this may not be much of an advantage.

The American Heritage Dictionary also has a gimmick: anagrams. Scrabble players will love this function, but unfortunately, the feature is severely limited. The program can form variants only on words of up to five letters — six if you put an s after certain words. Even then, it can't find obvious word combinations. There's undoubtedly a word list instead of an algorithm at the heart of the anagram function and that's a shame.

**Thesauri**

The choice of best thesaurus depends on whether you're running System 6 or System 7. For the former, it's Deneba's BigThesaurus; for the latter, it's Thunder 7, from Baseline Publishing.

Baseline Publishing's Thunder 7 (see Figure 3) is by far the most powerful and flexible thesaurus. It also takes up the most hard-disk space. Thunder 7 can insert itself automatically into any menu you define and can also correct spelling after the fact or interactively spell-check as you type. The thesaurus has 1.4 million synonyms, antonyms, and contrasting and related words and also comes with user dictionaries and several custom dictionaries for names, contractions, and computer terms.

Hard on Thunder 7's heels is Deneba's BigThesaurus. It also sports 1.4 million synonyms plus definitions. Also like Thunder 7, it has user-definable font and size preferences and makes good use of color; unlike Thunder 7, it lists at the top of the window the number of meaning groups and sets them apart by using different symbols.

The major drawback for BigThesaurus fans is that it doesn't run under System 7, and Deneba wouldn't say when, or even if, a System 7-compatible version would be released.

Another thesaurus is the new Word Finder Plus, from Microlytics. Taking up a scant 290K of disk space and 70K of RAM, it returns four times as many words as its predecessor. After those benefits, however, the celebrating stops. Word Finder Plus has no color implementation, no user-definable font and size settings, and no definitions. It also appears as a menu item in the Finder — for no discernible reason, considering that Word Finder Plus...
Writer's Tools

can't be used in the Finder, only inside applications. Another problem is that in our testing, it interfered with normal operations of several Now Utilities 3.0.2 modules and even tied up a Word 5.0 document by keeping it from saving normally. More work needs to be done for it to be on the level of Thunder 7 and BigThesaurus.

Report Ideas, from ia Software, and its sibling program Letter Ideas are thesauri of phrases, not of words. There is nothing like them in the book world. Report Ideas is designed for one specific task, writing reports, and Letter Ideas is for writing letters. These DAs give writers a boost by helping alleviate writer's block, in that, unlike words, phrases are waiting to be completed as sentences. These DAs are simple to use and extremely efficient: Each contains more than 100,000 phrase combinations and takes up only 33K of disk space! Any phrase combination is automatically copied to the Clipboard for easy pasting.

Style Guides

Strunk and White must be turning in their graves over what Microlytics has done to their landmark publication, The Elements of Style. The book has long been revered for its charm, wit, and sheer readability — something rare for a reference book — but all that has been stripped away in The Elements of Style - Electronic Edition, a single-disk DA version. The presentation of information lacks coherency, and the InfoDesk DA interface is as execrable and primitive as it is in the other Microlytics products. Like The Random House Encyclopedia, all this program has in common with the hard-copy version is the name. Read the book, and forget this truishy attempt at literary credibility.

Although it's easy to dislike Microlytics' products, it's harder to figure out which of the other style guides for the Mac — Editorial Advisor, from Petroglyph, or Correct Writing, from WordStar International — is the better. Editorial Advisor is the more extensive of the two (six HyperCard stacks) and is also more difficult to use. This is primarily because of icon overkill and small on-screen text size. On the other hand, Editorial Advisor has capabilities not found in other style guides, such as a guide to copyediting as well as proofreading marks. The program is most effective when you open it in conjunction with a word processor, but if your Mac has limited memory, this may not be possible.

WordStar International offers a solution to this problem. It supplies two identical versions of Correct Writing in the same box. (All three of the “Correct” products — Correct Writing, Correct Letters, and Correct Quotes — offer this convenience.) One version is a traditional HyperCard 2 stack that can be run as an application. The other is a HyperCard 1 stack that can be opened from a DA called Writing Guide. Correct Writing isn't quite as sweeping as Editorial Advisor, but it's easier to use and easier to read.

Quotations

No one has created a Mac version of Bartlett's Familiar Quotations yet, so in the interim, we have two products to choose from: Correct Quotes, from WordStar International, and 2001 Quotes, from Heizer Software. Of the two, Correct Quotes is greatly superior. At first glance, the reason would seem obvious: Correct Quotes contains more than 5,000 quotes. Content notwithstanding, Correct Quotes is also better because it looks better. Once again, WordStar's HyperCard-stack design is elegant, straightforward, and pleasing.
You can choose from categories such as The Talmud, source for quotations or words of wisdom, Beacon’s designed stack, it showcases more than 2,000 years of The Complete Works of Jewish sayings, stories, proverbs, and concepts (see Figure 4). You can choose from categories such as The Talmud, Philosophy, Folk Stories, or Hassidic, and you can click on a Biography button to find out more about the source of the item in question. This is a true original.

HyperBible is an immense program, filling more than 9 megabytes of disk space. If you’ve ever wanted to study the Bible in a friendly, relaxed way or are involved with the Bible on a daily basis, this is a must-have item (see Figure 5). If, however, you’d just like to use the Bible as a source for quotations or for words of wisdom, Beacon’s DA companion product, Gems of the Word, is more appropriate, because it’s more compact and accessible.

For those who need some quick inspiration for both mind and spirit, Gems of the Word may be just the ticket. A small and simple DA, it contains more than 2,000 of the most useful, best-loved, and most often quoted passages from the Bible. Not only is this a convenient way to get ideas for speeches and other writing tasks but the program also comes with an application that puts a random quote on the screen at startup.

CMC’s Shakespeare disc is fascinating. For one thing, it contains both the queen’s English and modern-English versions of Shakespeare’s plays. The disc also includes the Bard’s poems and sonnets.

You might think that searching through that many words on a CD-ROM just to find a juicy quote or two would be an excruciatingly slow process, and you would normally be right. However, DiscPassage, CMC’s CD-ROM software, lets you search a CD-ROM in just seconds.

CMC also makes other CD-ROM discs that use the DiscPassage software, including the Multimedia Audubon’s Birds and The Complete Works of Sherlock Holmes. Although the CMC discs are wickedly fast in operation, they lack sophistication: Each disc contains raw, unformatted text in Geneva font.

**Tools and Tidbits**

Writers get stuck. That’s an inevitable part of writing. But often all it takes to get unstuck is a phrase or interesting tidbit of information. Author Larry Belling has combined five stacks aimed at writers into one convenient package, Writer’s Dream Tools (distributed by Heizer Software). The stacks are Events Day-by-Day, The Stuck of Lists, The Stack of Decades, Cliches and Catch Phrases, and the Slang Thesaurus.

The events stack contains information keyed to the days of the year: who was born, who died, and what major ancient and modern world events happened on that particular day (see Figure 6). You can search by event, person, or date. The interface is a little crude, but the program is easy to use and always makes you sound more interesting than you are.

The lists stack is a mind-boggling 1.1 megabytes’ worth of lists: people, places, and things around the world. Cliches and Catch Phrases can be extremely useful to anyone involved in writing for film, TV, news, and advertising. The Slang Thesaurus is handy for those who like a colorful phrase — if you’ve ever needed to know Australian slang terms for toilet, this is the stack for you. The Slang Thesaurus also includes newer terms such as surfer, skate-boarding, and gang-speak.

Sometimes you can get stuck even if you’re just writing a business letter. For those times, there’s Correct Letters, from WordStar International, a collection of 273 typical business letters in text format and a HyperCard stack with which to search them.

All you have to do is find the category of letter you need...
and narrow the selection, and Correct Letters produces a complete letter, waiting to be personalized. You can either work within the stack, and even print from it, or export the letter to your word processor. Correct Letters also includes The Letter Guide, which can help you understand the guiding principles behind good letter writing. The guide is as easy to use and understand as the rest of the product.

The Bottom Line
If you’re thinking about trashing all your well-thumbed reference volumes in favor of their electronic equivalents, don’t do it. Most of the electronic packages still have a long way to go to equal their paper progenitors, but there are enough successes that you can build a reasonable electronic reference shelf. For electronic versions of the basics — dictionary, thesaurus, and encyclopedia — the choices are easy: Webster’s Ninth, Thunder 7, and The New Electronic Encyclopedia: 1991 Edition. For philosophy and religion, there’s HyperBible and Otzar Plus. For literature, there’s The Complete Works of Shakespeare. For style guidance and quotations, there are the three “Correct” packages from WordStar (Letters, Writing, and Quotes) and Writer’s Dream Tools. Stephen Sondheim won’t be tossing his rhyming dictionary and thesaurus any time soon, but someday, that may just happen — and then Diane Sawyer will really have a story.

Ken Gruberman was the editor of Los Angeles’ MacValley user-group newsletter for three years. During that time, he learned the true value of reference works and now cannot live without them.

## Writer’s Reference Tools

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<tr>
<td>Grolier Electronic Publishing, Inc.</td>
<td>Sherman Turnpike, Danbury, CT 06816</td>
<td>203-797-3530</td>
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<td>Beacon Technology, Inc.</td>
<td>631 Elkton Drive, Colorado Springs, CO 80907</td>
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<td>HyperBible 2.0</td>
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<td>CMC Research</td>
<td>514 N.W. 11th Street, Suite 203, Portland, OR 97209</td>
<td>503-241-4351</td>
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<td>The Complete Works of Shakespeare</td>
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<td>7074 N. Western Avenue, Chicago, IL 60645</td>
<td>312-465-4070</td>
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<td>Deneba Software</td>
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The first affordable PostScript® printer designed specifically for Macintosh® users has just become more affordable. It's from GCC Technologies® and it's called the BLP Elite™. A printer so advanced that it offers exactly the features you're looking for, at a price you've never seen before. Now just $1399.

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CIRCLE 164 ON READER SERVICE CARD.
# Table 1: Features of Recommended Writer's Tools

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<tbody>
<tr>
<td><strong>List price</strong></td>
<td>$29.95</td>
<td>$49.95</td>
<td>$49.95</td>
<td>$59.95</td>
<td>$199</td>
</tr>
<tr>
<td><strong>Pros</strong></td>
<td>Fast search engine. Queen's-English and modern-English versions of the plays. Includes poems and sonnets.</td>
<td>Good source of model business letters. Final writing can be done inside program or with designated word processor. Good interface design.</td>
<td>Can quickly search for quotes on topic or author level. Users can add favorite quotes. Good interface design.</td>
<td>Provides useful information on writing form, usage, and style. Can be used as a DA. Good interface design.</td>
<td>Makes Bible study easier with hyperlinks and searchable text. Has audible pronunciation of more than 400 Bible names. Several different ways to find desired material.</td>
</tr>
<tr>
<td><strong>Cons</strong></td>
<td>Unformatted text in Geneva font.</td>
<td>Needs more categories for letter searching.</td>
<td>Not comprehensive enough; needs more quotes and topics.</td>
<td>Needs more subjects and cross-references.</td>
<td>Cluttered and inelegant interface.</td>
</tr>
<tr>
<td></td>
<td>514 N.W. 11th St. Ste. 203</td>
<td>201 Alameda del Prado Novato, CA 94949</td>
<td>201 Alameda del Prado Novato, CA 94949</td>
<td>201 Alameda del Prado Novato, CA 94949</td>
<td>631 Elkton Dr. Colorado Springs, CO 80907</td>
</tr>
<tr>
<td></td>
<td>Portland, OR 97209 800-262-7668</td>
<td>415-382-8000</td>
<td>415-382-8000</td>
<td>415-382-8000</td>
<td>719-394-4884</td>
</tr>
<tr>
<td></td>
<td>503-241-4351</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Cons</strong></td>
<td>Pictures and maps cannot be exported or printed. Many articles are short and perfunctory.</td>
<td>Needs more topics and better explanation of icons.</td>
<td>Complicated installation and setup. Takes up more disk space than other thesauri.</td>
<td>Low audio fidelity makes understanding pronunciations difficult.</td>
<td>Events Day-by-Day and The Stack of Decades need more material. Poorly implemented interface.</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>
DON'T MISS THE BOAT.

S.S. OCEAN DUCHESS

PROMENADE DECK

GET THE NEW WIDEWRIITER 360.

If you've been waiting for an affordable desktop printer that can handle the really big jobs, your ship has finally come in. Introducing the new WideWriter 360™ from GCC Technologies® — the wide-carriage inkjet printer capable of printing on 17" x 22" (C-size) paper. With the WideWriter 360, printing large CAD drawings, super spreadsheets and gigantic graphics is no big deal. And because it can also print on a variety of paper sizes including letter, ledger and fanfold, there's little the WideWriter 360 can't handle.

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:

• AppleTalk networking or serial. Automatically configures for shared or personal use.
• Background printing. Returns control of your Macintosh to you faster.
• ATM and Adobe Type 1 fonts are included, with support for TrueType. Gives you unlimited font access in any size.
• Flexible paper handling with our multiple sheet feeders. Lets you take letterhead from one feeder and subsequent pages from the optional second feeder.

The WideWriter 360 also features the unmatched reliability and innovation that are standard in every GCC Technologies product. It's the only name to count on when you want a high quality, large format printer that fits even the smallest budget.

Easy Ordering. 800-422-7777, extension 638.

The WideWriter 360 is available for the amazing price of just $1699! To order your WideWriter 360 or for the name of the dealer nearest you, simply call us toll-free. When you order direct from us, you get a 30-day money-back guarantee and $9 Federal Express overnight delivery.

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CIRCLE 165 ON READER SERVICE CARD.
When it comes to printing in the background there are plenty of spoolers to choose from.

So why have over 150,000 Mac users chosen SuperLaserSpool?

Because it supports more printers than any other spooler?

Or because it's the only one that supports Apple's Image Writers and HP Laserjets, Deskjets, and DeskWriters?

Is it because SuperLaserSpool is compatible with many more Macintosh configurations?

Or because it's compatible with virtually every Mac application?

Because only SuperLaserSpool can spool color PostScript files?

Or because it spools everything and anything faster than any other spooler?

Could it be our exclusive LaserQueue desk accessory that lets you preview and prioritize documents, re-route them to another printer, or print to several printers simultaneously?

How about our vaunted 24-hour toll-free technical support?

How about our one-year money-back guarantee?

How about picking up the phone? Dial 1-800-666-2904. It's the right thing to do.
Your 100-megabyte hard drive doesn’t seem so spacious—or speedy—anymore. But before you buy more room, turn the page and read why more isn’t necessarily more anymore—and where to best target your storage dollar.

Then dig in to the rest of this month’s Buyer’s Guide: Learn about revolutionary new 3.5-inch 128-megabyte magneto-optical cartridge drives; read about the latest developments in 5.25-inch optical technology; find out how to stuff an extremely fast 3.5-inch gigadrive mechanism into your IIcX, IIci, or Quadra 700; discover a high-speed bypass to your Mac’s notoriously slow SCSI port. And when you’re up-to-date on current storage technology, consult our comprehensive directory in this Storage Buyer’s Guide to find out who’s selling what and where to find it.
NEC and Radius have designed a display system

Presenting display systems that will be the apple of Macintosh™ users' eyes. NEC's 15", 17" and 21" MultiSync™ FG™ display systems.*

A combination of NEC's award-winning monitor technology, and a display interface card specially designed for NEC FG monitors by Radius™, these display systems give you the flexibility you've never had before.

By providing you with multiple viewing modes. Which allow you to use all sorts of different applications more effectively. Whether it's a business program, desktop publishing or any other type of software.

For instance, condensed modes let you increase your resolution and desktop size. So you can display more on-screen information and do everything from putting two documents side by side, for easy cutting and pasting, to displaying more cells in your spread sheets.

There's also a 72 DPI mode which gives you a WYSIWYG view of your final output.

And expanded modes that let you enlarge images and get a closer look at your work.
But the best part is, as you change applications, you can switch to any of these modes on the fly. Right from the control panel. You don't even have to restart the computer.

There's more. Our MultiSync FG monitors 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.

If they don't make your eyes pop out of your head, nothing will.

For a listing of all available DPI/viewing modes and other neat stuff we didn't have room to include, call 1-800-NEC-INFO. In Canada, 1-800-343-4418. For immediate information via fax, call 1-800-366-0476, request #62234.

Once you take a look at these display systems, we're sure you'll see things our way.

Because is the way you want to go.
Storage: What to Buy, What to Pay

Where are you going to fit all that new software? What about those giant color and QuickTime files? Backups? Archives? It may be time for a change.

BY RIK MYSLEWSKI

You’ve run out of room on your hard disk. What’s the solution? A bigger hard drive? This is a common answer but often the wrong one. Before you write a hefty check for multiple megabytes, switch on your Mac; click through your folders; and divide your files and applications into those you use constantly, those you access occasionally, and those you seldom open but can’t bear to trash.

Congratulations. You’ve just defined the three major categories of mass storage. Which applications and files do you need to have available at all times? They belong on your primary-storage drive. What files can you keep easily accessible, grouped by project and ready to swap with other users or deliver to service bureaus? Put them on removable cartridges. Finally, don’t forget to regularly save copies of all your important files onto a backup device. You can also reclaim precious space on your primary-storage disk by using your backup device to archive files that are no longer active but that are crucial for reference and record keeping.

Primary-Storage Drives

Hard drives are traditionally the first choice for primary storage — if the six years since the introduction of the Mac Plus can establish a tradition. Although removable-cartridge drives can be used for primary storage, they can’t match a hard drive’s speed, safety, economy, and reliability.

Hard drives come in a wide range of capacities but only three form factors: those based on 2.5-inch mechanisms, which are currently limited to 20 to 120 megabytes and which are used in PowerBooks and tiny transportable drives from such companies as La Cie, Liberty, and Mass Microsystems; those based on 3.5-inch mechanisms, which have capacities as large as 1 gigabyte (see “3.5-Inch Gigabyte Hard-Disk Mechanisms,” in this Buyer’s Guide); and those based on 5.25-inch mechanisms, the champion of big, fast primary-storage devices. We recommend that you look at fast, compact 3.5-inch models first and move on to hefty 5.25-inch or miniature 2.5-inch models when size, speed, or capacity dictates.
Remember that you’re not limited to hard drives that are located inside your Mac or parked on your desktop. If you need to transport data between Macs and you don’t know if a cartridge drive awaits you at your destination, a transportable hard drive is your best bet. Transportable drives contain some of the same mechanisms as their desktop brethren do, but they’re smaller, lighter, and more rugged. Although most transportable drives plug in to the wall, expect to see transportable PowerBook partners — the 1.3-pound Liberty 20 Series is a pint-sized pioneer — that run on battery power.

If total security is your goal, consider a removable hard-drive subsystem. This option lets you unplug the hard-drive mechanism from the power supply and carry it with you or lock it away. If demanding graphics applications such as Photoshop are too slow even on the fastest gigadrives, consider going into debt to invest in an external solid-state drive or equip your Mac with enough 16-megabyte SIMMs to create a sizable RAM disk.

For More Information . . .

MacUser closely follows the growing storage market and keeps you up-to-date on the best primary-storage, removable-cartridge, and backup and archiving devices. The following MacUser articles, culled from the best of our recent coverage, include lab reports with comprehensive testing and information about upcoming products and technology as well as reviews with timely looks at the hottest new products.

**Primary-storage drives**

"Sizable Storage: 200-Megabyte Hard Drives," April '92, page 108 — Forty-one 200-megabyte hard drives are analyzed for performance and quality. Also included are an explanation of how a drive stores, finds, and moves data as well as a discussion of caching.

"Searching for Storage Perfection: 100-Megabyte Hard Drives," November '91, page 124 — Thirty-two 100-megabyte hard drives are put through a test suite. Service and warranty statistics are also detailed.

"Gigadrives: The 1,000-Megabyte Solution," July '91, page 140 — Nineteen 1,000-megabyte gigadrives are rated for speed, service, and support. Also included are tips on gigadrive care and disk partitioning.

"Life Begins at 40 Megabytes: Small Hard Drives," April '91, Buyer’s Guide page 4 — We report on thirty-two 40-megabyte hard drives and include tips on connecting SCSI devices, an illustration of the ideal external drive, and information on other storage options.

"Surviving the Crash: Hard-Disk Recovery," April '91, Buyer’s Guide page 42 — This analysis of four hard-disk-recovery programs also includes tips on fixing a crash without recovery software and advice on how to prevent hard-drive problems.

**Removable-cartridge drives**

"Magnetic-Cartridge Drives: The Next Generation," January '92, page 126 — We rate twenty-three 88- and 90-megabyte magnetic-cartridge drives that contain a SyQuest mechanism or Iomega’s Bernoulli mechanism. Also included are solutions to cartridge-mounting problems and an illustration of how SyQuest and Bernoulli mechanisms work.

"SyQuest Doubles Up," June '91, page 54 — We take a first look at the SyQuest SQ511088-megabyte mechanism.

"Portable Secure Unlimited-Storage Cartridge Drives," February '91, page 206 — We compare 30 magnetic-disk-cartridge drives based on the SyQuest, Ricoh, and Bernoulli mechanisms and include an introduction to other types of removable-media drives.

**Backup devices**

"Double-Duty Drives: Multifunction Optical Storage," November '91, page 108 — We analyze three multifunction mechanisms that combine both WORM and erasable optical technologies.

"Less Is More: Digital Audiotape," October '91, page 116 — Nineteen DAT drives are tested, and helical-scan recording is illustrated. Also included is information on data compression.

"Pinnacle Micro REO-6500 and PLI Jukebox Junior," August '91, page 56 — Two high-capacity optical jukeboxes are reviewed. Also included are test results and a discussion of optical-jukebox technology.

"Overnight Success: Network Backup," August '91, page 112 — Five network-backup-software/DAT-drive combos are tested.

"Maximum Movable Megabytes: Erasable Optical Drives," November '90, page 102 — Twenty erasable optical drives are rated. Also included are a cost comparison of three removable-media technologies and information on WORM technology.

"Getting it on Tape," December '89, page 189 — We test 30 tape drives. Also included are a discussion of tape-backup-drive construction and a cost comparison of 12 types of storage media.

— Nancy Peterson
Either way, you’ll have the fastest storage that money can buy — although an external solid-state drive will still be hindered by the slowness of the Mac’s built-in SCSI port (see “Supercharging the SCSI Bus: SCSI-2 Cards,” in this Buyer’s Guide) and using an internal RAM disk means data loss in the event of a system crash or power failure.

If speed and reliability are all-important, consider a fault-tolerant *disk array* — available from Lovièl, Core, and others — which can distribute the storage work load and data-loss risk over multiple drives, resulting in impressive performance and crashproof security. Be forewarned of the risk when using a non-fault-tolerant disk array such as MicroNet Raven, however. Despite the Raven’s remarkable performance, data is extraordinarily difficult to restore after a crash — if your Raven takes a nosedive, call a data-recovery service such as Drive-Savers, of Novato, California (415-883-4232), and let a professional painstakingly reassemble the data.

**Removable-Cartridge Drives**

Although few users will ever need a disk array, most already own a cartridge drive, the *floppy-disk* drive that comes with their Mac. These drives are slow and the disks are small and fragile, but floppies are still the best way to swap small files among non-networked Macs.

If your files are too big for a floppy disk, consider a *Floptical* drive, which has a mechanism from Insite Peripherals. This hybrid technology combines optical head positioning with magnetic recording to pack as much as 25 megabytes on what looks like a standard floppy disk, although it costs significantly more. Floptical-drive vendors such as PLI and Procom claim that their drives can read standard floppy-disk formats, but MacUser Labs technicians report some compatibility problems with early units — check them out before you buy.

The real battle in cartridge-drive
you bought your PowerBook as a "second" machine. All was well, but your PowerBook somehow became your "main" Mac. That was fine too, but there's just one little, teensy-weensie 40 megabyte problem remaining...

**Come to Quantum's Go•Drives**
- Quantum's Go•80 and 120 drives provide state-of-the-art SCSI storage in Powerbook 100, 140 and 170 models.
- They're fast! - The Go-80 and 120 models have an average seek time of only 16ms.
- They're lightweight! - only 8 ounces in a 2.1" form factor.
- They're advanced! - state-of-the-art technology, great reliability, fast spin-up for prolonged battery life.
- For just $499 you can solve that teensy-weensie 40mb problem you have with your Powerbook. Solve it with a Quantum Go•80. For just $699, solve it with a Quantum Go•120.
- For more information about APS' full line of SCSI Storage products, see our full-line ad beginning on page 291.

**Go•Drive Installation Guide**
**Four Pages – Over 30 Photo Illustrations**
- With every Go•Drive you receive our simple step-by-step guide to easy Go•Drive installation. Apple service technicians and technically inclined users should be able to install a Go•80 or 120 Drive in 15 to 30 minutes with our easy to follow instructional guide. So don't suffer the teensy-weensie 40 megabyte problem any longer. Call APS Technologies today.
Storage Systems

technology is between 5.25-inch magnetic-cartridge drives with a SyQuest or Bernoulli (Omega) mechanism and the new 3.5-inch optical drives. Read "Pocket Opticals: 3.5-Inch Magneto-Optical Drives," in this Buyer’s Guide, for the lowdown on this duel of the removables.

Backup Devices

Even though SyQuest, Bernoulli, and 3.5-inch optical cartridge drives can also be used for backup and archiving, you’ll need more room than they offer to store many large files — and much more room if you’re planning to back up an entire network.

These low-capacity cartridge drives have one great advantage over most other backup devices: Like hard drives, they are random-access devices that let you quickly locate any file. Only one popular high-capacity backup device shares this ability — and, not surprisingly, it’s also a cartridge drive: a 5.25-inch optical cartridge drive.

Single-cartridge drives are limited to 650 megabytes or 1 gigabyte, but multiple-cartridge jukeboxes are available from IDE, Pinnacle Micro, and PLI. In addition to performing backup duties, a jukebox can provide an astounding amount of information at all times.

Most backup devices use magnetic tape rather than random-access magnetic or optical media. The oldest Mac tape technologies — DC2000- and DC6000-cartridge drives and Teac cartridge drives — move tape past a stationary head, which generally causes slow performance and low capacities. Newer helical-scan tape drives pass the tape over a rotating cylindrical read/write head, a technology that provides greater data density.

Helical-scan technology is a network administrator’s dream: One 4-millimeter DAT (digital audiotape) cartridge, which is smaller than a short stack of business cards, can hold 2 gigabytes, or with in-drive compression, 5 gigabytes. An 8-millimeter Exabyte cartridge can hold as much as 8 gigabytes with compression.

Don’t discount streaming-tape drives, however. An inexpensive Teac cartridge drive, which uses a cartridge similar to a standard audiotape cassette, is a good backup device for a single Mac. New high-density DC2000- and DC6000-cartridge drives can provide rugged, reliable backup of as many as 525 megabytes. (DC6000-cartridge drives that hold more than 1 gigabyte exist for other platforms — expect them for the Mac soon.) In fact, because a streaming-tape drive can start and stop the tape almost instantly, it has a performance advantage, when connected to a slow Mac such as an LC II, over a helical-scan drive, which needs time for its cylindrical head to come up to speed.

Bigger is not always better. Sometimes the best solution is not the most expensive one. When choosing your next storage device, carefully assess your everyday computing — primary-storage requirements, removable-cartridge opportunities, backup and archiving necessities — and then target multiple solutions for specific needs. You’ll work faster and smarter, save money, and sleep better.

Rik Myslewski is a MacUser senior editor and director of MacUser Labs. Davyrl Chan, assistant editor, also contributed to this report.

Dealer or Direct?

If you’ve seen ads for low-priced Mac hardware available directly from the manufacturer and assumed there has to be a catch to phone shopping, your caution could prove costly.

As in any business, mail-order — also known as direct sales — is not immune from scam artists, misleading claims, bollixed transactions, and outright fraud. It’s easy to safeguard yourself against the unscrupulous few, however, and reap the benefits of cost savings offered by the majority of reputable direct sellers.

Before you buy anything, ask a few questions: Can you return the product if you don’t like it, and is there a restocking fee? Who pays for return shipping if the product is damaged in transit? What kind of warranties apply? Be sure to pay by credit card, so in the event of a dispute, your credit-card company can do the fighting for you (and suspend the disputed charges in the interim). Ask for opinions at your user group, or post a notice on an on-line service such as ZiffNet/Mac to see what kind of experiences other customers have had with a particular source.

Direct marketers generally offer support, advice, and troubleshooting, as good as or better than most retail dealers’. And most direct sources have better inventory systems than retail dealers do — they can often get a high-demand product into your hands faster than your dealer can.

Don’t dismiss dealers and VARs (value-added resellers), however — they still have an important place in the market. They can provide customized CPU configurations; complete network planning; and on-site services such as installation, training, and maintenance.

Jon Zilber

Download a Consultant

For the right answers to your storage questions, sometimes it’s best to consult a consultant. But because good advice can be expensive, we’ve developed a HyperCard-based expert system: Which Storage Device Should I Buy? asks a few basic questions about your storage needs and then tells you which system is right for you. It’s available exclusively on ZiffNet/Mac, MacUser’s on-line service. The file name is WCHDRV.VLT, and you can find it in Library 3 (Utilities) of the MacUser Forum (GO ZMC:MACUSER).
<table>
<thead>
<tr>
<th>Table 1: Pros and Cons of Storage Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary-storage drives</strong></td>
</tr>
<tr>
<td><strong>Pros</strong></td>
</tr>
<tr>
<td>2.5-inch hard drives</td>
</tr>
<tr>
<td>• Compact.</td>
</tr>
<tr>
<td>• Low power consumption.</td>
</tr>
<tr>
<td>• Fit inside PowerBooks.</td>
</tr>
<tr>
<td>• Quiet.</td>
</tr>
<tr>
<td>• High cost per megabyte.</td>
</tr>
<tr>
<td>• Maximum capacity of 120 megabytes.</td>
</tr>
<tr>
<td>• Storage-hungry PowerBook users.</td>
</tr>
<tr>
<td>• Travelers who need tiny transportables.</td>
</tr>
<tr>
<td>3.5-inch hard drives</td>
</tr>
<tr>
<td>• Fit inside IIC, IICl, and Quadra 700.</td>
</tr>
<tr>
<td>• Very fast new models.</td>
</tr>
<tr>
<td>• New high-capacity models not yet proven.</td>
</tr>
<tr>
<td>• Users who need reliable, fast storage, especially in internal drives.</td>
</tr>
<tr>
<td>5.25-inch hard drives</td>
</tr>
<tr>
<td>• Reliable, proven technology.</td>
</tr>
<tr>
<td>• Wide range of capacities and prices.</td>
</tr>
<tr>
<td>• High power consumption.</td>
</tr>
<tr>
<td>• Some older models can be slow.</td>
</tr>
<tr>
<td>• Low capacities: bargain hunters.</td>
</tr>
<tr>
<td>• High capacities: power users.</td>
</tr>
<tr>
<td>Transportable hard drives</td>
</tr>
<tr>
<td>• Fit inside a briefcase. Lightweight.</td>
</tr>
<tr>
<td>• Convenient.</td>
</tr>
<tr>
<td>• Some models are expensive.</td>
</tr>
<tr>
<td>• Must be rugged to survive.</td>
</tr>
<tr>
<td>• Travelers who carry data to sites that have no cartridge drive.</td>
</tr>
<tr>
<td>Removable hard drives</td>
</tr>
<tr>
<td>• Best hard-disk security.</td>
</tr>
<tr>
<td>• Faster than removable-cartridge drives.</td>
</tr>
<tr>
<td>• Some models are expensive.</td>
</tr>
<tr>
<td>• Can't be mounted without a reboot.</td>
</tr>
<tr>
<td>• Users who demand the utmost in data safety and lockup security.</td>
</tr>
<tr>
<td>Disk arrays</td>
</tr>
<tr>
<td>• Very fast.</td>
</tr>
<tr>
<td>• Advanced versions are fault-tolerant.</td>
</tr>
<tr>
<td>• Expensive.</td>
</tr>
<tr>
<td>• Basic versions don't allow file recovery after a crash.</td>
</tr>
<tr>
<td>• Users who require speed and security and are willing to pay for it.</td>
</tr>
<tr>
<td>Solid-state drives</td>
</tr>
<tr>
<td>• Extremely fast.</td>
</tr>
<tr>
<td>• No mechanical parts to wear out.</td>
</tr>
<tr>
<td>• Very expensive.</td>
</tr>
<tr>
<td>• Performance limited by Mac's SCSI bus.</td>
</tr>
<tr>
<td>• Only users with the most time-sensitive tasks can justify the cost.</td>
</tr>
<tr>
<td><strong>Removable-cartridge drives</strong></td>
</tr>
<tr>
<td>Floppy drives</td>
</tr>
<tr>
<td>• All Macs since late SEs have 1.4-megabyte floppy drives.</td>
</tr>
<tr>
<td>• Very slow.</td>
</tr>
<tr>
<td>• Low capacity.</td>
</tr>
<tr>
<td>• Disks susceptible to dust and magnets.</td>
</tr>
<tr>
<td>• Every user needs — and most already have — a high-density floppy drive.</td>
</tr>
<tr>
<td>Floptical drives</td>
</tr>
<tr>
<td>• Higher-capacity disks than floppy disks.</td>
</tr>
<tr>
<td>• Also read floppies.</td>
</tr>
<tr>
<td>• Mediocre performance.</td>
</tr>
<tr>
<td>• Disks susceptible to dust and magnets.</td>
</tr>
<tr>
<td>• Users who need to move single large files among Macs.</td>
</tr>
<tr>
<td>SyQuest cartridge drives</td>
</tr>
<tr>
<td>• Large installed base.</td>
</tr>
<tr>
<td>• Service-bureau standard.</td>
</tr>
<tr>
<td>• Many vendors.</td>
</tr>
<tr>
<td>• 88-megabyte drives can't write to 44-megabyte media.</td>
</tr>
<tr>
<td>• Cartridges susceptible to shock.</td>
</tr>
<tr>
<td>• Users who need compatibility with a large installed base.</td>
</tr>
<tr>
<td>Bernoulli cartridge drives</td>
</tr>
<tr>
<td>• Exceptionally well built.</td>
</tr>
<tr>
<td>• Rugged cartridges and drives.</td>
</tr>
<tr>
<td>• 90-megabyte drives can't write to 44-megabyte media.</td>
</tr>
<tr>
<td>• Limited choice of vendors.</td>
</tr>
<tr>
<td>• Users who need rugged reliability and DOS compatibility.</td>
</tr>
<tr>
<td>3.5-inch optical cartridge drives</td>
</tr>
<tr>
<td>• Low cost per megabyte.</td>
</tr>
<tr>
<td>• Compact, reliable, inexpensive cartridges.</td>
</tr>
<tr>
<td>• Mediocre speed.</td>
</tr>
<tr>
<td>• Drives are more expensive than SyQuest or Bernoulli.</td>
</tr>
<tr>
<td>• Users who need compact, reliable data transfer or archival storage.</td>
</tr>
<tr>
<td><strong>Backup devices</strong></td>
</tr>
<tr>
<td>5.25-inch optical cartridge drives</td>
</tr>
<tr>
<td>• 550-megabyte or 1-gigabyte cartridges.</td>
</tr>
<tr>
<td>• Some drives offer WORM option.</td>
</tr>
<tr>
<td>• Mediocre speed.</td>
</tr>
<tr>
<td>• Some drives may not read media from other vendors.</td>
</tr>
<tr>
<td>• Users who can afford high-capacity, reliable random-access backup.</td>
</tr>
<tr>
<td>DC2000- and DC6000-cartridge drives</td>
</tr>
<tr>
<td>• Time-tested technology.</td>
</tr>
<tr>
<td>• New DC6000-cartridge drives are very fast for tape.</td>
</tr>
<tr>
<td>• Only the most recent drives have a low per-megabyte cost.</td>
</tr>
<tr>
<td>• Network managers who need reliable, low-capacity backup more than speed.</td>
</tr>
<tr>
<td>Teac-cartridge drives</td>
</tr>
<tr>
<td>• Inexpensive drives and media.</td>
</tr>
<tr>
<td>• Fast.</td>
</tr>
<tr>
<td>• Low capacities have mediocre speed.</td>
</tr>
<tr>
<td>• Limited capacity.</td>
</tr>
<tr>
<td>• Users who want to back up economically although often slowly.</td>
</tr>
<tr>
<td>Helical-scan (DAT and Exabyte) drives</td>
</tr>
<tr>
<td>• Very fast.</td>
</tr>
<tr>
<td>• Compact, inexpensive media.</td>
</tr>
<tr>
<td>• Maximum capacity of 5 gigabytes on DAT cartridge (compressed).</td>
</tr>
<tr>
<td>• Maximum capacity of 8 gigabytes.</td>
</tr>
<tr>
<td>• Slow to start and stop.</td>
</tr>
<tr>
<td>• Repeated searches shorten media life.</td>
</tr>
<tr>
<td>• Network managers who need to back up an entire network quickly.</td>
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</tbody>
</table>
Pocket Opticals:

3.5-Inch Magneto-Optical Drives

MacUser Labs looks at ten 3.5-inch optical drives, which promise safe, pocket-sized passage for millions of bytes of data.

BY MARK FROST, JOHN RIZZO, AND THE MACUSER LABS STAFF

It looks like little more than a fat floppy, but it holds 88 times as much data. It holds 50 percent more than a SyQuest or Bernoulli cartridge, but it slips into a shirt pocket for safe passage to a local service bureau. A 128-megabyte magneto-optical cartridge, with its accompanying 3.5-inch magneto-optical drive, is the latest in storage technology. It’s also one of the safest and longest-lasting forms of storage: 3.5-inch optical cartridges are so impervious to magnetic fields that you won’t lose data even if you stick one to your refrigerator with a magnet.
3½”
Rewritable magneto-optical disk
3.5-Inch Magneto-Optical Drives

There are plenty of methods to choose from when it comes to archiving and transporting Mac data. Whether it’s been tape, SyQuest, Bernoulli, Floptical, or 5.25-inch optical drives, various devices for long-term storage or transportation of data have evolved over the past few years. But compared with other products, the new 3.5-inch optical drives offer the greatest reliability in the most portable of packages to date.

For example, drives that use optical technology to locate data and magnetic technology to read and write it are slow. The disks these drives use are plagued by the same shortcomings as floppies are — low capacity and questionable data integrity (see the “Removable-Media Alternatives” sidebar). Although SyQuest and Bernoulli drives are faster — and are something of a removable-media standard for the Mac — 3.5-inch optical drives use cartridges that offer greater data integrity and cost less: The price of a 128-megabyte 3.5-inch optical cartridge is not even half that of a SyQuest 88-megabyte cartridge.

Magneo-optical drives also promise greater compatibility with each other than is the case with SyQuest or Bernoulli drives. High-capacity SyQuest or Bernoulli drives cannot write onto low-capacity SyQuest or Bernoulli cartridges — nor are SyQuest and Bernoulli drives compatible with each other. But thanks to a recently adopted ISO (International Standards Organization) standard, all 3.5-inch optical drives should be compatible with each other, although the standard allows for some mechanism differences that may create compatibility problems. For example, the IBM MD3125A mechanism spins its discs at 1,800 rpm whereas the Sony SMO-P301 mechanism spins its discs at 3,000 rpm, so a cartridge designed for use in a fast-spinning drive may not be able to work in a slower drive, and vice versa. If you plan to use a removable-media drive for exchanging data, compatibility is crucial — check our compatibility table (see Table A in the “Not All Discs Are Equal” sidebar).

Nonetheless, 3.5-inch optical drives use the most fail-safe method for storing data, the same technology as that in 5.25-inch magneto-optical drives (see the “How It Works: Magneto-Optical Drives” sidebar), which promises to house your data safely, well into the next century.

How It Works: Magneto-Optical Drives

Erase Pass: Before a drive can write to a magneto-optical disc, it must first erase the portion of the disc it will be writing to. A laser heats a spot on the disc to a temperature of around 150 degrees C, the Curie point. At this temperature, the spot’s magnetic polarity can be changed by an electromagnet. In the erase pass, the electromagnet is switched on and applies a polarity (shown as minuses) to the area on the disc to be written to, effectively creating all Os.

Write Pass: Once the portion of the disc to be written to has been erased, the laser returns to write the 1s. Quick pulses of the laser again heat the medium to its Curie point, where it can adopt the opposite magnetic polarity (shown as pluses), supplied by the electromagnet, whose polarity has been reversed.

Read Pass: To read data, the drive uses what is known as the Kerr effect, in which polarized light is rotated when it is reflected from a magnetized metal surface. During the read pass, the laser runs at a lower power and bounces light off the medium. The optics in the laser assembly then read the differences in polarization as 1s and Os.
For this report, MacUser Labs looked at ten drives based on three 3.5-inch optical mechanisms. These were the only drives available at test time, and each was available for less than $2,000. But by the time you read this, more than a dozen 3.5-inch mechanisms — from such companies as Epson, Fujitsu, Olympus, Panasonic, and Ricoh — should be integrated into the products of more than three dozen U.S. vendors alone. And all these drives should be able to read from and write to media from other drives (see the “On the Horizon” sidebar).

We looked at five drives based on the Sony SMO-P301 mechanism: the Mass Microsystems DataPak MO/128, Optima Technology DiscKover 128MO, Pinnacle Micro REO 130S, PLI Infinity Optical 3.5” Drive, and Procom Technology MEOD 128. We also tested four drives based on the MOST RMD-5100-S mechanism: The DGR Technologies 128REM, Liberty Systems 128MB-MO, MacProducts Magic 128REM, and OCEAN Microsystems Vista 128. And finally, we tested the Microtech OR120, which is based on the IBM MD3125A mechanism.

We examined each drive’s documentation, software, and construction and then subjected the drives to our suite of performance tests based on four real-world applications — tests that not only let you know how each drive would perform in these specific applications but also examined specific aspects of drive operation such as access speed, sustained throughput, and caching efficiency. We sorted a 2,000-record 4th Dimension database to evaluate the access speed of each drive and copied a 13-megabyte file with CE Software’s DiskTop utility to examine sustained throughput. We then duplicated a 13-megabyte file with the Finder to test the efficiency of each drive’s cache and examined all aspects of drive operation by opening, rotating, and saving a 5.4-megabyte Photoshop image.

Earth-Friendly Packaging

Before you can even think about turning on your new drive, you’ve got to know if you have everything you need. We began our inspection by taking a good look at the packaging to make sure that it provided adequate protection without being wasteful (see Figure 1). All the drive vendors packed their drives in either foam or plastic popcorn, neither of which is easy to recycle. Furthermore, none of the boxes we examined had the recycling logo. None of the vendors reported that the ink on their boxes was soy-based (it’s easier to recycle paper that contains soy-based ink rather than traditional oil-based ink). Vendors ought to try harder to reduce the amount of waste in their packaging and to incorporate recycled or recyclable materials. Apple, Hewlett-Packard, and IBM’s OEM Products are leading the way in this respect; it’s time for the smaller vendors to follow suit.

Once you’ve got the box open, a packing slip telling you exactly what’s in the box should be right on top. However, of the boxes we examined, only those from Mass Microsystems, Optima, Pinnacle Micro, and PLI contained such slips.

Most hard drives come preformatted, so you might never have to deal with the formatting software that was shipped with the drive. All you need to concern yourself with is setting the SCSI-ID number on the drive and terminating the drive. Setting up removable-media drives is similar, but you’ll probably be using more than one cartridge and the cartridges usually come unformatted. Not only do you need a good understanding of how your drive’s formatting software works but you also have to install a
3.5-Inch Magneto-Optical Drives

Table 1: Battle of the Drives

<table>
<thead>
<tr>
<th></th>
<th>3.5-inch magneto-optical drives</th>
<th>88-megabyte SyQuest drives</th>
</tr>
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<tbody>
<tr>
<td>Drive cost</td>
<td>$1,300 – $2,000</td>
<td>less than $800</td>
</tr>
<tr>
<td>Media cost (per megabyte)</td>
<td>40 – 50 cents</td>
<td>$1.30 – $1.40</td>
</tr>
<tr>
<td>Storage capacity per cartridge</td>
<td>120 megabytes, formatted</td>
<td>85 megabytes, formatted</td>
</tr>
<tr>
<td>Compatible with</td>
<td>a dozen cartridge brands</td>
<td>a single cartridge brand</td>
</tr>
<tr>
<td>Speed rating (scale of 1 – 10)</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Transportability of media</td>
<td>floppy-sized, sturdy</td>
<td>big, bulky, fragile</td>
</tr>
<tr>
<td>Data reliability</td>
<td>Cartridges impervious to magnetic fields. Drive heads distant from medium.</td>
<td>Cartridges susceptible to magnetic fields and damage from dropping. Drive heads close to medium.</td>
</tr>
<tr>
<td>Media life</td>
<td>30+ years</td>
<td>5+ years</td>
</tr>
<tr>
<td>Ejection method</td>
<td>auto</td>
<td>manual</td>
</tr>
</tbody>
</table>

Table 1: As storage devices, 3.5-inch optical drives beat 88-megabyte SyQuest drives in every area except speed and drive cost. Optical cartridges are significantly less expensive, are more portable, and provide greater data security.

As for software documentation, all the vendors did well — most of the instructions were written by the driver publishers themselves. DGR includes a “light” version of FWB’s Hard Disk ToolKit, which has perhaps the most detailed manual on all things SCSI and the functions of Hard Disk ToolKit itself. Liberty also did well in this category by including Appoloyics’ SCSI Director software, which has its own detailed manual. MacProducts, Mass Microsystems, and Microtech ship versions of Software Architects’ Formatter One, an easy-to-use all-purpose formatter. Optima and Pinnacle Micro ship proprietary formatters.

All the formatters did their job well in our tests and offered a variety of useful features, such as the ability to password-protect cartridges and partition them into separate volumes. The OCEAN and Pinnacle formatters are the only ones that fail to provide any extra features. DGR and MacProducts also include Retrospect Remote, a popular backup utility, and Microtech includes Symantec’s Norton Utilities for the Macintosh, a powerful suite of utilities for recovering data. Retrospect and Norton Utilities are each $100 values, something to think about when considering the price of the drive.

Figure 1: Price Versus Service and Packaging

Figure 1: No matter how fast or well built a drive may be, if you can’t figure out how to get it running, it’s of little value. To get a handle on how much help each vendor provides, we rated each drive on the quality and the completeness of the packaging, the quality of the documentation, and the amount of service and support offered after the sale. We plotted each drive’s street price against its service-and-packaging score. High scores are to the right of the chart, and the least expensive drives are at the top.

system extension that will help mount your cartridges on the desktop after they’ve been formatted.

Because removable-media drives can be complex to use, we took a close look at all the documentation and software that accompanies these drives. We were pleased to see that many of the vendors felt the same way as we do about providing detailed instructions and powerful yet easy-to-use software. Leading the list for the best documentation were Mass Microsystems, PLI, and Procom Technology, whose manuals are written specifically for the drives they accompany and include clear instructions and illustrations that cover all aspects of hardware installation. Optima Technology provides an excellent manual that covers all aspects of setting up an optical drive — too bad it was written for a 5.25-inch optical drive. Although many of the instructions are the same as they are for a 3.5-inch drive, $1,500 ought to buy you a manual for your specific drive. The other vendors, with the exception of Liberty, offer adequate installation instructions. Liberty provides only a photocopy of the instructions for the MOST OEM mechanism, which were written by MOST for vendors, not users.
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CIRCLE 145 ON READER SERVICE CARD.
Gentlemen, Start Your Opticals

Once we had formatted the cartridges, we copied the contents and file structures of the drives containing our test applications and files. After the copying was completed, we restarted the test platforms (Mac IIci’s), using the optical drives as the startup devices. We immediately ran into trouble.

Most of the optical drives were unable to function as startup devices unless we “hid” the Finder on the Mac’s internal hard drive in an unnamed folder — and even this worked only some of the time. This reluctance to function as a startup device can be a real pain if you’re relying on your optical drive to be a mountable backup device — you may need to boot from it if your hard drive fails. Part of the problem is that these drives take some time to spin up. Some drive manufacturers are making changes to the mechanisms to fix this problem. Once we’d managed to get all the drives to function as startup devices, we subjected them to our suite of real-world performance tests.

With hard drives, speed varies greatly, because manufacturers implement different disk rotational speeds and different-sized caches, but the 3.5-inch optical drives we tested performed almost identically in all of our tests. The drives had relatively unsophisticated caches, making rotational speed the only significant factor, and only one drive, the Microtech OR120, which uses an IBM mechanism, spins its discs at a speed (1,800 rpm) significantly slower than that of the other drives. We tested each drive’s access performance by sorting a 2,000-record 4th Dimension database. This test asks the drive to locate, sort, and write very small chunks of data, forcing the head to travel rapidly across the disc in search of that data.

All the drives, except for the Microtech OR120, were almost two-thirds as fast as a SyQuest 88. The OR120 was about half the speed of the other 3.5-inch optical drives. So if you base your buying decision on
speed alone, look for the cheapest drive you can find based on a Sony or a MOST mechanism, but do take construction quality into account.

**Built to Last?**

We looked at each drive’s case to see if the drive was portable and allowed for vertical as well as horizontal installation. Mass Microsystems, Microtech, Optima, and Pinnacle provide removable feet to increase stability when the drives are vertically oriented.

We also looked for any extra AC outlets for connecting other drives and checked the location and type of the SCSI-ID selector. Only the DGR 128REM, the MacProducts Magic 128REM, and the Mass Microsystems DataPak MO/128 offer extra AC outlets.

All the drives offer either a push-button or a wheel SCSI-ID selector — acceptable means of setting SCSI-ID numbers. As for location, all the drives except for Liberty’s and Pinnacle’s have ID switches where they can’t be changed accidentally. Liberty and Pinnacle didn’t have much choice for ID-switch location, because they have compact, portable cases, but the Liberty 115 128MB-MO has a wheel-type switch that is hard to change inadvertently. The Pinnacle Micro REO 130S has a push-button switch located right next to the power switch, making it easy for you to change the ID number by accident while groping for the power switch.

We then opened all the cases and examined each drive’s construction quality, making sure the drives had internal as well as external fuses, shielded power supplies to cut down on electronic interference, and cooling schemes. We preferred the metal cases used by DGR, Liberty, MacProducts, Mass Microsystems, OCEAN, and PLI, because of their sturdiness and because metal is better at dissipating heat. The Microtech OR120’s case is plastic but has a conductive coating inside for reducing power-supply interference; the remaining drives have plastic cases that lack this preparation, and with the Optima DiskStor 128MO and the Pinnacle REO 130S, the plastic is too flexible. All the drives have internal fuses, but those from DGR, MacProducts, Mass Microsystems, Microtech, OCEAN, and PLI provide external fuses as well — an extra precaution and convenience in case a low-level surge hits your drive.

Cooling is critical in optical drives. The lasers the mechanisms use keep the inside of the mechanism hot. Most manufacturers prefer air to be drawn through the front of the mechanism,
Not All Discs Are Equal

It doesn’t matter how small or how well designed a removable medium is if it doesn’t work when you put it in another drive. The key element for any storage product is data security — if you save your files on a disc, you need to know that you can go back to that disc at any time and retrieve your data, even if you’re not using the drive that wrote the data on that disc. Unfortunately, this has not always been the case.

Apple has never set clear standards for driver writers to follow, which has resulted in the driver/system-extension compatibility problems we have come to dread with SyQuest drives. Apple hasn’t made any effort to forge a standard, so expect this type of incompatibility to hobble 3.5-inch optical drives as well.

But users of SyQuest drives may have one up on users of 3.5-inch optical drives when it comes to compatibility. Currently there are at least ten manufacturers of 3.5-inch optical cartridges, and some are compatible with more drives than others are.

Part of the problem lies with the ISO standard governing 3.5-inch optical drives, which allows a range of rotational speeds. With a slow-spinning — say, 1,800-rpm — drive, each data bit remains under the laser for twice as long as it does with a drive spinning at 3,600 rpm. The result is that the medium used for slower drives needs to be less coercive — in other words, it needs more time under the laser for the data bit to change. The problem is that if you put this medium into a faster-spinning drive, it’s possible that a data bit won’t be under the laser long enough for it to be changed.

To test the compatibility of 3.5-inch drives and cartridges, we acquired cartridges from Epson, Hoechst (which will carry the Dysan label in this country), Kuraray, Mitsubishi Kasei, MOST, Sony, 3M, Tosoh, and Verbatim and 3.5-inch drive mechanisms from IBM (MD3125A), MOST (RMD-5100-S), Ricoh (RMO 3010), Sony (SMO-P301), and Teac (OD 3000). We used Software Architects’ Formatter One to format the cartridges on each mechanism. We then copied the 5.4-megabyte Photoshop file onto the disc, removed the cartridge, and inserted it into another mechanism to see if it could mount and read the file.

For the most part, things went smoothly. But the Teac mechanism did not accept either the MOST or the Tosoh cartridge. When either was inserted into the Teac mechanism, the mechanism spun down and its activity light flashed, indicating an error. The Teac mechanism also failed to format the Epson cartridge, although it could read it when the cartridge had been formatted on another mechanism. The Hoechst mechanism proved to be problematic for the MOST mechanism. The MOST mechanism could neither format nor read the Hoechst cartridge, and it could not read the Mitsubishi Kasei, 3M, and Verbatim cartridges if they had been formatted on the IBM mechanism. As for the 3M cartridge, the IBM mechanism could not read it when it was formatted on the MOST mechanism.

If exchanging cartridges is important to you — and it should be if you’re considering a removable-media drive — take a close look at Table A. We found that the Sony and Ricoh mechanisms were compatible with the greatest variety of cartridges. On the media side, the Sony and Kuraray cartridges were compatible with the greatest number of mechanisms. Until Hoechst, MOST, and Tosoh do something to rectify their cartridges’ compatibility problems, we do not recommend their cartridges.

### Table A: Compatibility

<table>
<thead>
<tr>
<th>Cartridge (formatting mechanism)</th>
<th>Mechanism</th>
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<tbody>
<tr>
<td></td>
<td>IBM</td>
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<tr>
<td>Epson (IBM)</td>
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<tr>
<td>Epson (MOST)</td>
<td>◙</td>
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<tr>
<td>Epson (Ricoh)</td>
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<td>Epson (Sony)</td>
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<td>Epson (Teac)</td>
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<td>Hoechst (IBM)</td>
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<td>Hoechst (MOST)</td>
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<td>Hoechst (Ricoh)</td>
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<td>Kuraray (IBM)</td>
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<tr>
<td>Mitsubishi Kasei (IBM)</td>
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<td>Verbatim (Teac)</td>
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across the optics, and out the back. All the drives we tested use cases common to the respective company’s other storage products and contain fans designed to expel heat created by the internal power supply. However, most of the Sony mechanisms have extra fans directly attached to the mechanism for the specific purpose of cooling it. The Mass Microsystems drive is the only drive based on the Sony mechanism that lacks this fan. Although these extra fans do keep the mechanisms cool, they also increase the drives’ noisiness. None of the drives based on the MOST mechanism have additional fans. The Microtech OR120 has only a single fan, but its IBM mechanism is open in the front and back, making it easy for the single fan to draw air through the mechanism. However, this design also increases the likelihood of dirt being drawn into the mechanism, possibly dirtying the optics.

To complete the construction-quality phase of our testing, we cut open each drive’s SCSI cable to check its quality. The best cables — from Microtech, Optima, and Procom — have the internal data wires twisted with their respective ground lines to reduce noise from one line to another, foil insulation to lower impedance, and metal braid to protect the internal wires from cuts and fatigue. DGR and Pinnacle offer lower-quality cable, containing only foil insulation.

Is It Legit?

Once you’ve installed a drive on your desk, there’s nothing more frustrating than finding that as soon as you power up the drive, the picture on your monitor starts to shimmy and your telephone line acquires a buzz. Hopefully, your office isn’t in the flight path of the local airport, because that new drive may cause enough interference to confuse aircraft communications as well as interfere with police and other emergency communications.

To prevent such problems, the Federal Communications Commission has implemented strict rules on how much radio-frequency energy peripherals such as optical drives can emit. Unfortunately, few companies vigorously adhere to these rules.

For a peripheral to receive FCC certification, it must be tested for radio-frequency interference by an FCC-authorized laboratory and the results of those tests must be forwarded to the FCC, where commission engineers can either grant authorization or ask for further modifications and
3.5-Inch Magneto-Optical Drives

testing to bring the peripheral into compliance. Once the peripheral has passed the tests, the FCC gives the manufacturer a Grant of Certification, which certifies that the device has passed and indicates the FCC ID number to be attached to the peripheral.

For the ten drives we tested, only three vendors — Liberty, Microtech, and Procom — could provide us with verifiable FCC Grants of Certification. (The Procom drive, however, lacked an FCC ID number on its case.) Mass Microsystems, Pinnacle, and PLI provided us with copies of their results from the FCC laboratories, but they had yet to receive their Grants of Certification; they should have received them by the time you read this.

We were unable to verify the validity of the remaining drives’ FCC ID numbers, either because the grants provided had numbers different from those on the drives or because the FCC’s PAL (public-access line, a BBS that provides the name of the company holding the grant for any given FCC ID number) was unable to verify that the number was valid.

Worth the Wait

If you’ve been wanting a reliable means of storing important data or have longed for a compact way to take your data with you, the waiting is over. For the most part, the drives we looked at come with decent software and documentation. All the drives performed almost identically in our tests, with the exception of the slower-spinning Microtech drive. However, Microtech has since upgraded the IBM mechanism it uses from the MD3125A to the MD3125B, which promises to offer performance close to that of the Sony mechanism (see the “On the Horizon” sidebar).

If speed is your only concern, buy the cheapest drive you can find. If, like most folks, you value construction, software, and documentation, read “The Bottom Line” for our specific recommendations.

As our testing showed, speed is not a strength of 3.5-inch optical drives. But what these drives lack in speed, they more than make up for in data security. During the course of our testing, we had ample opportunity to drop, drag, dirty, and otherwise abuse our optical cartridges. To our delight, not one died during the course of our testing. If this is any sign of the durability of this medium, 3.5-inch optical drives look like the best solution we’ve seen so far for both data transportability and simple backup.

We preferred drives based on the Sony mechanism over those based on the MOST RMD-5100-S because of the former’s superior compatibility with a variety of cartridge brands. However, two drives based on the MOST mechanism offer good value for your money: The DGR Technologies 128REM ($1,299 direct) and the MacProducts Magic 128REM ($1,399 direct) are well built and were the least expensive of the drives we tested. In addition, each comes with Retrospect Remote and FWB’s powerful Hard Disk Toolkit.

Regardless of the drive, we found that we could minimize compatibility problems if we used the right media. The Sony and the Kuraray cartridges were our favorite media for all the drives we tested.

Cream of the crop (from top): The Procom Technology MEOD 128, the PLI Infinity Optical 3.5” Drive, and the Optima Technology DiskDiscovery 128MO offered the best combination of good documentation, design, and construction for the price.
While Apple Quadras are setting new standards in computing performance, Microtech's new Nova XL drive series was designed to maximize the speed and power of your new machine. With data transfer rates ranging from 4MB/sec and beyond, access times as fast as 11ms, and capacities from 650MB-1.3GB, the XL internal and external drives are built for the true power user. Additional power features include impedance-matched cables, Norton Utilities, Lifeguard and a five year warranty.*

Customize your Macintosh Quadra 900 by choosing high performance solutions from Microtech's line of internal mass storage devices, like the 120MB OR120i re writable optical drive or the CD600i CD-ROM drive. Or choose the T2000i 2GB DAT tape backup system with network compatible Retrospect software. The R50i removable drive provides unlimited storage capabilities plus Mac and DOS file sharing through TransPORT. And optimize your internal storage capacities to 1.6GB with the new Nova N1600i.

As a power user, you can also count on Microtech to bring you the latest technology in memory solutions. With Microtech 16MB SIMMs you can maximize your Quadra 900 to 256MB of RAM!

Power without dependability is no power at all. Since 1985, Microtech's Commitment to Quality has meant reliable products backed by the longest warranties in the industry. Our dedicated service and support teams are winners of Macworld Magazine's Service Hero Awards and ensure your satisfaction — guaranteed.

When you need the latest technology today with the confidence that you will be supported tomorrow, call Microtech International for Ultimate Power.

For your nearest dealer call: 800-325-1895
International inquiries: 203-468-6223/Fax 203-467-8124

MICROTECH INTERNATIONAL, INC.
©1992 Microtech International, Inc. 158 Commerce St., East Haven, CT 06512. All trademarks are the property of their respective owners. *The five year warranty is offered on drives sold, delivered, and used in the U.S. and Canada. Certain restrictions apply. Microtech reserves the right to change specifications without notice.

CIRCLE 160 ON READER SERVICE CARD.
## 3.5-Inch Magneto-Optical Drives

### Table 2: Features of 3.5-Inch Magneto-Optical Drives

<table>
<thead>
<tr>
<th>Feature</th>
<th>DGR 128REM</th>
<th>Liberty 115 128MB-MD</th>
<th>MacProducts Magic 128REM</th>
<th>Mass Microsystems DataPak M0/128</th>
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<tr>
<td><strong>List price</strong></td>
<td>$1,299</td>
<td>$1,499</td>
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<td>$75</td>
<td>$59</td>
<td>$79</td>
<td>Included</td>
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<tr>
<td><strong>Cons</strong></td>
<td>Poor documentation.</td>
<td>Internal termination. Poor documentation.</td>
<td>Poor documentation. No toll-free tech support.</td>
<td>Poor documentation. No toll-free tech support.</td>
</tr>
<tr>
<td><strong>Hardware</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formatted capacity</td>
<td>119.0 MB</td>
<td>119.4 MB</td>
<td>119.0 MB</td>
<td>119.4 MB</td>
</tr>
<tr>
<td>Internal mechanism</td>
<td>MOST RMD-5100-S</td>
<td>MOST RMD-5100-S</td>
<td>MOST RMD-5100-S</td>
<td>Sony SMQ-P301</td>
</tr>
<tr>
<td>SCSI-ID selector</td>
<td>push button</td>
<td>wheel</td>
<td>push button</td>
<td></td>
</tr>
<tr>
<td>SCSI termination</td>
<td>external</td>
<td>internal</td>
<td>external</td>
<td>external</td>
</tr>
<tr>
<td>Indicator lights</td>
<td>access, power</td>
<td>access, power</td>
<td>access, power</td>
<td>access, power</td>
</tr>
<tr>
<td>Size (L x W x H, in.)</td>
<td>10 x 9.5 x 2.5</td>
<td>9.5 x 7 x 2</td>
<td>10 x 9.5 x 2.5</td>
<td>10 x 10 x 2.5</td>
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<td>Case material</td>
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<td>molded aluminum</td>
<td>metal</td>
<td>metal</td>
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<tr>
<td>External fuse</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Fan</td>
<td>●, 2 switched</td>
<td>●</td>
<td>●, 2 switched</td>
<td>●, 2 switched</td>
</tr>
<tr>
<td>AC outlets</td>
<td>●, 2 switched</td>
<td>●</td>
<td>●, 2 switched</td>
<td>●, 2 switched</td>
</tr>
<tr>
<td>Vertical operation</td>
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<td>●</td>
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<td>●, with feet</td>
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<td>Portable</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td><strong>Software</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Bundled software</td>
<td>Hard Disk ToolKit, Retrospect Remote</td>
<td>none</td>
<td>Hard Disk ToolKit, Retrospect Remote</td>
<td>SuperDisk, DiskDoubler</td>
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<tr>
<td>Formatter</td>
<td>HDT Primer 1.1</td>
<td>SCSI Director 1.9.7</td>
<td>HDT Primer 1.1</td>
<td>DataPak M0/128 Formatter</td>
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<td>Partitioning</td>
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<td>●</td>
<td>●</td>
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<td>Backup</td>
<td>○</td>
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<td>●</td>
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<td>Password protection</td>
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<td>●</td>
<td>●</td>
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<tr>
<td>File recovery</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>Disk optimization</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>○</td>
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<tr>
<td><strong>Other</strong></td>
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<td>Standard warranty</td>
<td>1 year</td>
<td>1 year</td>
<td>1 year</td>
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<td>Money-back guarantee</td>
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<td>30 days</td>
<td>30 days</td>
<td>none</td>
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<td>Turnaround time</td>
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<td>Extended warranty</td>
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<td>Toll-free tech support</td>
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<td>●</td>
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<td>Data-recovery service</td>
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<tr>
<td>DGR Technologies</td>
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<td></td>
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<tr>
<td>1800 Rio Grande, Ste. 205</td>
<td></td>
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<tr>
<td>Austin, TX 78701</td>
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<td>800-235-9748</td>
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<td>512-476-9855</td>
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<tr>
<td>Liberty Systems, Inc.</td>
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<td>160 Saratoga Ave., Ste. 38</td>
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<tr>
<td>Santa Clara, CA 95051</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>408-963-1127</td>
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<td></td>
<td></td>
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<tr>
<td>MacProducts USA</td>
<td></td>
<td></td>
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<tr>
<td>608 W. 22nd St.</td>
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<tr>
<td>Austin, TX 78705</td>
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<td>800-622-3475</td>
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<td>408-724-8881</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mass Microsystems, Inc.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>810 W. Maude Ave.</td>
<td></td>
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<td></td>
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<tr>
<td>Sunnyvale, CA 94086</td>
<td></td>
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<td></td>
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<tr>
<td>800-522-7879</td>
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<tr>
<td>408-522-1200</td>
<td></td>
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</tr>
</tbody>
</table>
On Verbatim® data storage products. They start out backed by a complete Verbatim warranty. And then they get better.

For example, our DataLife® Colors disks let you color-code your files for convenience and added security.

Our Teflon®-coated DataLife-Plus® disks let you wipe off fingerprints, dust, even pencil shavings. Without wiping out information.

Our 5.25-Inch and 3.5-Inch Rewritable Optical Disks are virtually incapable of losing data. Plus, they both have enormous storage capacities.

And our data cartridges, high density data cassettes, data certified 8mm/4mm data cartridges, and reel tapes live up to the same impeccable safety standards we've set with our disks.

So next time, ask for Verbatim. And get the name you can't lose with.

Teflon® is a DuPont registered trademark.
## Table 2: Features of 3.5-Inch Magneto-Optical Drives, continued

<table>
<thead>
<tr>
<th></th>
<th>Microtech OR120</th>
<th>OCEAN Vista 128</th>
<th>Optima Diskeroy 128MO</th>
<th>Pinnacle Micro RED 130S</th>
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<tbody>
<tr>
<td><strong>List price</strong></td>
<td>$2,599</td>
<td>$1,895</td>
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<td>$1,499</td>
<td>$1,995</td>
<td>$1,995</td>
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<tr>
<td><strong>Cartridge</strong></td>
<td>included</td>
<td>included</td>
<td>included</td>
<td>$79</td>
</tr>
<tr>
<td><strong>Cons</strong></td>
<td>Slowest.</td>
<td>Minimal formatting software. No bundled software.</td>
<td>No toll-free tech support. No bundled software.</td>
<td></td>
</tr>
<tr>
<td><strong>Hardware</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formatted capacity</td>
<td>119.0 MB</td>
<td>119.0 MB</td>
<td>119.4 MB</td>
<td>119.0 MB</td>
</tr>
<tr>
<td>Internal mechanism</td>
<td>IBM MD3125A</td>
<td>MOST RMO-5100-S</td>
<td>Sony SMO-P301</td>
<td>Sony SMO-P301</td>
</tr>
<tr>
<td>SCSI-ID selector</td>
<td>push button</td>
<td>push button</td>
<td>push button</td>
<td>push button</td>
</tr>
<tr>
<td>SCSI termination</td>
<td>external</td>
<td>external</td>
<td>external</td>
<td>external</td>
</tr>
<tr>
<td>Indicator lights</td>
<td>access, power</td>
<td>access, power</td>
<td>access, power</td>
<td>access, power</td>
</tr>
<tr>
<td>Size (L x W x H, in.)</td>
<td>10.5 x 10 x 2.5</td>
<td>10.5 x 10 x 3</td>
<td>10 x 11.5 x 2.5</td>
<td>8.5 x 7 x 2</td>
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<td>Case material</td>
<td>plastic with EMI</td>
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<td>plastic</td>
<td>plastic</td>
</tr>
<tr>
<td>External fuse</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Fan</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>AC outlets</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Vertical operation</td>
<td>○</td>
<td>●</td>
<td>●, with feet</td>
<td>●, with feet</td>
</tr>
<tr>
<td>Portable</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td><strong>Software</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bundled software</td>
<td>Norton Utilities, LifeGuard</td>
<td>none</td>
<td>none</td>
<td>none</td>
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<td>Formatter</td>
<td>OR 120 Formatter 3.47</td>
<td>Compass Works 4.33</td>
<td>DiskMount</td>
<td>RED Formatter 2.62</td>
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<td>Partitioning</td>
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<td>○</td>
<td>●</td>
<td>○</td>
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<tr>
<td>Backup</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>Password protection</td>
<td>○</td>
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<td>●</td>
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<td>Data encryption</td>
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<td>○</td>
</tr>
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<td>File recovery</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>Disk optimization</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td><strong>Other</strong></td>
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<tr>
<td>Standard warranty</td>
<td>2 years</td>
<td>1 year</td>
<td>1 year</td>
<td>1 year</td>
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<tr>
<td>Money-back guarantee</td>
<td>none</td>
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<td>30 days</td>
<td>30 days</td>
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<tr>
<td>Turnaround time</td>
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<td>48 hours</td>
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<tr>
<td>Extended warranty</td>
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<td>Data-recovery service</td>
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<td>●</td>
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<td>○</td>
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<tr>
<td>FCC certification</td>
<td>●</td>
<td>○</td>
<td>○</td>
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</tr>
</tbody>
</table>

---

Serious Tools for Serious Work

At FWB, we're serious about hard drive performance. That's why Hammer drives consistently come out on top in reviews in MacWorld and MacUser. We're also serious about delivering superior service, support, and software. Our new 2 year warranty and Hammer PremiumService™ guarantee you'll never have more than 48 hours of downtime with a Hammer drive. And our Hard Disk ToolKit software gives you the power to configure your Hammer drive for unequalled functionality and control. That's why Hammer has become the first choice among serious Macintosh professionals.

For more information and the name of your local Hammer dealer, call FWB at 415/474-4806 or fax us at 415/775-2125.

Prices reduced up to 25%. Call today!

Featured:
hammer600FMF
11.9 ms seek time
3.0 MB per second transfer rate
2 year warranty

Hammer and HDToolKit are trademarks of FWB, Inc. Other trademarks are properties of their respective owners.

CIRCLE 84 ON READER SERVICE CARD.
### Table 2: Features of 3.5-Inch Magneto-Optical Drives

<table>
<thead>
<tr>
<th>Criteria</th>
<th>PLI Infinity Optical 3.5&quot; Drive</th>
<th>Procom MEDO 128</th>
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</thead>
<tbody>
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<td><strong>List price</strong></td>
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<td><strong>Cartridge</strong></td>
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<td>included</td>
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<tr>
<td><strong>Pres</strong></td>
<td>Good documentation.</td>
<td>Good documentation.</td>
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<tr>
<td></td>
<td>Good construction.</td>
<td>Good construction.</td>
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<tr>
<td></td>
<td>formatting software.</td>
<td>formatting software.</td>
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<td><strong>Cons</strong></td>
<td>No bundled software.</td>
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<table>
<thead>
<tr>
<th>Hardware</th>
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</thead>
<tbody>
<tr>
<td><strong>Formatted capacity</strong></td>
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<td>119.5 MB</td>
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<tr>
<td><strong>Internal mechanism</strong></td>
<td>Sony SMO-P301</td>
<td>Sony SMO-P301</td>
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<tr>
<td><strong>SCSI-ID selector</strong></td>
<td>wheel</td>
<td>wheel</td>
</tr>
<tr>
<td><strong>SCSI termination</strong></td>
<td>external switch</td>
<td>external</td>
</tr>
<tr>
<td><strong>Indicator lights</strong></td>
<td>power</td>
<td>power</td>
</tr>
<tr>
<td><strong>Size (L x W x H, in.)</strong></td>
<td>10 x 10 x 2.5</td>
<td>10.5 x 9.5 x 2</td>
</tr>
<tr>
<td><strong>Case material</strong></td>
<td>metal</td>
<td>plastic</td>
</tr>
<tr>
<td><strong>External fuse</strong></td>
<td>●</td>
<td>●</td>
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<td><strong>Fan</strong></td>
<td>●</td>
<td>●</td>
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<tr>
<td><strong>AC outlets</strong></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td><strong>Vertical operation</strong></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Portable</strong></td>
<td>○</td>
<td>○</td>
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<table>
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<tr>
<th>Software</th>
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</thead>
<tbody>
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<td><strong>Bundled software</strong></td>
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<td><strong>Formatter</strong></td>
<td>PLI Formatter 3.3</td>
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<td>●</td>
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<td><strong>Data encryption</strong></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td><strong>File recovery</strong></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td><strong>Disk optimization</strong></td>
<td>●</td>
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<table>
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<td><strong>Standard warranty</strong></td>
<td>1 year</td>
<td>1 year</td>
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<tr>
<td><strong>Money-back guarantee</strong></td>
<td>30 days</td>
<td>none</td>
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<tr>
<td><strong>Turnaround time</strong></td>
<td>48 hours</td>
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<td><strong>Extended warranty</strong></td>
<td>$199/year</td>
<td>$399/year</td>
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<td><strong>Toll-free tech support</strong></td>
<td>●</td>
<td>●</td>
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<tr>
<td><strong>Data-recovery service</strong></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>FCC certification</strong></td>
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<td><strong>PLI</strong></td>
<td>47421 Bayside Pkwy.</td>
<td>Procom Technology</td>
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<td></td>
<td>Fremont, CA 94538</td>
<td>2181 Dupont Dr.</td>
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<tr>
<td></td>
<td>800-288-8754</td>
<td>Irvine, CA 92715</td>
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<td></td>
<td>510-657-2211</td>
<td>800-800-8600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>714-852-1000</td>
</tr>
</tbody>
</table>

### Table 2 Criteria

- **List price** — The manufacturer's suggested retail price.
- **Street price** — An average actual price charged by dealers around the U.S. in April 1992.
- **Formatted capacity** — The amount of usable storage space on a single cartridge after formatting, in megabytes.
- **Internal mechanism** — The OEM name and model number of the disk mechanism used in the drive. Double-check with the vendor to see if it uses different mechanisms in the same-model drive.
- **SCSI-ID selector** — The method used to change the SCSI-ID number.
- **SCSI termination** — The location of the SCSI termination used by the drive.
- **Indicator lights** — What the lights (if any) on the front of the drive indicate.
- **External fuse** — Does the drive have an external fuse?
- **Fan** — Does the drive have a fan to keep its power supply cool?
- **Portable** — Is the drive small enough to fit in a handbag or small briefcase?
- **Bundled software** — Commercial applications, utilities, and shareware that come with the drive.
- **Formatter** — Software for formatting the drive for use with a Mac.
- **Partitioning** — Does the drive come with software that lets you partition a disc into separate volumes?
- **Backup** — Does the drive come with software that lets you copy files to other media for safekeeping?
- **Password protection** — Does the drive come with software that prevents others from accessing data unless they have a password?
- **Data encryption** — Does the drive come with a method of scrambling disc contents to prevent others from accessing data unless they have the correct password?
- **File recovery** — Does the drive come with a utility for rescuing deleted or damaged files?
- **Disk optimization** — Does the drive come with a utility for reorganizing its contents into contiguous blocks to improve performance?
- **FCC certification** — Was the vendor able to provide a verifiable FCC Grant of Certification?
Color documents were always of supreme importance to the people at this world-famous movie and publishing company. In fact, they spent thousands per month on outside color copying services. They wanted their own machine but no one had put together the kind of performance and support they needed. Then Tammy Johnson and the Xerox team introduced them to the Xerox 5775 Digital Color Copier.

They were all impressed by the color quality and speed of the Xerox 5775. And the numbers people were especially attracted to the low costs per copy and high reliability figures. Then the creative people got their hands on it.

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The Document Company
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The PMO-650 features the latest advancements in optical technology. Pinnacle's R&D center, located in Colorado Springs, CO, is one of the most advanced optical research and development facilities in the country. The Pinnacle R&D Center is now the leader in optical drive performance and innovation.
The PMO-650 is faster than a Seagate® ST4350N magnetic hard drive and five times faster than Sony's® SMO-E501 optical drive. With speeds faster than most hard drives, the PMO-650's applications are endless. It can replace existing hard drives for general data storage or can be used for vertical applications such as digital audio, digital video or multimedia. The PMO-650 is the ultimate storage system. It's more than a hard drive. It's optical.

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Anyone who has ever needed to restore years of financials for an audit and had to fumble desperately with corrupted tape under the nerve-wracking gaze of an IRS agent can appreciate the importance of data integrity and the simplicity of optical storage. An optical cartridge provides far greater data security than a magnetic medium such as tape does, and optical drives are much easier to use than are tape drives, which have the additional disadvantage of not being desktop-mountable.

Unfortunately, magneto-optical (MO) mechanisms have historically been hobbled by slow performance and high costs: When we last took a look at 5.25-inch optical mechanisms (see “Maximum Movable Megabytes: Erasable Optical Drives,” November ’90, page 102), they weren’t cost-effective until storage needs exceeded 650 megabytes. But thanks to falling prices for 3.5-inch optical drives, prices of 5.25-inch optical drives are also coming down — and performance is improving.

What this means for network administrators; production managers; and others charged with storing, retrieving, and transporting huge files or large quantities of files is that high-performance 5.25-inch optical drives are no longer just an exotic alternative but are actually a practical storage solution at a reasonable price: Drives that cost around $5,000 two years ago are now available for less than $3,000.

For this report, MacUser Labs tested three leading 5.25-inch optical mechanisms — the Maxoptix Tahiti II, the Ricoh Hyperspace, and the Sony E501. We designed our test suite around four real-world applications that exercise the various components that influence a mechanism’s speed (see Figure 1).

Keep in mind as you read this report that these mechanisms are not stand-alone products: They are packaged by drive vendors and come with various levels of service, warranty, and other extras. Pick the mechanism you like, choose the vendor that bundles the right mix of features to best meet your needs, and then shop for the best price (see the directory at the end of this Buyer’s Guide). At press time, we found drives based on these mechanisms in the $2,500-to-$4,000 price range — for example, a Sony E501-based drive for $2,895, a Ricoh Hyperspace-based drive for $2,999, and a Maxoptix Tahiti II-based drive for $3,699.

### Mechanism Features

All three mechanisms use MO technology to read data from and write it to ISO-standard 650-megabyte optical-disc cartridges. (See the “How It Works: Magneto-Optical Drives” sidebar in “Pocket Opticals: 3.5-Inch Magneto-Optical Drives” in this Buyer’s Guide.) Thus, you can swap cartridges freely among all three mechanisms. The mechanisms read only one 325-megabyte side at a time, so you must remove, flip, and reinsert a cartridge to access data on the other side.

In addition to the standard format, the Maxoptix Tahiti II reads from and writes to its own proprietary 1-gigabyte optical cartridges, using the ZCAV (zoned constant angular velocity) formatting scheme. Similar to zone-bit recording on magnetic mechanisms, ZCAV formatting enables greater capacity by packing an increasing number of sectors per track on
5.25-Inch Magneto-Optical Mechanisms

Figure 1: Performance of 5.25-Inch Magneto-Optical Mechanisms

<table>
<thead>
<tr>
<th>Overall Performance</th>
<th>4th Dimension Sort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxoptix Tahiti II (1-gigabyte mode)</td>
<td>Better</td>
</tr>
<tr>
<td>Ricoh Hyperspace</td>
<td></td>
</tr>
<tr>
<td>Maxoptix Tahiti II (650-megabyte mode)</td>
<td></td>
</tr>
<tr>
<td>Sony E501</td>
<td></td>
</tr>
</tbody>
</table>

Performance relative to that of a Quantum LPS 80

**Figure 1**: Optical cartridges are one of the most fail-safe storage solutions available, but the mechanisms that use them are slower than most hard-disk mechanisms. We tested three leading mechanisms, using four real-world applications, because different applications move data in different-sized pieces and involve different aspects of a mechanism's operation — for example, a database program such as 4th Dimension uses a drive differently from the way an image-manipulation program such as Photoshop does.

**Overall Performance**

We compared all our test results with those of a Quantum LPS 80 mechanism. The Maxoptix Tahiti II in 1-gigabyte mode was the fastest of the 5.25-inch optical mechanisms, followed closely by the Ricoh Hyperspace and the Maxoptix Tahiti II in 650-megabyte mode. The Sony E501, with its slow rotational speed and small cache, brought up the rear. Unfortunately, cartridges you use with the Maxoptix Tahiti II in 1-gigabyte mode won't work with the other mechanisms. In 650-megabyte mode, however, the Maxoptix Tahiti II is completely compatible with all ISO-standard mechanisms.

**4th Dimension Sort**

Sorting in 4th Dimension taxes a mechanism's access speed — how fast the head can find and get data from the disc. The Ricoh Hyperspace was the fastest, edging out the Maxoptix Tahiti II in 1-gigabyte mode. The Ricoh Hyperspace has the fastest rotational speed of all the mechanisms, which reduces access time by bringing the correct sector under the head quickly, and its 480K cache holds more data at the ready once it gets there. Despite its slower rotational speed, the Maxoptix Tahiti II in 1-gigabyte mode achieves relatively fast access, because it packs a large number of sectors per track.

**Performance Issues**

Many factors besides rotational speed influence a mechanism's overall speed. Historically, MO mechanisms have been slow, because writing is a three-pass operation: a section of the disc is first erased, then written to, and then read from to verify that the write was successful (write with verify). Skipping the verify pass can improve speed by about a third. The Maxoptix Tahiti II and the Sony E501 write without verify by default, although all three mechanisms can be configured through jumper settings or FWB's Hard Disk ToolKit to write without verify.

Disabling the write-with-verify feature provides the single largest performance gain: We tested all three mechanisms with write with verify on and with it off and found all three to be about 30 percent faster when write with verify was disabled. However, if you’ll be using the optical mechanism for backing up or doing long-term archiving, leave write with verify on, because data integrity is more important than speed in this situation. With write with verify off, you have no way of telling if the write was unsuccessful until it’s too late — when an auditor’s breathing down your neck, for example.

Another factor that improves performance is caching — the Maxoptix Tahiti II has a 128K read cache, the Ricoh Hyperspace has a 480K read/write cache, and the Sony E501 has a 64K read cache. Unfortunately, the Ricoh Hyperspace’s write cache is not turned on by default, and the mechanism doesn’t yet have a jumper for turning it on: If you want to engage the Ricoh Hyperspace’s write cache, you must use an application such as Hard Disk ToolKit to do so. Unfortunately, changes made with Hard Disk ToolKit on removable-media mechanisms are temporary: You must turn the write cache on each time you reboot your Mac or insert a cartridge.

successive tracks toward the outer edge of the disc. ZCAV formatting also provides higher transfer rates than does ISO-standard formatting by allowing more sectors to pass under the mechanism’s head with each revolution of the cartridge disc. So although the Maxoptix Tahiti II spins discs at a middle-of-the-road 2,200 rpm, when it’s using ZCAV-formatted cartridges, it’s faster than either the 3,600-rpm Ricoh Hyperspace or the 2,400-rpm Sony E501.

But reading older media on these newer mechanisms may be a problem. Fortunately, the Ricoh Hyperspace offers backward compatibility with earlier cartridges by spinning at 1,800 rpm if need be and at 3,600 rpm when possible. When a cartridge is inserted into the mechanism, the Ricoh Hyperspace compares it with a qualification list in read-only memory; only if the cartridge meets the criteria will the mechanism read and write at the higher speed.
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5.25-Inch Magneto-Optical Mechanisms

Figure 1: Performance of 5.25-Inch Magneto-Optical Mechanisms, continued

DiskTop Copy:
DiskTop copies data by passing it in large chunks, each usually greater than the size of the mechanism's cache, so using it for copying tests a mechanism's sustained throughput. The Maxoptix Tahiti II in 1-gigabyte mode was the fastest of the 5.25-inch optical mechanisms. Once again, even though the Maxoptix Tahiti II's rotational speed is less than that of the Ricoh Hyperspace, more data can pass under the head in the same amount of time, because more sectors are packed into each track. The Sony E501 was faster than the Maxoptix Tahiti II in 650-megabyte mode, because it spins 200 rpm faster.

Finder Duplicate:
In addition to being a common operation, duplicating files in the MacFinder provides some measure of a mechanism's seek capability: Because the Finder moves data in small pieces, the mechanism must read from source sectors and write to destination sectors of the disc in rapid succession, exercising the head's actuator—the mechanical part that moves the head from track to track on the disc—and the mechanism's cache. The Ricoh Hyperspace was the fastest of the 5.25-inch optical mechanisms, slightly surpassing the Maxoptix Tahiti II in 1-gigabyte mode. The Sony E501, with its slower rotational speed and relatively small buffer, was last.

Photoshop Open, Rotate, and Save:
Because it uses the disc for virtual memory, Photoshop exercises all aspects of mechanism operation. We opened, rotated, and saved a 5.4-megabyte image in Photoshop. In all three tests, the Maxoptix Tahiti II in 1-gigabyte mode was the fastest, followed by the Ricoh Hyperspace, then the Maxoptix Tahiti II in 650-megabyte mode, and finally the Sony E501. The 1-gigabyte Tahiti II was much faster than the rest in the open and rotate tests, and the Sony E501 was much slower than the rest in the save test.

The Bottom Line
If you want an optical drive for storing and transporting large files—and high performance and interchangeability are top priorities—you have two good options: A drive based on the Maxoptix Tahiti II offers the highest performance and capacity when the mechanism is operating in its proprietary 1-gigabyte mode and full interchangeability in its 650-megabyte mode. But our first pick is a drive based on the Ricoh Hyperspace, which offers near-Tahiti II performance and costs only a few dollars more than a drive based on the Sony E501.

For those who want an optical drive for backup purposes only, data security and low price are priorities. Although it was the slowest of the three mechanisms we tested, the Sony E501 has a rock-bottom price, which makes drives that use it your best pick for safe, inexpensive desktop-mountable backup.

—Mark Frost and the MacUser Labs staff

Table 1: Features

<table>
<thead>
<tr>
<th></th>
<th>Maxoptix Tahiti II</th>
<th>Ricoh Hyperspace</th>
<th>Sony E501</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pros</td>
<td>High capacity and high speed in 1-gigabyte mode.</td>
<td>Fast. ISO standard.</td>
<td>Least expensive.</td>
</tr>
<tr>
<td>Capacity</td>
<td>650 MB, 1 GB</td>
<td>650 MB</td>
<td>650 MB</td>
</tr>
<tr>
<td>Format</td>
<td>ISO, ZCAV</td>
<td>ISO</td>
<td>ISO</td>
</tr>
<tr>
<td>Rotational speed</td>
<td>2,200 rpm</td>
<td>3,600 rpm</td>
<td>2,400 rpm</td>
</tr>
<tr>
<td>Cache size</td>
<td>128K</td>
<td>480K</td>
<td>64K</td>
</tr>
<tr>
<td>Jumper-settable</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
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<tr>
<td>Write-with-verify default</td>
<td>no</td>
<td>yes</td>
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<tr>
<td>Jumper-settable</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>
If you're getting too much attention, MacTools*2.0 can help. It protects and repairs data automatically, so you don't have to.

INTEGRATED VIRUS PROTECTION, BACKUP AND DATA RECOVERY.

To make sure that today's minor disk problems don't turn into tomorrow's disasters, MacTools is the only data protection package to offer scheduled disk analysis and repair.

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Our newest optical drive, the 3.5” LF-3000/LF-3004 erasable makes big storage a small task indeed: Our 1 gigabyte erasable opticals are the answer for overburdened file servers and Desktop Publishing applications. Our WORM drives are the perfect answer for mass storage where permanence and audit trails are required. And our jukebox options give larger networks 50 gigabytes of room between changes. Of course, every Panasonic® optical storage product is equally happy in DOS, OS/2, Macintosh, UNIX* and other environments.

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3.5-Inch Gigabyte

Hard-Disk Mechanisms

There’s no such thing as too much room on a hard disk, especially for network file services or work involving 24-bit-color graphics. For such applications, a gigabyte hard drive is far from overkill. Until recently, though, gaining the advantage of that much storage forced you to spend at least $4,000.

Earlier this year, a handful of manufacturers of hard-disk mechanisms, some of which are newcomers to the hard-disk-OEM world — IBM and Digital, for example — introduced several 3.5-inch gigabyte hard-disk mechanisms. Thanks to its small size and minimal power requirements, a 3.5-inch gigabyte mechanism can store more than one billion bytes of data in the same amount of space as an old Quantum 80-megabyte mechanism. The small, sleek 3.5-inch mechanisms the Digital DSP3085 and DSP3105, Hewlett-Packard C2247, IBM 0663-H12, Micropolis 2112, and Toshiba MK-438FB. We ran each mechanism from the Digital DSP3085’s 852 megabytes to the IBM 0663-H12’s 1.05 gigabytes. All support the Fast-SCSI-2 specification and are capable of sustained data-transfer rates as high as 10 megabytes per second (see “Gigadrives: The 1,000-Megabyte Solution,” July ‘91, page 140). Pick the mechanism you like, choose the vendor that bundles the right mix of other features to best meet your needs, and then shop for the best price (see the directory at the end of this Buyer’s Guide).

Mechanism Features

The six 3.5-inch mechanisms we looked at each hold around a gigabyte of data. Formatted capacities range from the Digital DSP3085’s 852 megabytes to the IBM 0663-H12’s 1.05 gigabytes. All support the Fast-SCSI-2 specification and are capable of sustained data-transfer rates as high as 10 megabytes per second (see “Supercharging the SCSI Bus: SCSI-2 Cards,” elsewhere in this Buyer’s Guide).

Hewlett-Packard sets a high-quality standard with a five-year manufacturer’s warranty; Digital offers a two-year warranty, with one-year extensions available (which will no doubt bump up the cost of the drive). The other mechanisms come with a one-year manufacturer’s warranty, which really isn’t long enough for such a critical — and costly — piece of hardware. Hopefully, vendors will...
3.5-Inch Gigabyte Hard-Disk Mechanisms

Figure 1: Performance of 3.5-Inch Gigabyte Hard-Disk Mechanisms

Overall Performance

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Performance</th>
<th>Better</th>
<th>4,000 rpm.</th>
<th>5,400 rpm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital DSP3105</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital DSP3085</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hewlett-Packard C2247</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micropolis 2112</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IBM 0663-H12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toshiba MK-438FB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Performance relative to that of a Seagate Elite-1

Table 1: Features

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Digital DSP3085</th>
<th>Digital DSP3105</th>
<th>Hewlett-Packard C2247</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cons</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity</td>
<td>852 MB</td>
<td>1.05 GB</td>
<td>1.05 GB</td>
</tr>
<tr>
<td>Recording method</td>
<td>nonbanded</td>
<td>nonbanded</td>
<td>zone-bit</td>
</tr>
<tr>
<td>Rotational speed</td>
<td>5,400 rpm</td>
<td>5,400 rpm</td>
<td>5,400 rpm</td>
</tr>
<tr>
<td>Cache size</td>
<td>512K</td>
<td>512K</td>
<td>256K</td>
</tr>
<tr>
<td>Sectors per track</td>
<td>85</td>
<td>85</td>
<td>variable</td>
</tr>
</tbody>
</table>

Figure 1: The amount of data that gets written or read in a given time — throughput — depends primarily on a mechanism's rotational speed and the number of sectors per track. Other factors that involve the simple mechanics of finding data on the platters also affect throughput. Some manufacturers rely on high rotational speeds to enhance performance, some rely on large caches, and others do both.

Overall Performance:

We connected each mechanism to a Mac Ici and ran it through the same set of tests used for the other lab reports in this month's Buyer's Guide. We sorted a 4th Dimension database to gauge access speed; copied a 13-megabyte file, using DiskTop, to examine sustained throughput; duplicated a large file in the Finder to see how the mechanism's speed might be helped by its cache; and finally, opened, rotated, and saved an image in Photoshop to exercise all aspects of mechanism operation as well as to see whether faster mechanisms improved performance with this disk-bound application. We normalized all results to those of a Seagate Elite-1, a 5.25-inch gigabyte hard-disk mechanism. Overall, the Digital mechanisms led the pack, with the DSP3105 just edging out the DSP3085. Next came the Hewlett-Packard C2247, followed by the Micropolis 2112 and the IBM 0663-H12. The Toshiba MK-438FB was last.

4th Dimension Sort:

To test access time, we sorted a 2,000-record 4th Dimension database to see how quickly the heads found and retrieved data from the disk. The Digital DSP3105 and DSP3085 were the fastest. The Hewlett-Packard C2247 came next, followed by the Micropolis 2112 and the slightly-slower-spinning IBM 0663-H12. Predictably, the Toshiba MK-438FB, which has the slowest rotational speed, was last.

Performance Issues

Hard-disk mechanisms contain disks, or platters, that store data in concentric circles, called tracks. The platters rotate at a steady speed while an actuator moves heads from track to track, reading data from and writing it to the platters. The time it takes the actuator to position the heads over the right track (the seek time) and the time it takes for the correct sector to rotate under the heads both affect the access time. Throughput — how much data actually gets written or read in a given period of time — is determined primarily by a combination of a mechanism's rotational speed and the number of sectors per track. For example, the Hewlett-Packard C2247, the Micropolis 2112, and the Toshiba MK-438FB all use the zone-bit recording method, which lays down a variable number of sectors per track — as many as 85 sectors on the outermost track and almost half that number on the innermost track — whereas the Digital DSP3085 and DSP3105 have a consistent number of sectors per track.

Table 1: Features

Supplement manufacturers' warranties or provide data-recovery services, should the need arise. (As we went to press, IBM announced another new 3.5-inch gigabyte mechanism, the IBM 0663-E15, which will have a five-year warranty.)

Performance Issues

Hard-disk mechanisms contain disks, or platters, that store data in concentric circles, called tracks. The platters rotate at a steady speed while an actuator moves heads from track to track, reading data from and writing it to the platters. The time it takes the actuator to position the heads over the right track (the seek time) and the time it takes for the correct sector to rotate under the heads both affect the access time. Throughput — how much data actually gets written or read in a given period of time — is determined primarily by a combination of a mechanism's rotational speed and the number of sectors per track. For example, the Hewlett-Packard C2247, the Micropolis 2112, and the Toshiba MK-438FB all use the zone-bit recording method, which lays down a variable number of sectors per track — as many as 85 sectors on the outermost track and almost half that number on the innermost track — whereas the Digital DSP3085 and DSP3105 have a consistent number of sectors per track.

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<th>7</th>
<th>Photo shoot</th>
<th>Focus group</th>
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<td>8</td>
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<td>NY Ad Club dinner</td>
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<td>Flight to Chicago</td>
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<td>Breakfast w/Barry</td>
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<td>Lunch</td>
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<td>22</td>
<td>Trade show w/agency</td>
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<td>Trade Show</td>
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<td>Agency review</td>
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<td>CLIC dinner</td>
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access times — the heads travel shorter distances to reach the correct track. But rotational speed — how fast a mechanism’s platters rotate — affects almost all aspects of performance. High rotational speed can help reduce access time by bringing the correct block under the heads quickly. High rotational speed also increases sustained throughput by passing more blocks under the head in a given time. The Digital DSP3085 and DSP3105, the Hewlett-Packard C2247, and the Micropolis 2112 spin their disks the fastest, at 5,400 rpm. The IBM 0663-H12 has a rotational speed of 4,300 rpm, and the Toshiba MK-438FB has the slowest rotational speed of the lot, 3,600 rpm.

Performance can be boosted with the help of a cache. The Digital DSP3105 and DSP3085 and the Micropolis 2112 have 512K read/write caches, the Hewlett-Packard C2247 has a 256K read/write cache, and the IBM 0663-H12 and the Toshiba MK-438FB each have a 256K read cache. The Digital DSP3105 and DSP3085, with the same rotational speed but a smaller (256K) cache, came in third. The Micropolis 2112’s inefficient cache hobbled this mechanism in this test, leaving it in fourth place.

Table 1: Features, continued

<table>
<thead>
<tr>
<th>IBM</th>
<th>Micropolis</th>
<th>Toshiba MK-438FB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cons</td>
<td>Slow.</td>
<td>Speed decreases as disks fill.</td>
</tr>
<tr>
<td>Capacity</td>
<td>1.2 GB</td>
<td>1.06 GB.</td>
</tr>
<tr>
<td>Recording method</td>
<td>nonbanded</td>
<td>zone-bit</td>
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<tr>
<td>Rotational speed</td>
<td>4,300 rpm</td>
<td>5,400 rpm</td>
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<tr>
<td>Cache size</td>
<td>256K</td>
<td>512K</td>
</tr>
<tr>
<td>Sectors per track</td>
<td>66</td>
<td>variable</td>
</tr>
</tbody>
</table>

The Bottom Line

In our tests, the Digital mechanisms led the pack, with the 1.05-gigabyte DSP3105 just ahead of the 852-megabyte DSP3085. Next was the Hewlett-Packard C2247, followed by the Micropolis 2112. The IBM 0663-H12 and the Toshiba MK-438FB mechanisms were considerably slower overall. Nonetheless, 3.5-inch gigabyte mechanisms hold the promise of high speed and large capacity in a sleek form. At press time, more 3.5-inch mechanisms were being announced or released by several manufacturers, including Fujitsu, Hewlett-Packard, Hitachi, IBM, Maxtor, and Quantum. We’ll keep you posted.

— Mark Frost and the MacUser Labs staff
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Supercharging the SCSI Bus: SCSI-2 Cards

Give your Mac a faster data path with one of these four SCSI-2 cards.

BY KELLI WISETH AND THE MACUSER LABS STAFF

You'll notice an underlying theme for this month's lab reports — speed. All the drives and mechanisms discussed in this Buyer's Guide, from historically slow magneto-optical drives to gigabyte hard-disk mechanisms, access and transfer data faster than ever. Manufacturers of hard-disk mechanisms especially have implemented a variety of performance-enhancing techniques, including smarter caches and more-efficient formatting schemes, in order to squeeze data into and out of their drives as quickly as possible (see "3.5-Inch Gigabyte Hard-Disk Mechanisms," elsewhere in this Buyer's Guide).

So how come you still find time to brew a pot of coffee while a 50-megabyte Photoshop image is opening on your Mac IIx, despite its newly attached ultra-high-speed drive? Because although hard-disk-drive data-transfer speeds — the rate at which data is written to and read from the storage medium — have improved over the years, your Mac's SCSI (Small Computer System Interface) bus still moves data from a drive into your Mac at the same tired rate it always did. On most Macs, that's about 2 megabytes per second.

The Mac's built-in SCSI controller chip, which handles most of the transfer chores between a Mac and a hard drive, is based on the original ANSI-standard SCSI specification, which provides for a maximum data-transfer rate of about 5 megabytes per second (see the "SCSI Evolution" sidebar). However, Apple's implementation of SCSI is slightly different from the original SCSI standard. Apple adopted only a subset of the full industry-standard specification, and unfortunately, its deviations from the standard impose a maximum speed limit on the Mac's SCSI bus. This maximum rate can range from 1.5 to 3.2 megabytes per second (see Table 1). Most hard
**SCSI-2 Cards**

**SCSI Evolution**

<table>
<thead>
<tr>
<th>SCSI-1</th>
<th>SCSI-2</th>
<th>SCSI-2 (Fast)</th>
<th>SCSI-2 (Wide)</th>
<th>SCSI-2 (Fast and Wide)</th>
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<tr>
<td></td>
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<td>Currently</td>
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<td>Available</td>
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<tr>
<td>available</td>
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<tr>
<td>8 bits</td>
<td>16 bits</td>
<td>32 bits</td>
<td>16 bits</td>
<td></td>
</tr>
<tr>
<td>10 MBps</td>
<td>20 MBps</td>
<td>30 MBps</td>
<td>40 MBps</td>
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</tbody>
</table>

Figure A: Shown here are SCSI-1 and SCSI-2 transfer rates as specified by ANSI.

The original SCSI (Small Computer System Interface) specification, now known as SCSI-1, was approved by ANSI (American National Standards Institute) in 1986 and provides guidelines for computer- and peripheral communications.

The SCSI specification covers many things, including how fast data transfers between a device and a host computer can occur. The SCSI standard includes a command set that a host, such as a Mac, can use to communicate with a hard drive or other devices on the SCSI bus. Nonetheless, the original standard provided a lot of latitude for vendor-unique commands that needed to be handled by proprietary and sometimes incompatible device drivers—thus somewhat defeating the original intent of the SCSI specification.

The original command set, known as the CCS (Common Command Set), has now been codified and subsumed by the recently approved SCSI-2 specification. In addition to mandating that the de facto CCS be used by all SCSI-2 devices, the standard also provides specifications for faster data-transfer rates through the Fast and Wide options. SCSI-1 and SCSI-2 each transfer data in parallel, 8 bits at a time, and can achieve maximum transfer rates of 5 megabytes per second. The optional Fast-SCSI-2 mode, however, can transfer data at as much as 10 megabytes per second. Wide SCSI-2 uses a wider data path—16 bits compared with the normal 8 bits—to achieve the same 10 megabytes per second in the same amount of time. A third option, which combines both the Fast and Wide options, can theoretically achieve transfer speeds as high as 20 megabytes per second. Making the data path 32 bits wide would theoretically provide transfer rates of a whopping 40 megabytes per second, but issues involving multiple caching schemes make this a distant-future improvement for the Mac.

drives available today conform to a newer version of the SCSI standard, SCSI-2, and they can transfer data faster than the Mac's built-in SCSI bus can handle. For example, the Seagate Elite-1 mechanism we used in our tests can sustain a data-transfer rate of 3.3 megabytes per second. What your Mac needs is a faster data path that can keep up with a fast hard drive.

For this report, we tested four SCSI-2 cards in the Mac IIx. The ATTO SiliconExpress II, the MicroNet NuPORT-II, and the PLI QuickSCSI cards are NuBus cards designed for NuBus Macs; the Storage Dimensions Data Cannon PDS/FX card is designed specifically for the Mac IIx's PDS (processor-direct slot).

Some vendors have tried unsuccessfully to boost the speed of the Mac's existing SCSI bus (see "SCSI Accelerators," March '90, page 175). But the SCSI cards in this report leave your existing built-in SCSI bus alone and add a second, faster SCSI bus that works through your Mac's NuBus or PDS: The built-in SCSI bus remains intact to handle slow-performing peripherals such as scanners and tape drives (see the "How It Works: SCSI-2 Cards" sidebar).

The MicroNet NuPORT-II and the Storage Dimensions Data Cannon PDS/FX cards are sold with high-speed large-capacity hard drives from the respective vendor's product line; the ATTO SiliconExpress II and the PLI QuickSCSI cards are sold independently of any drive, so you can match one of these to a fast drive from any number of vendors. We ran the same suite of real-world benchmark tests used in this month's other lab reports to isolate some of the variables that affect overall performance.

**Performance Issues**

In simple terms, all the components that make up the Mac's data pipeline, beginning with the hard drive, through the SCSI bus, to the Mac's CPU, handle data transfer at different speeds. Nonetheless, the net result of all these variables is easy to figure: Nothing can travel faster than the slowest device in the pipeline lets it (see Figure 1). For example, NuBus speed is about 4.4 megabytes per second, so regardless of how fast a hard-disk drive can find data and read it from the disk, if it travels on the NuBus, it can't travel faster than 4.4 megabytes per second at any time after that. Likewise, if a relatively slow hard-drive mechanism, such as the Quantum LPS 80, transfers data into a 5-megabyte-per-second-capable pipeline at 1.25 megabytes per second, 1.25 megabytes per second is as fast as the data is going to get to the Mac.

In addition, hard-drive speed—the speed at which data enters the pipeline—ultimately depends on a combination of factors, including a drive's access time, burst rate, and sustained data-transfer rate. The access time is simply how long it takes the drive to find data on the disk. Data is then transferred into the SCSI bus at the sustained data-transfer rate. Data is
**How It Works: SCSI-2 Cards**

**NuBus SCSI-2 card**
A NuBus SCSI-2 card contains a SCSI-2 controller chip, an external SCSI-2 port, and a connector for an internal drive. Data is sent to the Mac's CPU from the SCSI-2 controller chip on the NuBus card.

**PDS SCSI-2 card**
A PDS SCSI-2 card contains a SCSI-2 controller chip and a connector for an internal drive. The SCSI-2 port is connected via a ribbon cable through one of the NuBus openings at the back of the Mac. Data is sent directly to RAM from the PDS card.

**Mac's built-in SCSI controller chip**
The speed of the built-in SCSI controller chip depends on your Mac model. The Quadra's built-in SCSI controller chip is the fastest of all the Mac controller chips, operating at 3.2 megabytes per second.

**RAM**
RAM receives data from the Mac's CPU if you're using the built-in SCSI controller chip or a SCSI-2 controller chip on a NuBus card. If a PDS SCSI-2 card is installed, RAM receives data directly from the PDS card.

**CPU**
The CPU sends a request for data either to the Mac's built-in SCSI controller chip or the SCSI-2 controller chip on a NuBus card. If a PDS SCSI-2 card is installed, the request goes directly to the SCSI-2 controller chip on the PDS card.

SCSI is handled by the SCSI controller chip and by the Mac operating system through the SCSI Manager. All pre-Quadra Macs use the NCR 5380 or the 53C80 SCSI controller chip. The Quadras sport the more powerful NCR 53C90 SCSI chip, but they are still outpaced by the fastest SCSI drives available today.

Unfortunately, each NCR controller chip has a top speed of about 2 megabytes per second—much slower than that of many of the speedier hard drives now on the market. You can get around the Mac's slow built-in SCSI controller chip by installing a SCSI-2 NuBus or PDS card. Data is transferred from the drive to the SCSI-2 controller chip on the card and then moved to your Mac's memory. When matched with an ultra-high-speed drive, such as Newer Technology's Dart-II drive, a PDS card is faster than a NuBus card, because it works directly with the Mac's RAM rather than going through the Mac's CPU.
On the Horizon

The release of NCR's latest SCSI controller chip, the 53C720, has produced a flood of new SCSI-2 cards that implement the 16-bit Fast and Wide options of SCSI-2.

DayStar Digital's SCSI PowerCard is a plug-and-play product with installation software written into its programmable ROM chips, thus reducing floppy-disk software to a control panel. The SCSI PowerCard for NuBus Macintoshes costs $1,000; current PowerCard owners can upgrade without charge. DayStar Digital, 5558 Atlanta Highway, Flowery Branch, GA 30542; 404-967-2077.

FWB's new JackHammer SCSI card has a built-in 128K RAM buffer. Generally, a drive sends only as much data as your Mac can handle. When the Mac is ready for more, it signals the drive, which sends the next chunk of data. With the JackHammer, the drive sends a continuous stream of data to the buffer on the card. The buffer then sends the Mac as much data as it can handle while the drive continues its operation uninterrupted, so the drive transfers data faster. The JackHammer, designed for use with any hard drive, costs $999; it costs $799 if purchased with an FWB drive. FWB, Inc., 2040 Polk Street, San Francisco, CA 94109; 415-474-8055.

Loviél has announced two SCSI-2 PDS cards based on the 53C720: the FXSCSI20, for the Mac Ilfx and the QuadSCSI20, for the Quadras. Although PDS cards are unable to reach their publicized data-transfer speeds of 20 megabytes per second, they do take advantage of the PDS slot, which allows for rates as high as 7 megabytes per second. The FXSCSI20 has a 20-megahertz input/output processor, and the QuadSCSI20 has a 25-megahertz input/output processor. The cards based on the 53C720 are priced at $1,099 each. An earlier version of the FXCSI20, the FXCS10, is also available for the Mac Ilfx. This earlier version uses the 53C710 SCSI-2 chip and costs $999. Loviél Computer Corp., 5174 W. 76th Street, Edina, MN 55439; 612-835-3553.

Storage Dimensions has announced a Data Cannon PDS/Qua-dracard for the Quadras. The card is available only for owners of Storage Dimensions' MacinStor SCSI-2 drives. Software bundled with the new Data Cannon PDS/Qua-dracard supports mirroring, spanning, and data stripping. The card lists for $1,099. Storage Dimensions, 1656 McCarthy Blvd., Milpitas, CA 95035; 408-864-0710. — Roman Victor Loyola

The applications-based approach to our tests was designed to highlight the differences among applications and how they interact with the hard drive. In general, a SCSI-2 card coupled with a fast drive can improve performance by 75 to 250 percent, depending on the application (see Figure 2).

Simple Setup

You don't need to be a systems engineer to install one of these SCSI cards in your Mac, but you do need to use the same care as would you in installing any other NuBus or PDS card. Shut down your Mac and all peripherals, and be sure to ground yourself by touching something metal, such as the power supply, before installing the card.

The NuBus cards fit snugly into any available NuBus slots in your Macintosh. The Storage Dimensions Data Cannon PDS/FX card, on the other hand, is designed to work only with the Mac Ilfx's PDS. And you nevertheless lose the use of one of your Macintosh Ilfx's NuBus slots, because the PDS in the Ilfx is directly in line with the rightmost NuBus slot and the SCSI connector protrudes

<table>
<thead>
<tr>
<th>Table 1: Should You Buy a SCSI-2 Card?</th>
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<tr>
<td>Built-in SCSI</td>
</tr>
<tr>
<td>transfer rate</td>
</tr>
<tr>
<td>1.5 MB/sec (Mac II)</td>
</tr>
<tr>
<td>2.0 MB/sec (Mac iii)</td>
</tr>
<tr>
<td>1.5 MB/sec (Mac Ilfx)</td>
</tr>
<tr>
<td>3.2 MB/sec (Mac Quadra)</td>
</tr>
</tbody>
</table>

Table 1: There's no point in getting a SCSI card unless your hard drive is faster than your Mac's built-in SCSI bus. Here are some example transfer rates, from the lowest to the highest possible, of various drives and of the Macs.
The trouble with most 24-bit color products is that they do the job exactly as their name implies, bit by bit by bit by bit.

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through the back of the Macintosh.

You can connect your Mac’s internal hard drive to the SCSI-2 card rather than to the built-in bus, by using the existing 50-pin SCSI ribbon cable. Depending both on the number of internal and external hard drives that will share the SCSI bus and the type of Mac you have, you may or may not have to futz with the termination of the card, the internal hard drive, or an external hard drive. All the cards’ manuals discuss the details of termination clearly and in depth.

When you’re certain that your new SCSI bus and all devices, internal as well as external, have distinct SCSI-ID numbers and are properly terminated, you can install any necessary system extensions or control-panel software, although you generally don’t need to.

### Figure 1: SCSI-1 Versus SCSI-2

![Graph showing speed comparison between SCSI-1 and SCSI-2 cards](image)

Figure 1: Just as any system is only as strong as the weakest link in the chain, data transfer between a Mac and a hard-disk drive can occur only as fast as the slowest device in the pipeline operates. The Mac IIfx’s built-in SCSI bus can transfer data at about 1.5 megabytes per second, but the Seagate Elite-1 transfers data at about 3.3 megabytes per second — the Mac’s built-in SCSI can’t keep pace. Conversely, the increased throughput of the SCSI-2-based PLI QuickSCSI card is lost when the card is matched with a relatively slow drive mechanism, such as the 1.25-megabyte-per-second Quantum LPS 80, the internal mechanism shipped in many Mac models. Results are compared with those of a Mac IIfx with a Quantum LPS 80.

### Figure 2: Speed of SCSI-2 Cards

![Table showing speed comparison between different SCSI-2 cards](image)

Figure 2: We ran the same set of benchmark tests as we used for the other lab reports in this Buyer’s Guide: We sorted a 2,000-record 4th Dimension database; copied a 13-megabyte file, using DiskTop; duplicated a 13-megabyte file with the Finder; and opened, rotated, and saved a 5.4-megabyte Photoshop image. Our test platform was a Mac IIfx with a Seagate Elite-1 drive mechanism. We compared all our results with those of a Mac IIfx with a Quantum LPS 80.

**Overall Speed:**
Different applications interact with the hard-disk drive in different ways: Some constantly move small-sized blocks of data between the Mac and the drive, whereas others work with large-sized blocks or access the drive less frequently. Thus you’ll gain greater benefit from a SCSI-2 card only when you use certain applications.

**4th Dimension Sort:**
Sorting a 4th Dimension database is a disk-bound task that taxes a drive’s access speed more than anything else. As the records in the database are being reorganized, the heads skip all around the drive, reading and writing data. Because that data doesn’t travel back across the SCSI bus to your Mac, a faster SCSI port has only a negligible effect on performance.

**DiskTop Copy:**
DiskTop copies data by moving large chunks of data through the SCSI port, thus taking advantage of high sustained data-transfer rates. In this test, the SCSI-2 card kept pace with the sustained data-
need to install any software to use the cards. The ATTO SiliconExpress II card contains its driver — the software that enables the Mac and any attached peripherals to communicate over the bus — in ROM on the card, and the MicroNet NuPORT-II card loads its drivers into memory from ROM on the card. The Storage Dimensions Data Cannon PDS/FX card works only with the company’s own MacinStor drives, which are shipped with the appropriate drivers. The PLI QuickSCSI card requires that you install the QuickSCSI system extension for the card to work.

**Of Formatters and Features**

Both MicroNet and Storage Dimensions preformat the drives shipped with their respective cards, but you can use the formatting software included with any of these cards to reformat drives or make use of additional features. Fault-tolerant features such as mirroring and cloning provide additional data integrity. Mirroring, for example, maintains a continuous copy of one hard disk on a second hard disk and is an effective continuous-backup strategy that is often used for network file servers. (Of course, you need a second hard drive to use this feature.) Software provided with each of the cards lets you create mirrored pairs of drives.

In addition to mirroring, the MacinStor Installer software that comes with the Storage Dimensions Data Cannon PDS/FX card lets you span multiple hard drives connected to the card — two or more drives become a single logical drive, giving you more continuous storage space. But because the MicroNet NuPORT-II card works only with MicroNet hard drives and the Storage Dimensions Data Cannon PDS/FX card works only with hard drives from Storage Dimensions, you cannot span other drives you may have. The software that ships with the ATTO SiliconExpress II and MicroNet NuPORT-II cards provides a performance-enhancing feature called overlapped seeks, which reduces seek time by combining two hard drives into one logical volume. However, recovering data from a crashed drive that uses this feature is extremely difficult, if not impossible.

Features such as these are often found in third-party software, but these vendor-provided options are designed

<table>
<thead>
<tr>
<th>DiskTop Copy</th>
<th>Finder Duplicate</th>
<th>Photoshop Open, Rotate, and Save</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td><strong>Mac IIx's built-in SCSI</strong></td>
<td><strong>Mac IIx's built-in SCSI</strong></td>
<td><strong>Mac IIx's built-in SCSI</strong></td>
</tr>
<tr>
<td>with a Quantum LPS 80</td>
<td>with a Quantum LPS 80</td>
<td>with a Quantum LPS 80</td>
</tr>
</tbody>
</table>

*Speed relative to that of a Mac IIx's built-in SCSI with a Quantum LPS 80*

Photoshop Open, Rotate, and Save:

Because it uses the hard drive for virtual memory, Photoshop exercises all the components of your storage system. Photoshop not only uses the hard drive for RAM but it also reads and writes data in small-sized blocks and maintains two additional copies of the working image — an undo copy and an original copy. When we opened, rotated, and saved the 5.4-megabyte Photoshop test file, the Mac was juggling at least 16.2-megabytes’ worth of data between its RAM and the hard drive, giving the hard drive, the Mac’s CPU, and the SCSI bus a real workout. Performance with a fast hard-drive mechanism and a SCSI-2 card was in general close to twice as fast as with the built-in SCSI and a slow drive mechanism.
Hard-disk drives have gotten faster and CPUs have gotten leaner and meaner, but the Mac’s built-in SCSI controller chip still limps along at a fairly modest clip. There’s no getting around it, you must go around it: A NuBus- or PDS-based SCSI-2 card can provide your Mac with a second, faster data path that can better keep pace with today’s SCSI-2 hard drives. But remember that your hard drive should be capable of a sustained throughput rate of about 2 megabytes per second to take advantage of a faster SCSI bus.

For those whose drives meet this criterion, the PLI QuickSCSI card ($399 list, $325 street) will stand them in good stead. It’s not only the least expensive card by a long shot but it also gave the best results in our tests.

That’s not to knock the other cards, however. The MicroNet NuPORT-II card ($600 list, $450 street) is also relatively inexpensive and is sold as part of a complete hard-disk storage system. MicroNet’s formatting utility lets you enable overlapped seeks between two drives for improved performance. If you’ve got a MicroNet drive, this is the card you need to get if you want to squeeze out better SCSI performance.

The ATTO SiliconExpress II card ($1,295 direct) and the Storage Dimensions Data Cannon PDS/FX card ($859 list, $550 street) are built for the future, when the Mac will be able to take advantage of multitasking. These bus-master cards also have coprocessors on board, ready to absorb many of the processing tasks that bog down the Mac’s CPU during input/output operations. AppleShare 3.0 is one Mac application that can take advantage of bus-master features today.

Some of the differences among the cards are hardware-based. For example, the more expensive cards — the ATTO SiliconExpress II and the Storage Dimensions Data Cannon PDS/FX cards — are bus-master cards that also contain coprocessors. Many of the input/output chores typically handled by the Mac’s CPU are relegated to these coprocessors for more-efficient handling, much as is the case with a video coprocessor. The Mac’s CPU is then free for other tasks. A bus-master card can send data directly to RAM without routing it through the CPU — but only in a multitasking operating system, such as A/UX, or if an application is written to take advantage of the feature, as is AppleShare 3.0, for example. We expect to see better performance when Apple releases an operating system that can take advantage of this feature of bus-master cards.

### Hop on the Right Bus

The Mac’s SCSI port lets you connect hard drives or other peripherals to your Mac, but the speed of the built-in SCSI controller chip is far slower than that of today’s fast hard drives. If you have a Mac IIfx and a fast hard drive — any drive that outpaces the Mac IIfx’s 1.5-megabyte-per-second SCSI port — you may well benefit from a second, faster NuBus- or PDS-based SCSI bus.

The PLI QuickSCSI is the least expensive card we looked at, and it gave the best performance. Two of the cards — the ATTO SiliconExpress II and the Storage Dimensions Data Cannon PDS/FX — are bus-master cards, which will no doubt show their benefits more when the Mac operating system makes use of multitasking. Such cards can help today, though — for example, when AppleShare 3.0 file-server software is being used in networked environments.

Kelli Wiaeth is a MacUser senior editor.

---

### Table 2 Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>List price</th>
<th>Street price</th>
<th>Slot type</th>
<th>Bus master</th>
<th>Sustained data-transfer rate</th>
<th>Burst rate</th>
<th>Internal SCSI connector</th>
<th>External SCSI connector</th>
<th>Maximum partitions</th>
<th>Overlapped seeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>List price — The manufacturer’s suggested retail price.</td>
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<tr>
<td>Street price — The average price (without options) as charged by a sample of U.S. dealers in February 1992.</td>
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<tr>
<td>Slot type — The type of expansion bus slot, NuBus or PDS, into which the card is designed to fit.</td>
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<tr>
<td>Bus master — Is the card a bus-master card, designed to send data directly to RAM without using the Macintosh’s microprocessor?</td>
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<tr>
<td>SCSI-2 controller chip — The SCSI controller chip used on the SCSI-2 card.</td>
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<tr>
<td>On-board coprocessor — The coprocessor to which the card can offload certain processing tasks.</td>
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<tr>
<td>Sustained data-transfer rate — The rate at which large data blocks are transferred from the drive, in megabytes per second.</td>
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<tr>
<td>Burst rate — The rate at which data is read from the cache, in megabytes per second.</td>
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<tr>
<td>Internal SCSI connector — The type of SCSI port provided on the card for connection to an internal hard drive.</td>
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<tr>
<td>External SCSI connector — The type of SCSI port provided on the card for connection to external hard drives and other supported devices.</td>
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<tr>
<td>Formatting software — The formatting software shipped with the card.</td>
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<tr>
<td>Additional software — Additional utility software, system extensions, or control panels shipped with the card.</td>
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<tr>
<td>Maximum partitions — The maximum number of partitions into which you can format a hard disk, using the formatting software provided.</td>
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<tr>
<td>Password-protected partitions — Can you use the formatting software to password-protect partitions?</td>
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<tr>
<td>Mirroring — Does the formatting software let you write data to two drives automatically?</td>
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<tr>
<td>Cloning/copying — Does the formatting software let you duplicate the contents of one hard disk onto another hard disk in one step?</td>
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<tr>
<td>Spanning — Can the formatting software combine two hard-disk drives into one logical unit?</td>
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<tr>
<td>Overlapped seeks — Does the formatting software provide drivers for searching the contents of two disks simultaneously, thus increasing performance?</td>
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<tr>
<td><strong>Table 2: Features of SCSI-2 Cards</strong></td>
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<tr>
<td><strong>● = yes</strong></td>
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<tr>
<td><strong>○ = no</strong></td>
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<tr>
<td><strong>ATTO</strong></td>
<td><strong>MicroNet</strong></td>
<td><strong>PLI</strong></td>
<td><strong>Storage Dimensions</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>SiliconExpress II</strong></td>
<td><strong>NuPORT-II</strong></td>
<td><strong>QuickSCSI</strong></td>
<td><strong>Data Cannon PDS/FX</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>List price</strong></td>
<td>$1,295</td>
<td>$600</td>
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<tr>
<td><strong>Cons</strong></td>
<td>Most expensive. No toll-free tech support.</td>
<td>No toll-free tech support.</td>
<td>Cannot use the Mac's Startup control panel.</td>
<td>No toll-free tech support.</td>
<td></td>
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<tr>
<td><strong>Hardware features</strong></td>
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</tr>
<tr>
<td><strong>Slot type</strong></td>
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<td>NuBus</td>
<td>NuBus</td>
<td>PDS</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bus master</strong></td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>SCSI-2 controller chip</strong></td>
<td>Emulex 53C90A</td>
<td>53C90</td>
<td>53C710</td>
<td>53C710</td>
<td></td>
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</tr>
<tr>
<td><strong>On-board coprocessor</strong></td>
<td>none</td>
<td>none (on-board DMA)</td>
<td>none</td>
<td>none</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Sustained data-transfer rate</strong></td>
<td>10 MB/sec</td>
<td>4.4 MB/sec</td>
<td>4.4 MB/sec</td>
<td>10 MB/sec</td>
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<tr>
<td>** Burst rate**</td>
<td>10 MB/sec</td>
<td>6 MB/sec</td>
<td>6 MB/sec</td>
<td>10 MB/sec</td>
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<tr>
<td><strong>Internal SCSI connector</strong></td>
<td>50-pin ribbon</td>
<td>50-pin ribbon</td>
<td>50-pin ribbon</td>
<td>50-pin ribbon</td>
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<td><strong>External SCSI connector</strong></td>
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<td>50-pin</td>
<td>25-pin</td>
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<td><strong>Devices supported</strong></td>
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<td><strong>Hard-disk drives</strong></td>
<td>any</td>
<td>MicroNet</td>
<td>any</td>
<td>Storage Dimensions</td>
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<tr>
<td><strong>SyQuest drives</strong></td>
<td>●</td>
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<td><strong>Bernoulli drives</strong></td>
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<td><strong>Tape drives</strong></td>
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<td><strong>Erasable optical drives</strong></td>
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<td><strong>Scanners</strong></td>
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<tr>
<td><strong>Software features</strong></td>
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<tr>
<td><strong>Formatting software</strong></td>
<td>SCSI Director</td>
<td>MicroNet SCSI Utility 5.0</td>
<td>QuickSCSI Formatter</td>
<td>MacinStor Installer 3.1</td>
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<tr>
<td><strong>Additional software</strong></td>
<td>SE express control panel, ExpressMirror</td>
<td>MicroNet QuikMount 1.0</td>
<td>QuickSCSI extension, QuickSCSI Manager</td>
<td>MacinStor control panel</td>
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<tr>
<td><strong>Maximum partitions</strong></td>
<td>unlimited</td>
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<td>6</td>
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<tr>
<td><strong>Password-protected partitions</strong></td>
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<tr>
<td><strong>Mirroring</strong></td>
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<td>●</td>
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<td>●</td>
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<tr>
<td><strong>Cloning/copying</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td><strong>Spanning</strong></td>
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<tr>
<td><strong>Overlapped seeks</strong></td>
<td>●</td>
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<td><strong>Other features</strong></td>
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<td><strong>Warranty</strong></td>
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<td>1 year</td>
<td>5 years</td>
<td>1 year</td>
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<td><strong>Extended warranty</strong></td>
<td>$139/year</td>
<td>$129/year</td>
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<td><strong>Money-back guarantee</strong></td>
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<td>30 days</td>
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<tr>
<td><strong>Toll-free tech support</strong></td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>no</td>
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</table>

*Asynchronous, the SCSI mode used by the Mac.

1Partitions of equal size.

2Requires two hard drives.
What did it take to get the editors at MacWeek and MacUser to agree on the best Macintosh utility product?

Unprecedented performance, compatibility, and value. In this case, a collection of 10 utilities that does for System 7 what products like SUM and Norton do for hard disks—only more so. As MacUser put it, “Now Utilities will make your Macintosh faster, easier, and more fun to use.” For example:

- **StartUp Manager™** provides complete extension management
- **Super Boomerang™** finds files and folders instantly
- **WYSIWYG Menus** groups fonts in their own typefaces
- **NowMenus™** makes the Apple Menu hierarchical
- **AlarmsClock™** displays the time & reminders in the menubar
- **NowSave™** automatically saves files to prevent data loss
- **Screen Locker™** keeps confidential information confidential
- **MultiMaster™** launches applications and files
- **Profiler™** analyzes system configurations
- **DeskPicture™** puts color and B&W pictures on the Desktop

In fact, every utility in the collection is the best of its kind. Every utility in the collection is also designed, tested, and guaranteed to work together—and with anything you may have—even System 6. No wonder MacUser gave it a perfect five mouse rating and called it, “a must-have for experienced users and novices alike.”

What will it take to get the editors at MacWeek and MacUser to agree on the best Macintosh network product?

Perhaps Now Up-to-Date™: the only Macintosh application that keeps your appointments and your associates up-to-date—whether you’re in the office, at home, or on the road.

**Organize Your Appointments** Now Up-to-Date can schedule a meeting to occur at 9:00 AM on the first Tuesday of every month and have it automatically appear on your associates’ calendars. Scheduled events can be private, shared, or restricted (i.e., only available to people with the correct password).

**Remember Your Meetings** Now Up-to-Date keeps track of all of your meetings and appointments, so you don’t have to. It can also provide advance warning of upcoming events to ensure everyone shows up on time.

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With all this attention from the press it’s not surprising that Now Utilities is already one of the best-selling products on the Macintosh. Now Up-to-Date looks to be just as popular. Call Now at 1-800-237-3611 to learn more about both of these great products, and how they can help you get more out of your Macintosh.

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CIRCLE 177 ON READER SERVICE CARD.
Storage Buyer's Guide

Directory

ADARA (Microtek)  680 Knox Street  Torrance, CA  90502  800-253-5226  213-321-2121

Anthem Technology Systems  1180 Ridder Park Drive  San Jose, CA  95131  800-359-3580  408-441-7177

APS (Alliance Peripheral Systems)  2900 S. 59th Highway  Independence, MO  64057  800-233-7550  816-373-9800

ATTO Technology, Inc.  1576 Sweet Home Road  Amherst, MA  01890  800-227-1688  617-721-7690

Blackholo Technology, Inc.  225 East Street  Winchester, MA  01890  800-233-1688  617-721-7690

Bytewide  5266 Fairway Avenue  Lachine, Quebec H8T 1C1  Canada  800-465-5241  514-636-5938

Casa Blanca Works, Inc.  148 Bon Air Center  Sunnyvale, CA  94086  408-752-8500

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CMS Enhancements  2722 Michelson Drive  Irvine, CA  92715  714-222-6000

Computer Upgrade Corp.  2910 E. La Palma Avenue  Anaheim, CA  92806  800-874-8807  714-630-3457

Contemporary Cybernetics Group  11846 Rock Landing  Newport, NY  12306  804-873-9000

Core International  7171 N. Federal Highway  Boca Raton, FL  33487  603-938-9610  407-997-8058

Corel Systems Corp.  1600 Carling Avenue Suite 190  Ottawa, Ontario K1Z 8R7  Canada  800-936-7274  716-423-9200

Cranell  510 E. Wilson Bridge Road  Worthington, OH  43085  800-288-3475  614-433-0045

Cutting Edge  97 S. Red Willow Road  Evanston, WY  82930  800-257-1666  307-789-0592

DayStar Digital  5556 Atlanta Highway  Flowery Branch, GA  30542  800-962-2077  404-967-2077

Delta Systems  1701 Junction Court Suite 302B  San Jose, CA  95112  800-745-1240  406-441-4244

DGR Technologies  1900 Rio Grande Suite 205  Austin, TX  78701  800-255-9748  512-476-9858

DirectTech  7262 Golden Triangle Drive Suite T  Eden Prairie, MN  55344  800-279-5200  612-941-2616

Dynatek  15 Tangiers Road  Toronto, Ontario M3J 2B1  Canada  416-636-3000

Ehman, Inc.  97 S. Red Willow Road  Evanston, WY  82930  800-257-1666  307-789-3830

EMAC (Everex)  48431 Milford Drive  Fremont, CA  94538  800-628-3837  510-498-1111

ETC (Exportech Training Corp.)  5426 Beaumont Center Blvd. Suite 300  Tampa, FL  33634  800-882-2853  813-894-2953

Flexsys Corp.  24 Graf Road  Newburyport, MA  01950  800-533-7756  508-465-6060

FWB  2040 Polk Street Suite 215  San Francisco, CA  94109  415-474-8035

GigaTrend  2234 Rutherford Road  Carlsbad, CA  92008  619-931-9122

Golden Triangle Computers, Inc.  4849 Roncon Court  San Diego, CA  92111  800-326-1858  619-279-2100

HDI (Hard Drives International)  1912 W. 4th Street  Tempe, AZ  85281  800-486-3031  602-350-1128

Hewlett-Packard Co. Network Server Division  11413 Chinden Blvd. Building 3 Lower Boise, ID  83714  208-932-6000

IDE (International Data Engineering), Inc.  7727 Washington Avenue S. Minneapolis, MN  55439  612-946-4100

Introl Corp.  2817 Anthony Lane S. Minneapolis, MN  55418  612-786-9361

Iomega Corp.  1281 W. 4000 S. Roy, UT  84067  800-777-6179  801-778-1000

Jet Cybernetics, Inc.  The Penthouse  535 Ramona Street  Palo Alto, CA  94301  800-369-5387  415-322-5387

Kalogr Corp.  1269 Anvilwood Avenue  Sunnyvale, CA  94089  408-747-1315

Kintronics  P.O. Box 518  Elmford, NY  10523  800-431-1658  914-347-2530

La Cie Ltd. (Quantum)  8700 S.W. Creekside Place  Beaverton, OR  97005  800-990-0140  503-691-0771

Laser Magnetic Storage, Inc.  4425 Arrows West Drive  Colorado Springs, CO  80907  800-777-5674  719-593-7900

Liberty Systems, Inc.  160 Saratoga Avenue Suite 38  Santa Clara, CA  95056  408-993-1127

Lovié Computer Corp.  5174 W. 76th Street  Edina, MN  55439  612-938-3553

MacDirect  65 E. Chestnut, #145  Chicago, IL  60611  800-671-8461  312-664-8225

MacFriends  8235 N. Vancouver Avenue  Portland, OR  97217  800-331-1322  503-286-9350

MacLand, Inc.  4685 S. Ash Avenue  Tempe, AZ  85282  800-533-2353  602-280-5912

MacPEAK Research  2906 Thousand Oaks Drive  Austin, TX  78746  512-327-3211

MacPower  17371 Mount Wyne Circle  Fountain Valley, CA  92708  800-989-1330  714-979-1330

MacProducts USA  608 W. 22nd Street  Austin, TX  78705  800-802-3475  512-472-8881
Directory

MacTel Technology
3007 N. Lamar
Austin, TX 78705
800-560-8411
512-451-2600

MacTown
5718 Central Avenue
Boulder, CO 80301
800-543-6096
303-442-4747

Mass Microsystems, Inc.
810 W. Maude Avenue
Sunnyvale, CA 94086
800-522-7970
408-522-1200

Maynard Electronics
36 Skyline Drive
Lake Mary, FL 32746
800-821-6782
407-263-3500

MegaDrive Systems
489 S. Robertson Blvd.
Beverly Hills, CA 90211
800-322-4744
213-556-1663

Memorybank, Inc.
2223 Packard Road
Suite 12
Ann Arbor, MI 48104
800-562-7593
313-761-2783

Micro Design International
6985 University Blvd.
Winter Park, FL 32792
800-228-0891
407-677-8333

MicroNet Technology, Inc.
20 Mason
Irvine, CA 92718
714-837-6033

Microtech International, Inc.
158 Commerce Street
East Haven, CT 06512
800-626-4576
203-468-6223

Mirror Technologies
2644 Patton Road
Roseville, MN 55113
800-654-5294
612-835-4450

Newer Technology
7803 E. Osie Street
Suite 105
Wichita, KS 67207
800-678-3728
316-665-4904

NKK Electronics America, Inc.
2380 Gume Drive
Suite A
San Jose, CA 95131
408-954-8685

NovaStor Corp.
3061 Agoura Road
Suite 109
Westlake Village, CA 91361
818-707-9900

OAI (Optical Access International)
800 W. Cummings Park
Suite 2050
Woburn, MA 01801
800-433-5133
617-937-3910

OCEAN Microsystems
245 E. Hacienda Avenue
Campbell, CA 95008
800-262-3261
408-374-8300

Omnionh Electronics
1700 Forest Way
Carson City, NV 89706
800-982-3232
702-667-2902

Optima Technology
17526 Von Karman
Irvine, CA 92674
714-476-0515

Panasonic Office Automation Group
2 Panasonic Way
Secaucus, NJ 07094
800-742-8086
201-348-7000

PPC (Personal Computer Peripheral Corp.)
4902 Eisenhower Blvd.
Suite 390
Tampa, FL 33634
800-622-2888
813-884-3092

Peripheral Vision
1100 E. Hector
Suite 236
Conshohocken, PA 19428
215-882-0800

Pinnacle Micro, Inc.
19 Technology
Irvine, CA 92618
800-533-7070
714-727-3300

PLI (Peripheral Land, Inc.)
47421 Bayside Parkway
Fremont, CA 94536
800-288-8754
510-657-2211

Prom Technology
7803 E. Osie Street
Suite 16
San Diego, CA 92121
800-228-0891
407-677-8333

Rancho Technology
6526 Archibald Avenue
Suite 101
Rancho Cucamonga, CA 91730
714-897-3966

Relax Technology
3101 Whipple Road
Union City, CA 94587
510-471-6112

Rodime Systems, Inc.
7700 W. Camino Real
Boca Raton, FL 33433
800-227-4144
407-390-5000

Sankyo Seiki (America), Inc.
2948 Campus Drive
Irvine, CA 92715
800-688-0058
714-724-1505

Saturea Corp.
149 Richdale Avenue
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800-373-3063
617-861-8166

Software Architects
10910 N. Creek Parkway
Suite 101
Bothern, WA 98011
206-487-0122

Storage Dimensions, Inc.
1656 MacCarty Blvd.
Milpitas, CA 95035
408-954-0710

Sumo Systems
1580 Old Oak Rd
Suite C103
San Jose, CA 95131
800-451-7866
408-453-7474

Sysgen, Inc.
556 Gibraltar Drive
Suite 390
Tempe, AZ 85282
800-922-9050
408-437-1000

Tandberg Data, Inc.
2649 Townsgate Road
Suite 390
Westlake Village, CA 91361
805-447-8384

Tecmar, Inc.
6225 Cochran Road
San Antonio, TX 78217
800-992-9050
512-346-8360

Ten X Technology
4807 Spicewood Springs Road
Austin, TX 78759
800-821-1339
612-346-8360

Third Wave Computing, Inc.
1926-B Kramer Lane
Austin, TX 78758
800-284-0486
512-832-6226

TMS Peripherals
1120 Holland Drive
Suit 16
Boca Raton, FL 33487
800-275-4867
407-998-9958

Total Peripherals
1 Brigham Street
Marboro, MA 01752
800-422-1139
508-480-9042

Total Systems
1720 Willow Creek Circle
Eugene, OR 97402
800-874-6288
503-349-7395

TTI (Transitional Technology, Inc.)
500 E. La Palma Avenue
Anaheim, CA 92807
714-993-7707

Tulin Technology
2150 H. O'Toole Avenue
San Jose, CA 95131
408-432-9025

VCP Computer
1320-A Hancock Street
Anahiem, CA 92807
800-447-6350
714-779-7478

VIP Drives
1551 S. Congress Avenue
San Antonio, TX 78215
800-462-6350
407-243-3668

Vision Logic
296 E. Broadway
San Jose, CA 95112
800-990-9909
408-437-1000

Wholesale 54
2415 S. Roosevelt
Tempe, AZ 85282
800-972-9934
602-356-1171

XYYIS Corp.
14637 Martin Drive
Eden Prairie, MN 55344
612-949-2368
In rewritable optical media, driving at the wrong speed can be hazardous to your priceless data.

But when you drive a Sony 3.5 inch rewritable optical disk, safety prevails at every turn. Because Sony disks are precisely tuned to perform across all 1800–3600 rpm ISO standard drives.

The fact is, users should pay as much attention to their disk's performance as to the drive's for a very simple reason. Multiple technological differences exist, affecting the way different media behave in various rpm drives.

Which means the media that you select can have a direct impact on how well your drive performs, as well as the reliability of your data.

So whatever speed you're driving, be sure you always fill up on premium. Sony 3.5 inch rewritable optical media.
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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.

Then do what over 200,000 resourceful Mac users do every day.

Instead of closing your applications, open a Suitcase.™

Suitcase is the award-winning utility that lets you park your growing collection of fonts, DAs, FKEYs and sounds outside the System File.

Thereby giving you the maximum amount of memory for running more applications, building bigger documents and doing other useful things.

What’s more, Suitcase compresses your screen font and sound files by up to 60%.

Thereby giving you that much more precious disk space to work with.

It even lets you put your screen and printer fonts on a server for all to share.

Thereby making each disk on the network that much more spacious.

The more resources you have—and the more organized you are—the more memory and disk space you’ll save.

But whether your dividends are measured in megs or merely in Ks, Suitcase is guaranteed to save you gigabytes of aggravation.

Even if you’re operating in System 7.

Because System 7 still stuffs your resources into your System File.

And System 7 still makes you close down all your applications and restart your Mac each time you install a new font.

Which is a real pain in the, uh, system.

Suitcase, on the other hand, gives you unlimited access to all your resources.

And total control over how you organize them.

Each suitcase can pack up to 800 fonts, 64 DAs, and any number of FKEYs and sounds.

You can group suitcases into sets, then summon all the luggage that belongs with a particular project at the click of a mouse.

Tips are optional. But here’s one for those of you who find font ID conflicts even more irritating than running out of memory.

Get Suitcase. It eliminates them.

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### Table 1: Vendors and Products, continued

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By Aileen Abernathy

Publishing by proxy: If you don’t want to sweat the details of your publication, Aldus’ Personal Press 2.0 takes automation to new heights. “Intelligent” AutoCreate templates (right) guide you through the creation and assembly of publications via graphical previews, or “proxies.” A copyfitting feature automatically adjusts text to fit a given space, and QuickTime support lets you drop a frame from a home movie into your holiday letter. Some features, such as drop caps and bulleted text, are handled through extensions called Aldus Additions—not to be confused with PageMaker’s Aldus Additions, which are incompatible. (Now there’s a marketing challenge.) Unfortunately, Personal Press also resembles PageMaker in another area: It still can’t open multiple documents. Personal Press now costs just $199; upgrades are $40.

TrueType returns: Just when you thought TrueType was moot on the Mac, Type Solutions has hatched The Incubator!, a $150 utility that lets you create new TrueType fonts by tweaking the weight, width, contrast, and/or slant of existing ones. This may sound like Adobe’s Multiple Masters for Type 1 fonts, but the products are miles apart. Multiple Master technology produces font variations by interpolating among several sets of specially tuned outlines contained in a special Type 1 font. The Incubator! works on the unoptimized outlines of garden-variety TrueType fonts. Minor tweaks produce decent-looking fonts, but dramatic changes can cause horrendous results, particularly with serif fonts. 603-382-6400.

If you want some fonts to run through The Incubator!, Monotype offers the TrueType ValuePack, seven compatible text and display fonts, for $89. 312-855-1440.

Colorful catches: Barneyscan’s top-notch scanning and color-separation program, CIS•ColorAccess, is now available as a stand-alone product for use with color flatbed scanners. For $695, CIS•ColorAccess provides such high-end tools as automatic selection of highlight and shadow points, custom tone curves, sophisticated color correction, and unsharpening. A major marketing mistake: The program is hardware copy-protected with the Eve dongle. 510-562-2480. For those who long for a library of already-scanned images, 21st Century Media offers PhotoDisc, a series of 24-bit stock color photos. Each collection comes in three formats—low-resolution PICT and TIFF and 300-dpi compressed TIFF. Volume I: Business and Industry contains 408 images of urban life, occupations, transportation, people, sports, textures, and nature. Next out is Lifestyles and People, followed by Backgrounds and Textures. $395 (CD-ROM) or $498 (floppy disks). 206-441-9355.
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That’s a Moiré

If you do color separations from the desktop, chances are you’ve seen printed photographs covered with a distracting doily pattern. That’s a moiré.

By Bruce Fraser

Printing full-color images is a highly skilled craft, much more complex than doing monochrome or spot-color work. Considering the difficulty of the process, it isn’t surprising that Mac-based desktop publishing has been relatively slow in penetrating the color-prepress market. But the trend is clear: Color is the future of desktop publishing, and the question is no longer whether to use desktop technology but when to do so.

The Mac still can’t handle color work as well as dedicated high-end systems can. Prepress-sized files present serious storage problems, and the lack of a color standard often makes calibration a guessing game. But one persistent problem has its roots in PostScript itself—a visible dot pattern, called moiré, in color images (see Figure 1).

What causes moiré and how can you minimize it? This two-part question requires a two-part answer. In this article, we explain how moiré occurs, including the differences between traditional and digital halftones, the importance of screen angles, and the printing process itself. In an upcoming issue, we’ll take a look at how companies such as Adobe, Agfa, Linotype-Hell, Optronics, and Scitex are solving the moiré problem for desktop color separations.

Optical Illusions

Before we discuss how color images are printed, let’s start with a simpler example: reproducing a black-and-white photograph on a printing press, using black ink and white paper. A close examination of a newspaper photograph reveals a pattern of dots, called a halftone (see Figure 2). The halftone’s dots are large in the dark areas of the image (the shadows), medium-sized in the middle grays (the midtones), and very small in bright areas (the highlights). The distance between the center of the dots, however, is always constant. And even though the image is composed of dots, each printed with the same density and ink color, the eye sees a uniform picture that contains shades of gray.

Halftones take advantage of an optical illusion that results from the limited acuity of human vision. Our eyes can’t distinguish two points when they are separated by only 1/30 of a degree, which is equivalent to 1/530 of an inch at a reading distance of 12 inches. Thus, the eye can be fooled into perceiving shades of gray or color if an image is converted to a pattern of small, equally spaced dots of varying sizes, as long as the dots are placed very close together.

Making a traditional halftone involves photographing the original image through a screen—a grid of thin, regularly spaced opaque lines that intersect at 90-degree angles. The holes in the screen act like pinhole lenses, producing dots on the film proportional to the amount of light reflected from the original art. The sharpness of the halftone depends on the spacing of the lines in the screen. This screen frequency is usually expressed in lpi (lines per
Figure 1: Moiré — such as the distracting interference pattern shown here — is a problem in color DTP. Moiré can be minimized in traditional color separations by rotating the halftone screens to precise angles. Because of the way imagesetters simulate the halftone process, however, they can't always reproduce the conventional angles and screen frequencies. As a result, they produce moiré problems.

Typical screen frequencies are 65 to 85 lpi for newspapers, 120 to 150 lpi for magazines (MacUser uses a 133-lpi screen for color photos), and 175 lpi and up for high-quality art books.

The other factor to consider with a halftone screen is its orientation, or screen angle. The underlying pattern of dots in a halftone is most obvious when the screen is vertical (0 degrees) and least obvious when the screen is oriented diagonally. Therefore, in monochrome printing, the screen is usually rotated 45 degrees.

Reproducing a full-color photograph is a bit more complicated, because printing presses and imagesetters are binary devices that see everything in black and white — or rather, ink and paper. They can only make a mark on the paper or film or leave it blank. Because it's impractical to use millions of different-colored inks, full-color-image printing uses the four-color process.

This technique produces the full spectrum of color by printing superimposed halftones in the three reflective primary colors — cyan, magenta, and yellow — plus black. In practice, you can obtain the entire range of printable color by using varying intensities of cyan, magenta, and yellow inks; combining 100 percent of each should give you black. In practice, overprinting full intensities of the three primary colors produces the full spectrum of color.
colors produces a muddy brown, so black is added as a fourth color.

Traditionally, you separate a color image into cyan, magenta, yellow, and black components by photographing the original image four times through a halftone screen, using a different filter for each color. For example, shooting with a red filter produces a cyan halftone, because subtracting the red component from white light leaves cyan. A separate plate is made for each halftone, and the colors are printed in sequence as the paper moves through the printing press.

The Right Angles

The four-color process sounds straightforward — but there's a catch. If you simply print the four halftones directly on top of each other, the inks blend together, producing mud. The halftone dots must therefore be arranged so they are adjacent.

Figure 3: Moiré is the interference pattern that occurs when two or more geometric grids, such as halftone screens, are superimposed at an angle. If the angle between screens is small, blatant interference patterns will occur. Moiré becomes less visible as the angle of separation increases. The maximum separation angle possible between two screens is 45 degrees.

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It's possible to print all four halftones at the optimum 45-degree angle, offsetting each color dot slightly from the others. The resulting image is composed of quartets of cyan, magenta, yellow, and black dots arranged in a tight square pattern. Many color thermal-wax and inkjet printers use this approach, but for press work, it has a major disadvantage — any shifting or stretching of the paper results in sudden color shifts.

To avoid color miscues on the printing press, the four halftone screens are rotated to different angles so that the dots form a tight, distinctive pattern called a rosette. This is where the moiré problem rears its ugly head.

Moiré is the interference pattern that occurs when two or more geometric grids, such as halftone screens, are superimposed at an angle. It can be pleasing in screensaver utilities or in psychedelic light shows, but in color printing it's a no-no, particularly when it makes an image look like a carpet of lace doilies. Moiré can't be completely eliminated, because of the way the four-color process works; the goal is to render it imperceptible (see Figure 3).

Objectionable moiré can have several causes. The angles of the four halftone screens are the most critical factor. Also, early imagesetters weren't designed for color work and they weren't accurate enough to produce the tight registration color separations required. Irregularities in the printing press can also cause moiré. But the main culprit in digital publishing has been the screen-angle technology used by PostScript imagesetters (more on this in a minute), compounded by the fact that moiré is particularly noticeable at the low-to-medium screen frequencies of 85 to 150 lpi that are used to output most desktop color work.

As mentioned earlier, the angles of the halftone screens are of paramount importance in minimizing moiré. The smaller the angle between screens, the more obvious moiré becomes. A screen is composed of lines that intersect at 90 degrees, so the largest angle possible between the lines on two screens is 45 degrees. But for full-color printing, we have to deal with four screens, not two.

The next-least-objectible angle, 30 degrees, provides room for three screens without overlap, and this is what the traditional four-color process uses. Black, the darkest color, is printed at 45 degrees, the angle at which the screen pattern is least noticeable. The cyan and magenta screens are each separated from the black screen by 30 degrees; cyan is usually set at 15 degrees and magenta at 75 degrees. Yellow is chosen for the odd angle because it's the lightest color and therefore least likely to produce visible moiré. The largest separation available for the fourth screen is 15 degrees, and it should also be as far as possible from the darkest color, black. Thus, yellow is set at 90 degrees.

When halftone separations are produced photographically, it's relatively easy to precisely control the screen angles and frequencies; you use the same halftone screen for all four separations and rotate it mechanically to the correct angle for each one. This is important, because an angular error of just 0.05 degrees or a slight misregistration between the screens can result in an obvious moiré.
The Digital Difference

PostScript imagesetters strive to produce the conventional screen-angle set of cyan at 15 degrees, black at 45 degrees, magenta at 75 degrees, and yellow at 90 degrees. Unfortunately, it's difficult for imagesetters to reproduce exactly the traditional angles while maintaining the same screen frequency on each plate. No matter what angles and frequency you specify, the resulting halftones often have slightly different values. This discrepancy is a direct result of the way imagesetters simulate the halftone process.

An imagesetter can't print the variable-sized dots of traditional halftones. Instead, it has a fixed grid of printable dots, like the holes in a pegboard, albeit on a very small scale. These printable dots—variously known as laser spots, rels (recorder elements), and pixels—are all the same size. The imagesetter is unable to vary either the size or the position of the laser spots—all it can do is print a given laser spot on the grid or leave it blank.

To simulate halftones, the imagesetter groups laser spots into cells, where each cell corresponds to a single traditional halftone dot. By varying the number of laser spots that are actually printed within the cell, the imagesetter simulates the varying sizes of halftone dots. For example, a halftone cell of 16 x 16 laser spots on a 2,450-dpi imagesetter simulates a halftone screen frequency of 153.125 lpi (2,450 ÷ 16). Each 16 x 16 cell contains 256 laser spots, so varying the number of laser spots printed can produce any of 256 levels of gray. The result is almost indistinguishable from a traditionally produced halftone.

Printing halftones on an imagesetter isn't quite that simple, however. For example, there's a trade-off between screen frequency and the number of levels of gray. A higher screen frequency gives a smaller halftone cell and a more detailed image, but because the halftone cell is smaller, it contains fewer laser spots and therefore can represent fewer shades of gray.

But the real problems—including moiré nightmares—arise when you rotate four halftones, all with the same frequency, to the angles used for color separations. When the halftone cell is rotated, its spots must fall directly on top of spots in the underlying grid, because the imagesetter can't print just part of a laser spot (see Figure 4). This drastically limits the angles available. The actual rotation angles possible depend on the imagesetter's resolution and on the screen frequency chosen—the higher the resolution and the lower the screen frequency, the more angles that are possible.

But don't despair—there are some ways to get moiré-free color separations from an imagesetter. In an upcoming issue, we'll take a look at the techniques used by high-end prepress vendors such as Scitex and also at new technologies from the mainstream players in the PostScript market: Linotype-Heit's HQS, Adobe's Accurate Screens, Agfa's Balanced Screening, Optronics' IntelliDot II, and Hyphen's Spectracell are all attempts to provide moiré-free desktop color separations.
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TrueLaser Printer
The TrueLaser printer is Microsoft's answer to fast and versatile laser printing. It offers 300 dpi resolution, comes with 15 built-in TrueType fonts and is PostScript and HP PCL compatible. Its auto-switching capability allows it to charge automatically between its AppleTalk, Centronics and RS-232C interfaces. The TrueLaser is one of the fastest printers in its class. It is powered by the SIMM 28000, 32-bit microprocessor and comes standard with 2MB of RAM and can be upgraded to 6MB. Manufacturer: Microtek

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Ray Dream Designer 2.0
You don't have to settle for flat illustrations and designs any longer. Ray Dream Designer's drawing and text tools, for creating lines, circles, ellipses, polygons, Bezier's, colors and shading, are virtually the same as those in professional 3D illustration programs. Only difference is, your objects have the realistic look of three dimensions. Wrap them around an object or text for instant region selections. Comes with a library of 3D solid textures you can use as user-defined lightening, shadows, transparency reflectors and, best of all, perspective is all handled automatically. Requires Mac II or newer with coprocessor, 32-bit QuickDraw, 4MB RAM and hard drive. Publisher: Ray Dream

WindoWatch 1.52
WindoWatch allows you to track the hours you spend on a project with WindoWatch. It's a must for professionals who bill their services by the hour (or minute). WindoWatch operates in the background, automatically generating a timesheet as you work. Use WindoWatch to collect and manage information from team members over the network or export timesheet information to a spreadsheet. Don't miss any opportunity to accurately bill your clients. After all, time is money. Publisher: ASD Software
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Aldus SuperPaint

- Aldus SuperPaint, 3.0—Five time winner of Macworld's World Class Award, new Aldus SuperPaint combines painting, drawing, and image enhancement, and includes: 1. true 24-bit color, textures, gradients, and EPS graphics. GRA012 $133.

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Publisher: Aldus GRA0279

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The UnMouse

The UnMouse does everything a mouse can—only faster, easier, and in less space. To move the cursor, simply slide your finger over the glass surface. To make a selection merely press down. The UnMouse also serves as an extended keyboard. Tap the large red button and a pointer keypad with 16 keys instantly available to operate macros (60 in advanced mode). With as one million touch points the UnMouse also performs as a small graphics tablet. Manufacturer: Microtouch INP0084

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Publisher: PC Globe GMA0416

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*Publisher: FontBank*

*Price: $95*

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*Publisher: Sensible Software*

*Price: $55*

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**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 tools provide an interactive environment for editing and sketching your ideas. Interactive 3-D presentations, QuickTime® and PICS animated movies and perspective pictures draw your audience. Enhanced imports of 2-D DXF, PICT, ClassICAD and MacDraw, and Export of 3-D DXF, 2-D DXF, ClassICAD, MacDraw, PICT and EPS. Winner of MacUser Breakthrough Product of the Year Award 1990.

*Publisher: Virtus Corporation*

*Price: $309*

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**White Knight V.11**

The perfect low-cost solution to almost any Mac telecommunicator's needs. Offers the kind of power associated with products costing hundreds of dollars more, but is easier to learn and more flexible. 270+ page user manual is geared to all levels of experience. Winner of 11 awards including MacWorld's World Class Software Award 1987-1991.

*Publisher: FreeSoft*

*Price: $85*

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**Design Your Own Home:**

Design Your Own Home: Architecture, Interiors, or Landscape. Create floor plans, elevations and building plans with structural details that you can hand right to your contractor. Do individual room plans and kitchen/bath designs. Then complete your dream house with graphic landscape plans. Interiors and landscape programs generate side views from top-view perspective. Sample plans are included.

*Publisher: AbraCadabra*

*Price: $65ea. Total: $130*
Microsoft Excel 4.0
crossing Excel just got even better. The new version 4.0 adds to this already incredible program by giving you more powerful features that make everyday spreadsheet tasks easier than ever. Excel 4.0 offers a whole new wealth of intelligence features, so it can actually anticipate the kind of information you'll want, and then present it to you. And that's just for starters!

whole new level of easy. New intuitive features replace the long, steep learning curve of previous versions. Excel's new customizable Toolbar provides a single step, one-stop access to the commands you must frequently use. In addition to AutoSum, more user conveniences have been added, including AutoFill, which recognizes trends in your data, and the incredible new Wizards, which guide you step-by-step through any complex task.

powerful analytical tools. Microsoft has added a host of new analysis tools to Excel 4.0. Outlining lets you expand or collapse your worksheet. Consolidate data from multiple workbooks, create Crosstab tables based on database entries, store related worksheets, and more. The new Analysis ToolPak includes the most extensive set of financial, statistical, engineering, and scientific tools that you will find in any spreadsheet. Plus the new Scenario Manager, which lets you create and save multiple "what if" scenarios, making it easy to compare any combination of values.

proved graphics tools and presentation support. Excel 4.0 provides everything you need to create dazzling reports, complete with charts, graphs, and notes or annotations. AutoFormat gives you one-step access to 16 professionally-designed spreadsheet macros. Report Manager accesses different sections of a spreadsheet. Charting lets you choose from over 90 chart options, including 3-D, and Excel's new Drawing tools make it easy to add images and logos. And there's even a built-in Spelling Checker to ensure that all your presentations and reports are letter perfect.

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*Ask for item CHP0012 1MB 120ns......$45.

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<tr>
<th>MACINTOSH CLASSIC</th>
<th>STANDARD</th>
<th>FOR 2MB SIMMS</th>
<th>FOR 2.5MB SIMMS</th>
<th>FOR 4MB SIMMS</th>
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The Mac Classic comes with a standard 1MB of memory, which is surface mounted (soldered) to the motherboard. Additional memory for your Mac Classic is provided by an Expansion Board, which slides into a slot on the Classic's motherboard. The Expansion Board can be purchased with 1MB of memory or a total of 2MB, and then two 1MB SIMMs can be added to the Expansion Board later, for a total of 4MB. Or, you can install a 2MB Expansion Board, which brings your Mac Classic up to its full 4MB of memory (CHP0050 1MB Expansion Board......$79. CHP0057 2MB Expansion Board......$129).

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<th>MACINTOSH PLUS &amp; SE</th>
<th>STANDARD</th>
<th>FOR 2MB SIMMS</th>
<th>FOR 2.5MB SIMMS</th>
<th>FOR 4MB SIMMS</th>
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The Mac Plus and Mac SE have four available slots on the motherboard, which originally contained 1MB SIMMS modules—totaling 4 megabytes of memory. To upgrade, you can replace each 1MB module with a 2MB module, but you must do it in pairs. Replace one 256K module and you will have a total of 2.5MB of memory. Replace all four modules and you'll have 4MB. (You should use the 256K modules for later use if you want to pass your Mac on to someone else.)

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<tr>
<th>MACINTOSH LC</th>
<th>STANDARD</th>
<th>FOR 4MB SIMMS</th>
<th>FOR 6MB SIMMS</th>
<th>FOR 10MB SIMMS</th>
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<tr>
<td>2MB SURFACE MOUNT</td>
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<td>ADD 2-2MB SIMMS</td>
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The Mac LC comes with a standard 2MB of memory, surface mounted (soldered) to the motherboard, with two slots available for additional memory. The Mac LC can be upgraded to 4, 6, or 10 MB, depending on whether you are using 1, 2, or 4MB SIMMS.

CHP0012 1MB SIMMS - 120ns......$45
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CHP0008 1MB SIMMS - 70ns......$69
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Digital Reality

Using Painter's natural-media tools, you can produce art that truly imitates life.

By Janet Ashford

One of the biggest complaints about digital artwork is, "You can tell that it was created on a computer." Computer-generated images lack the physical textures and subtle blendings of oil paint, watercolor, and chalk, not to mention their interactions with canvas and paper. But a new generation of painting programs — led by Time Arts' Oasis, Fractal Design's Painter, and SuperMac Technology's PixelPaint Professional 2.0 — is overcoming these objections by providing pressure-sensitive tools, customizable brushes, and libraries of digitized paper textures.

Foremost among these is Painter. Painter is the first program to accurately mimic natural brush dynamics and paper textures: You can actually see the brush marks in an oil painting and the nubby texture in a charcoal drawing. Other tools mimic chalk, felt pens, pencils, crayons, watercolor, and airbrushing.

Corinne Okada, of Rucker Huggins, a graphics-design firm in Mountain View, California, used Painter to quickly create a fish image for a book cover. The result convincingly imitates the way watercolors spread and bleed into each other on rough-textured wet paper.

Graphic designer Janet Ashford co-authored The Verbum Book of Post-Script Illustration.

Designer Corinne Okada used Painter to create the watercolor image on this book cover. She painted the image with a mouse, but Painter also offers special features for use with a digitizing tablet and a pressure-sensitive stylus.

BLUE KUMU
Japanese Hawaiian Short Stories
Written and illustrated by Sue Kimura

Choosing a Brush and Paper Texture

Tool: Hairy Brush
Method: Grainy Hard Cover
Paper: Watercolor 1

Tool: Airbrush with Fat Stroke
Method: Grainy Soft Cover
Paper: Small Canvas

Tool: Crayon
Method: Grainy Hard Buildup
Paper: Fine Grain

The Brush palette offers tools ranging from pencils to a watercolor brush. Customization is the secret of Painter's success in imitating natural media. You can select variants for each brush (such as Soft Charcoal or Japanese Brush) and specify its stroke behavior by selecting a method (Soft Buildup, for example). These choices can be further refined in other brush-related palettes. "Grainy" brushes interact with textures selected from the Paper palette.
Making a 'Pencil Sketch'

To begin her painting, Okada sets the paper color to a light brown, specifies a resolution of 300 dpi, and selects the Rough paper texture. She then uses the 2B Pencil with Grainy Soft Buildup to sketch a fish shape. At these settings, the pencil tool produces anti-aliased (smooth) strokes that react to the paper texture and build up color, becoming darker where they overlap. A Japanese Brush with an angled tip and Grainy Soft Buildup is used to paint the dark borders.

Adding the Basic Colors

Watercolor brushes in various sizes are used to add blues, reds, and greens to the sketch. Okada uses Soft Cover strokes, which have soft anti-aliased edges. If opacity were set at 100 percent, new strokes would completely cover underlying ones. But an opacity of 16 percent is selected, so that strokes build up color density more gradually.

Masking with Friskets

To add further detail in specific areas, Okada uses the knife tool to draw freehand friskets (Painter's term for masks) around sections of the fish and plants. The friskets are defined so that everything outside them is protected from changes. Within each frisket, a large brush is used to apply additional watercolor in darker, more opaque paint. The edges of the newly painted sections are smoothed with the water-drop tool.

Finishing the Image

Final coloring and highlights are added to the fish and plants with a variety of small watercolor brushes. The completed image is saved in TIFF format and opened in Photoshop, where the pale paper color around the outside of the image is selected with the magic-wand tool and deleted. The image is then imported into PageMaker to illustrate the book cover.

Variations on the Theme

Okada's artwork is easy to alter with Painter's customization and export capabilities.

Top: With the aid of a Wacom tablet and a pressure-sensitive stylus, color is added to the pencil sketch (see Figure 2). Painter's felt pens produce the look of a rough color comp.

Middle: The final image is repainted in the style of Van Gogh, one of the options available with Painter's unique Cloner brush. The Cloner brush can also be used to re-create existing images as pencil sketches, oil paintings, watercolors, and chalk drawings.

Bottom: The fish image is opened in Photoshop and treated with the Fresco filter, from Aldus' Gallery Effects. This filter adds darker, heavier strokes.
Now There Is A Way To Detect A Network Problem While It's Still Just A Funny Noise In The Engine.

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

What you really need is the Network Management System, new from Dayna. It’s the first integrated set of tools designed to detect trouble, pinpoint the source and let you take action to keep your network humming day after day.

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We Connect People And The Computers They Use®
Photonics, maker of the infrared PhotoLink device for creating wireless LocalTalk networks, has adapted its Infrared Transceiver to work with laptops and notebook computers. Plug it in, and the reflective surfaces of your walls, ceiling, and floor become a network. Too bad you can’t use it with your PowerBook. Although Apple is a major investor in Photonics, the new technology will be available first on TA Triumph-Adler AG Walkstation computers, and will come with NetWare—not AppleShare—client software. 408-370-3033.

By Henry Bortman

**NetWare for less:** If you want to connect your Mac to a NetWare server but don’t want to spring for NetWare for Macintosh 3.01 (see review, November ‘91, page 152), you should check out these alternatives: **MACLAN Connect for NetWare,** from Miramar (805-966-2432), is a gateway to NetWare that runs on its own PC. With this product, Macintosh users on AppleTalk and PC users connected to NetWare can access file servers and printers on either network. $695 for a 40-user license. **NetMounter,** from Dayna (801-531-0600), is an extension that installs NetWare (IPX) protocols on the Macintosh. Once the protocols have been installed, you simply use the NetMounter icon in the Chooser to mount NetWare servers on your Mac’s desktop. Single user, $99; five users, $395; ten users, $595.

**Mail call:** Novell’s MHS (message-handling service) is one of the most popular E-mail systems around, and two new products bring its capabilities to Mac users. **If you want full access to a Novell MHS mail system directly from your Mac,** check out MacAccess from Da Vinci Systems (919-881-4320). MacAccess makes your Mac a full-fledged MHS client and provides a client DA $395 for a five-user pack. **If you’ve already got QuickMail and want a gateway to MHS,** get in touch with CE Software (515-224-1995). With CE’s QuickMail for MHS (pricing not available at press time), you can access MHS mail servers without ever leaving the comfort of your familiar QuickMail DA. **In case you were wondering what would happen to the MCI Mail gateways for QuickMail and Microsoft Mail following Solutions’ dissolution,** they’ve been snapped up by MCI itself. MCI (202-833-8484) will support current installations of and provide future upgrades to CommGate MS and plans to ship CommGate/QM in the second quarter of this year. CommGate MS costs $595; expect similar pricing on CommGate/QM. **Microsoft’s acquired the FAXgate gateway from Solutions,** renaming it — are you ready? — Microsoft Mail for AppleTalk Networks Gateway to Fax. **Seriously.** It ships with MailMaker software, which gives you network-fax capability from within any application. Pricing not available at press time. 206-882-8080.

**Who’s there?** Want to know who’s sharing your files? **Nok Nok,** a handy control panel from Trik, keeps a log of the file-sharing activity on your Macintosh and notifies you any time a file-sharing user attempts to connect to your system. $49.95; multiuser discounts available. 617-933-8810.
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Connecting the Dots

Access to the wide world of IBM-compatible dot-matrix printers can benefit your pocketbook — and your PowerBook.

By Andy Ihnatko

Back in the mid-80s, the ImageWriter seemed like a good idea — but then, so did listening to Duran Duran on vinyl. Now, with the advent of cheap laser printers and near-laser-quality inkjet printers such as the StyleWriter and the HP DeskWriter, dot-matrix printing seems as outmoded as long-playing records.

But just as there are still reasons to keep your turntable set up (do you really need a CD to hear all the nuances of Aerosmith?), there are advantages in being able to connect your desktop or portable Mac to a dot-matrix printer — especially one of the many inexpensive IBM-compatible printers that still dot the landscape, so to speak.

The Case for Dot-Matrix

Dot-matrix printers may not be fashionable in the Mac world, but they still offer several advantages:

They’re Gloriously Inexpensive. Even when you include the costs of the hardware and software you’ll need in order to get one to work with the Mac, an IBM-type printer will give you print quality similar to a StyleWriter’s for almost half the price. ImageWriter quality can be had for almost a third. You might even discover a perfectly good IBM-compatible printer gathering dust in a closet; less than a hundred bucks in hardware can turn it into a productive part of your office’s Mac system.

Multipart Forms Printing. Multipart forms, carbons, and mimeographs can’t be used with laser or inkjet printers; only a device that prints by striking the page with force can punch an image through all those layers of paper. If your paper-pushers demand their forms in triplicate, a dot-matrix printer or a daisy-wheel printer are your only choices.

Oddball Printing Stock. A big drawback of laser and inkjet printers is that they’re all geared toward printing on standard letter-sized sheets of paper. Several companies can sell you labels, index cards, and the like arranged on 8-x-11.5-inch sheets for use with laser printers, but the greatest variety of printing materials and styles is available for dot-matrix printers, often with greater ease of formatting. With a wide-carriage dot-matrix printer, you can print an entire 132-column spreadsheet on a single page without resorting to taping sheets together or having to settle for scrunched-up text. And continuous-feed paper lets you print those festive “Happy 29th Birthday, Gladys!” banners everyone loves so well.

They’ve Infested the Entire Planet. Much like male executives with ponytails, IBM-compatible printers can be found in most American offices these days. So PowerBook owners, take note: If you travel with a small cable and software that let you connect IBM printers to Macs, you’re bound to find something you can print to, no matter where your business takes you. This is much cheaper and more convenient than gallivanting across the country with an expensive portable printer.
Then Again, Maybe Not

So sure, there are good reasons for using a dot-matrix printer — but then again, there were once good reasons for eating eggs and bacon every morning. Here are some of the drawbacks to dot-matrix printing:

Slowness. Even at top speed, a dot-matrix printer can take more than two minutes to print a single page. When it’s in high-quality mode, you can pretty much go out for pancakes while you wait.

Poorer Print Quality. A dot-matrix printer can’t lay down a dot in a specific location with the precision that a laser or inkjet printer can, so its output at a similar resolution is usually fuzzier. A top-quality dot-matrix printer can generate output approaching that of a StyleWriter’s, but if high print clarity is an absolute must, you’ll probably be happier with an inkjet or laser printer.

Noise. No kidding, they’re as noisy as an owl caught in an electrified fence — something to consider if you work near other people.

Spending Some Money

If you’re buying a dot-matrix printer rather than connecting to one that’s already on hand, you’ll find many models to choose from. The most important feature to consider is print quality. Fortunately, this simply means choosing between a 24-pin and a 9-pin print head. A 24-pin printer can achieve a maximum resolution of about 360 dots per inch, offering near-laser-quality printing for $250 to $300. For those who want to spend less than $200, 9-pin printers with the same resolution as the original ImageWriter (about 160 dpi) are still widely available.

The other three important features to look for are Epson compatibility, speed, and a commodious print buffer. Epson compatibility is a widely supported standard for sending commands to a dot-matrix printer. If you insist on an Epson-compatible printer, you’ll have your choice of third-party hardware and drivers for using the printer with your Macintosh. As for speed, you will generally see it specified in cps, which indicates the number of characters per second the machine can print in its lowest-quality print mode. 24-pin printers offer the highest speed, typically 200 cps or better, a 9-pin unit might creak along at 150 cps or so.

The printer’s buffer size also affects speed. The larger the buffer, the less your Macintosh has to wait when it’s sending data to the printer. A 1K buffer is enough to hold almost a full page of plain text, but it’s practically worthless with a Mac. Because the Macintosh sends a dot-by-dot image of the page, rather than text characters, a buffer of 16K, 32K, or even more is desirable.

You may also want to look for a printer that offers special paper-handling features. Paper-feeding options generally include tractor or friction feeders, with multiple paper paths and sheet feeders also available in some cases. For printing on wide forms, most dot-matrix printers are available in wide-carriage models.

Some of the best values in dot-matrix...
printers are put together by Epson and Panasonic. Panasonic offers two very affordable printers, the 9-pin KX-P1180 and the 24-pin KX-P1124; both are sturdy machines for the budget-conscious. If you don't mind spending a little more money for some extra speed, Epson's LQ-570 is a spiffy choice for 24-pin printing on a middle-class budget.

**Bridging the Gap**

So here you are with your Macintosh and your Epson-compatible dot-matrix printer, eyeing the rest of this article warily. Not to worry: the technological gulf in this case is agreeably narrow, thanks to the commercial interface kits available.

These kits have to solve two problems. First, the interfaces of the Mac and the printer are absolutely incompatible as is. The Mac's printer port is a serial interface, whereas the printer's connector is parallel (serial dot-matrix printers are practically nonexistent, and they generally cost more than a parallel printer with an interface kit). Any hookup solution must include a special cable that takes the Mac's serial output and translates it into parallel. The second thing you need is a printer driver that works with your printer. When you buy your Mac, it includes only drivers for Apple printers such as the ImageWriter and the ImageWriter LQ. Orange Micro's Grappler cartridges (Grappler Ilsp for 24-pin printers and Grappler 9 Pin for the you-know-whats) make the assumption that you're printing anything made by Apple. At a list price of $599, it's like buying an ImageWriter II with twice the print quality at the same price — plus, you get free envelope-printing and spooling software. And, unlike Apple, GCC makes a printer that will run on four C batteries. The Write-Move ($499), about the same size as a PowerBook and weighing in at a little less, makes it possible for you to fire up your PowerBook at the first sign of engine trouble and have a completed will and testament printed out and ready for your signature before your plane slams into the ocean.

GCC Technologies, Inc., 580 Winter Street, Waltham, MA 02154; 800-422-7777 or 617-890-0830.

If you're uncomfortable with the idea of buying a dot-matrix printer that isn't sold in a Macintosh-ready configuration, you still have a few options other than an ImageWriter. The 9-pin Seikosha SP-2400AP Personal Printer is compatible with the ImageWriter, uses the same cables and drivers, and costs only half as much. For its $349 list price, you can buy a much sturdier IBM printer and interface cable, but it's a popular printer for the faint of heart. Seikosha, 10 Industrial Avenue, Mahwah, NJ 07430; 800-338-2608 or 201-327-7227.

GCC's WriteImpact isn't ImageWriter-compatible, but with its own custom driver, it's as convenient to set up and use as
to an ImageWriter. They’re special cables that not only transmogrify serial signals to parallel but also translate ImageWriter-specific printing commands to the native print codes used by your non-Apple printer. As a result, you can use Apple’s standard ImageWriter and ImageWriter LQ print drivers and none of your applications will know the difference.

GDT Softworks’ PowerPrint takes a different approach. In addition to the requisite serial/parallel conversion cable, you get an impressive collection of Chooser-level print drivers that allow Macintosh applications to use just about any printer. Because each driver is tailor-made for a specific type of printer, GDT’s drivers can take advantage of features specific to that printer such as color printing, multiple paper sources, and so on. But the big advantage of the PowerPrint drivers is how much better they are than Apple's standard-issue ImageWriter drivers (see Figure 1). They let you choose to print only the document’s odd or even pages, scale the printed image to any percentage, and define new paper sizes on the fly.

Which one should you buy? The aforementioned advantages of PowerPrint’s drivers make it more attractive than the Grappler, but there are a few other things for you to consider before whipping out the ol’ MasterCard. First, keep in mind that the standard ImageWriter drivers used by the Grappler are industry standard; it’s always possible that you might run across an application that just plain doesn’t like PowerPrint’s custom drivers. PowerPrint drivers are also tightly licensed software. If you put a printer on a network (see the “Sharing the Dot-Matrix Delights” sidebar), you’ll have to buy a copy of PowerPrint for every Mac that’s going to be using that printer. The ImageWriter drivers used by the Grappler, on the other hand, can simply be duplicated for free — and the GrapplerShare software included with the Grappler provides a free, if rather slow, means of sharing the printer over a network. To share the printer over a network without increased costs, you may want to go with the Grappler.

If you want to look at every Mac-to-dot-matrix-printer product available, you can also check out ICD’s Graflex cartridge, which converts serial-to-parallel output and offers ImageWriter compatibility. It works just fine but offers none of the extra goodies that you get with PowerPrint or Grappler, and at street prices, it doesn’t cost much less.

Both the Grappler and the PowerPrint have a nifty additional benefit: They work with IBM-type inkjet and laser printers too, so when the time comes to take a step up in print quality, you can take your pick of dozens of cheap printers. And as we mentioned, both make excellent accessories for a PowerBook (see Figure 2). Having a Grappler or a PowerPrint in your
pocket means that no matter where you go, there’ll probably be some sort of printer you can print to.

**You Want PostScript Too?**

Before you get too excited about joining the dot-matrix world, there’s one more wrinkle to consider: No dot-matrix printer has PostScript built in, as many laser printers do. With both the Grappler and the PowerPrint, you can use ATM and TrueType outline fonts as well as QuickDraw graphics. (Both products also come with some bonus fonts, but the Grappler’s are not-especially-necessary outline fonts and the PowerPrint’s are just on-screen representations of the fonts built in to certain NEC and Toshiba printers.) However, the differences between QuickDraw and a high-octane page-description language will become apparent when you try to print from Adobe Illustrator and find that all your nifty text-mangling effects have disappeared.

Fortunately, there’s a cheap solution. Freedom Of Press Light ($149), from Custom Applications (800-873-4367 or 508-667-8585), is a PostScript-compatible interpreter that runs on your Mac and lets any connected QuickDraw printer emulate PostScript. Freedom Of Press Light’s print spooler appears as a standard LaserWriter in the Chooser, so printing involves no major life-style changes. However, the Mac winds up doing all those tricky PostScript calculations normally handled by the printer, so all your applications will slow down quite a bit while Freedom Of Press Light prints a document in the background. Otherwise, in form and function, it’s almost exactly like printing a file to a LaserWriter. TScript Basic ($85), from TeleTypesetting (617-734-9700), brings largely the same PostScript functions to your dot-matrix printer but with a slightly different set of extra features. Unlike Freedom Of Press Light, TScript Basic can preview a PostScript image before printing and convert PostScript output to a TIFF file, but it lacks the networking features of Freedom Of Press Light (see the “Sharing the Dot-Matrix Delights” sidebar).

**Dot, Dot, Dot**

We’d all love to have a LaserWriter of our very own, but those of us forced to look elsewhere by budget restrictions or special printing needs can find good deals in the world of IBM-compatible dot-matrix printers. And once we’re equipped with a device that lets us print from our Macs to IBM-compatible printers, such as the Grappler or the PowerPrint, we’re on the road to... well, to anywhere we can carry our Macs.

After three weeks of working with dot-matrix printers, contributing editor Andy Rosske hopes that his hearing will return sometime soon.
## Table 1: Mac/Dot-Matrix Printer Interface Kits

<table>
<thead>
<tr>
<th>Company</th>
<th>PowerPrint</th>
<th>ICD</th>
<th>Grappler 1sp</th>
<th>Grappler 9 Pin</th>
</tr>
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<tbody>
<tr>
<td>GDT Softworks, Inc.</td>
<td>$149</td>
<td>$99.95</td>
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<tr>
<td>ICD, Inc.</td>
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<tr>
<td>Orange Micro, Inc.</td>
<td>$159</td>
<td>$129</td>
<td></td>
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</tr>
</tbody>
</table>

### Pros
- Custom print drivers for individual printers have more features than Apple's ImageWriter LQ driver. Print driver is all that's needed (no control panels). Also compatible with inkjet and laser printers.
- Emulates ImageWriter LQ for maximum compatibility. A new version with network and spooling software should be out by the time you read this.
- Emulates ImageWriter LO driver. Network and spooling software included. In networks, you can add users at no additional cost. Also compatible with inkjet and laser printers.
- Lacks the special features of custom drivers. Uses a control panel as well as the somewhat quirky LQ driver.
- Lacks the special features of custom drivers. Uses a control panel as well as the somewhat quirky LQ driver.
- Lacks the special features of custom drivers. Uses a control panel as well as the somewhat quirky LQ driver.

### Cons
- No network software. In networks, each Mac must have a registered copy to use the networked printer.
- Lacks the special features of custom drivers. No inkjet or laser-printer compatibility. No network software.
- Lacks the special features of custom drivers. No inkjet or laser-printer compatibility. No network software.
- Lacks the special features of custom drivers. No inkjet or laser-printer compatibility. No network software.

### Company
- GDT Softworks, Inc.
  - P.O. Box 1965
  - Point Roberts, WA 98281
  - 604-291-9121
- ICD, Inc.
  - 1220 Rock St.
  - Rockford, IL 61101
  - 815-968-2228
- Orange Micro, Inc.
  - 1400 N. Lakeview Ave.
  - Anaheim, CA 92807
  - 714-779-2772
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Mirror 16-inch Color Display $899 for built-in video, with 8-bit $1299, 16-bit $1399, 24-bit $1699.
Impressing the members of a Mac user group is never easy, and if that group happens to be from Missouri, the task is all the more difficult. So we were particularly pleased to have the members of Missouri's largest user group tell us they were impressed by Mirror Macintosh peripherals.

It's easy to see why Tim Garcia thinks the new Mirror 16-inch Color Display is so exciting. Never before could you get the productivity and convenience of a 16-inch display and Mirror quality at such an attractive price. At only $899, the Mirror 16-inch Color Display is perfect for publishing, illustration and scanning. Plug it right into the video port on a Quadra or add one of our high performance video boards (available in 8-, 16-, or 24-bit models) and you've got a hard working system that won't break your budget.

Another addition to the Mirror product line that's bound to build a strong following is the Mirror 128 MB Optical Drive. It gives you 128 MB of fast, reliable storage on a rugged removable cartridge that fits in your pocket. Priced at only $1,449, the 128 MB Optical Drive is perfect for storing large graphics, database files or backups. Additional cartridges are just $59.

Our exciting new laser printers, the MirrorImage™ 309 and the MirrorImage™ 415 give you more features, more functionality and higher performance than printers costing hundreds or thousands more. With state-of-the-art RISC processors, Adobe's PostScript 2, SCSI port, three interface ports, and a very low cost-per-page for consumables, the MirrorImage Laser Printers can handle even complex jobs with ease.

Like all Mirror Products, the MirrorImage Printers include lifetime technical support and our 30-day, "love it or return it" guarantee.
COLOR DISPLAYS

- 14-inch Color Display $399*
- 16-inch Color Display $899*
  - w/ 8-bit video card $1,299
  - w/ 16-bit video card $1,399
  - w/ 24-bit video card $1,999
- 16-inch Trinitron® Display
  - w/ 8-bit video card $1,199*
  - w/ 16-bit video card $1,699
  - w/ 24-bit video card $1,999
- 20-inch ProView V
  - w/ 8-bit video card $1,799
  - w/ 24-bit video card $2,299
  - w/ 8-bit video card $2,499
- 20-inch ProView (Trinitron)
  - w/ 8-bit video card $2,499
  - w/ 24-bit video card $2,999

MONOCHROME DISPLAYS

From our value priced 15-inch portrait displays to our stunning 21-inch two-page display, every Mirror monochrome display offers superb sharpness, ergonomic design and excellent performance. Matching Mirror video cards are available for most Macintosh models.

- 15-inch Analog Portrait Display $449*
  - w/ monochrome video card $599
- 15-inch Standard Portrait Display $499
  - w/ monochrome video card $599
- 19-inch Two-page Display $779
  - w/ monochrome video card $999
- 21-inch Two-page Display $779*
  - w/ monochrome video card $999

STORAGE

All Mirror drives feature rugged steel enclosures, high-grade power supplies, external push-button SCSI address switch, switched convenience outlets, and external termination.

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Int.</th>
<th>Ext.</th>
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<td>Mirror CD Information Library (with drive purchase)</td>
<td>$189</td>
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</tbody>
</table>

COLOR SCANNER

Mirror's top-rated 600 Color Scanner offers true 600 dpi scanning resolution, 24-bit color and a great price. Comes complete with Adobe Photoshop 2.0.

- Automatic Document Feeder for scanning multiple pages automatically.
  - $549

LASER PRINTERS

The MirrorImage Laser Printers feature Postscript Level 2, RISC processors, 35 built-in Adobe fonts, three interface ports, a SCSI port for adding a font drive, and an installation videotape.

- The MirrorImage 309 is a 300 dpi, 9 page-per-minute printer for letter or legal size paper. Includes 2 MB of RAM (upgradable to 10 MB). $1,699
- The MirrorImage 415 is the smallest tabloid size laser printer available. It offers true 400 dpi printing and a heavy duty 15 page-per-minute print engine. Includes both an 11"x17" and 8.5"x11" paper tray, and 4 MB of RAM (upgradable to 16 MB). $4,499

COLOR SCANNER

Mirror's top-rated 600 Color Scanner offers true 600 dpi scanning resolution, 24-bit color and a great price. Comes complete with Adobe Photoshop 2.0.

- Automatic Document Feeder for scanning multiple pages automatically.
  - $549
Now, MS-DOS Files Can Look Just Like Mac Files.

With AccessPC®, you just pop any DOS floppy in your drive, and in a couple of clicks, what you see on your desktop are Mac files.

And they not only look just like Mac files, they act just like Mac files in Mac applications.

You can edit, copy, save, print, play with the numbers, print again, and give the PC folks back their diskette.

AccessPC is System 7 savvy as well as completely compatible with Apple's System 6.

Plus, it includes powerful Multi-Driver™ and Media Formatter™ utilities, free. You get instant compatibility even with DOS removable cartridges and optical drives. And you can get access up to ten times faster than with other utilities.

Pick it up today. You'll be amazed at how such an inexpensive little utility can make you look so good.
Back in August '91, *MacUser* columnist Michael Swaine predicted that X-rated videos would be what made digital video pay off commercially (see “America’s Home Video,” page 45). Swaine reasoned that “a genre in which production quality and artistic merit are superfluous can put a lot of product into the pipeline awfully quickly.” That prediction has taken a first step toward reality with *House of Dreams*, the first X-rated QuickTime CD-ROM movie, from Digital Ecstasy. Yes, it’s a 77-minute X-rated movie. You were expecting *Citizen Kane*, maybe?

**By James Bradbury**

**Don’t get caught shorted:** Like many other consumer products (such as video cameras and cellular phones), Apple’s PowerBooks come with battery packs that have exposed terminals. Accidentally shorting them (by storing spare batteries in the same carrying case as a leaky can of Diet Pepsi, for example) could result in anything from a ruined battery to a fire. Although the risk of such disasters is slight, Apple has decided to provide *free protective battery cases to PowerBook users*, just to be on the safe side. For information, call 800-377-4127 (outside the U.S., contact your local service provider).

**Making dates:** The PIM scheduler field has seen lots of new players, but an old favorite has shipped a new version as well. AgentDA, from Team Building Technologies (514-278-3010), features a *well-thought-out interface*, System 7 compatibility, and the ability to simultaneously open multiple calendars. Users without a lot of RAM will also appreciate that it needs only 140K of memory. $129 (additional user packs are $50 each).

**Speaking in tongues:** Want to learn a foreign language? Here are some software packages that could have you ordering fancy meals in Spanish, French, German, or Italian: *Picture It*, from Penton Overseas (619-431-0060), is a $69.95 set of computer flash cards. Each version teaches more than 500 words, complete with illustrations and audio pronunciations. For the more ambitious linguist, HyperGlot (800-726-5087 or 615-558-8270) offers *Berlitz Think & Talk*, a 50-lesson, 1,000-plus-word course on six to eight CD-ROMs, for $199. For linguists with *literary aspirations*: Transparent Language, from Transparent Language, Inc. (800-752-1767 or 603-465-2230), teaches reading comprehension by letting users read short works of foreign literature on their Mac, with translations, notes, and contextual information only a mouse click away. Each work comes with an audiocassette that provides pronunciation and listening-comprehension practice. The introductory package with samples (in Spanish, French, German, and Latin) costs $115.

**Not just for fun:** Kids who are learning to read English (and parents dreading that 100th reading of a favorite story) will appreciate *Just Grandma and Me*, the first Living Book from Brøderbund (415-382-4400). The beautiful color graphics, sound, and interactivity on this CD-ROM storybook are in a class by themselves. As an added bonus for preschool linguists, Japanese and Spanish versions are included. No retail price was set at press time, but expect to pay between $39.95 and $54.95.
"Brilliant"

The user-installable Accel-a-Writer controller from Xante® is literally an art director's dream come true. This breakthrough technological value installs in any Apple® LaserWriter® in minutes to deliver true 600 x 600 dpi typeset-quality text and 850 x 850 dpi gray scales. That means you'll have 197 gray levels instead of the 25 you're limited to at 300 dpi! You'll enjoy clear, crisp graphics, scanned images and halftones that are simply the best available from any laser printer on the market today.

What's more, the Accel-a-Writer's RISC processor delivers this superior output up to 12 times faster than your current laser printer!

You'll enjoy other important advantages, too. Like 35 resident fonts. Expanded connectivity for simultaneous operation of Apple Macintosh®, IBM®/compatibles and other popular workstations. A SCSI port to easily attach external hard drives for permanent storage of downloadable fonts. And Advanced Memory Management that automatically allocates the Accel-a-Writer's memory to increase resolution, virtual memory or font caching as needed.

Call Xante toll-free to order your Accel-a-Writer now, (there's one for every Apple LaserWriter & most HP® Laserjets®) and give your printer capabilities most art directors only dream about.

**Accel-a-Writer**
Original LaserWriter & LaserWriter II

**Accel-a-Writer II**
LaserWriter IIIC, LaserWriter IINT & LaserWriter II NTX

**Accel-a-Writer III**
Personal LaserWriter SC & Personal LaserWriter NT

**Accel-a-Writer IX**
Personal LaserWriter LS

1-800-926-8839
FAX 205-476-9421
If you had room on your shelf for only four Mac books, which ones would make the grade?

By Steven Bobker

The world has somewhere between 8 and 12 times as many DOS computers as Macs. That ratio hasn’t changed much in years. Even the recent trend toward less expensive Macs has had little effect.

Although Apple’s still having difficulty gaining CPU market share, Macs have made spectacular gains in one area: books — books about the Mac, about its workings, and about its software. The number of Mac titles has ballooned from 2 in early 1984 to a huge and constantly increasing number today. My local bookstore, which carries a reasonable number of computer books, now stocks 1 Mac-related book for every 3 or 4 DOS-related books. The last time I checked, there were 12 books on System 7 basics alone.

Those first Mac authors are still writing: Doug Clapp is finally bringing out his second book on Macs. Like the first, it’s sure to be eclectic and interesting.

The fourth edition of Cary Lu’s The Apple Macintosh Book (1-55615-278-7, Microsoft Press, $24.95) was published just before this issue went to press. (Note: Instead of the usual retail price and phone number, this column provides the ISBN [International Standard Book Number], in case you want your book seller to order the book; the publisher; and the suggested U.S. retail price.) The new edition retains the same squarish format, elegant and easy-to-read design, and wonderful mix of Macintosh and general computer knowledge. What’s more, it’s printed on recycled paper. The information is up-to-date as of January 1992, and coverage ranges from absolute beginner to just below power user. Several software programs get a brief mention, but the book’s greatest strength is its wealth of information on Mac operational details. The Apple Macintosh Book delves deeply into the subject, but it always remains understandable — definitely a book for every Macintosh library. If you return the included card, you’ll get a free update in the first half of 1993.

The Deluge

The number of Macintosh books I receive every week has prompted more than one complimentary comment from my mail carrier. It’s impossible to read all the books
printed in the past year — or even the past month — with care. There's simply not enough time. I do look at them all, though, and read at least part of each one. Here are two of the conclusions I've reached: (1) There are few really great Mac books available, but there are some. (2) My mail carrier has a valid complaint. Most of these books are unnecessary or have very small, specialized markets; a disproportionately large number are turkeys.

What follows is a rundown of the best Mac books I've read, with a few warnings tossed in about what to avoid. My goal is to give you a list on which you can base a good, solid Mac library.

For the most part, I've stuck to general Mac books and to books about the Mac's system software, programming, and related issues — omitting application-specific books. You can write to me at MacUser (or electronically on ZiffNet/Mac at 72511,45) and tell me what other books you like and why. If there's enough interest, I'll write a follow-up column.

Along with Cary Lu's book, there are three other essential Mac books. The first is Guy Kawasaki's *The Macintosh Way* (0-673-46175-0, Scott, Foresman, $19.95; also available in paperback). No other book comes close to this classic in explaining what the Macintosh really is, how it got that way, and how it can stay that way. It's a wonderful book.

The other two essential books have an operational nature. They're guides to getting started and becoming a productive and powerful user. My absolute favorite book is Bob LeVitus' *Dr. Macintosh: How to Become a Macintosh Power User*, second edition (0-201-57070-5, Addison-Wesley, $24.95). Bob, a regular in these pages, is as good at explaining details as anyone I know. He writes so well that learning complex, demanding material becomes a pleasure. The tone of the book is conversational, and it's packed with valuable tips.

The second great operational book is Danny Goodman's *Macintosh Handbook* (0-553-35485-X, Bantam, $29.95), written by Goodman and Richard Saul Wurman. Wurman is the creator of the highly honored Access series of travel guides, so it's no surprise that this book is laid out like those famous publications, with bold graphics and large areas of color that provide organization. The book is absolutely up-to-date and makes an excellent desktop reference. Its episodic and graphic structure isn't conducive to extensive reading but does make finding topics easy, and the quality of the information is very high. However, the first release of the book is flawed by bad printing on cheap-feeling paper (apparently there was a rush to get it out), and the power-user tips, in small white type on a black background, are difficult to read.

Two books that almost make the list are *The Macintosh Companion* (0-201-57754-2, Addison-Wesley, $22.95), by Sharon Zardetto Aker, and *The Little Mac...
Book, second edition (0-938151-68-1, Peachpit Press, $14.95), by Robin Williams and Kay Nelson. *The Macintosh Companion* is excellent for beginners and users who are considering buying their first Macintosh (these users should also get Cary Lu’s book). It won’t take you as far as the Big Three, but it will certainly get you started. *The Little Mac Book* provides a good overview of Mac operations. It’s more of a taste than a meal, but it’s a very nice taste.

Far too many books are devoted to the topic of System 7, and many were rushed to press. None of them is great, and you can get by without any of them. All the recent, more general books cover System 7 in detail and do it better than the stand-alone books do.

There are three good books about ResEdit and MacsBug. Although both applications were written for programmers and are often considered exclusively to be programmer’s tools, ResEdit and MacsBug are very handy for advanced users and are not at all dangerous when used properly.

The best ResEdit book is *ResEdit Complete* (0-201-55075-X, Addison-Wesley, $29.95 with disk), by Peter Alley and Carolyn Strange. The disk has a copy of ResEdit, but it’s not likely to be the latest version (the latest version of ResEdit is readily obtainable from bulletin-board services and user groups). This book is full of excellent explanations of how ResEdit works, and its detailed procedures can get readers started well in the joyous art of ResEdit hacking.

The other ResEdit book is *Zen and the Art of Resource Editing* (0-938151-75-4, Peachpit Press, $24.95), edited by Derrick Schneider, Hans Hansen, and Noah Potkin. This book is a good, safe way to get started with ResEdit. It’s not as thorough as *ResEdit Complete*, but it’s quite a bit friendlier.

Take my advice and stay away from the official Apple/Addison-Wesley guide to ResEdit, because it’s inferior to these books and is overpriced, as well.

The official *MacsBug Reference and Debugging Guide* (0-201-56767-9, Addison-Wesley, $22.95), on the other hand, is excellent. The book includes an explanation of a complicated but useful programmer’s tool in a form that makes it accessible to all readers. Good stuff.

Finally, let me mention one book that owners of older Macs might find useful: *The Dead Mac Scrolls* (0-940235-25-0, Goldstein & Blair, $32), by Larry Pina.

**ResEdit Complete’s excellent explanations and detailed procedures can get readers started well in the joyous art of ResEdit hacking.**
RealTech Laser
QMS 810 Turbo w/HD
Apple NTX w/HD
QMS 410
TI Micro-Laser 35
Apple PostScript LaserWriter

Street prices:
$1695
$3995
$4295
$1750
$1749
$1995

On average, the RealTech Laser performed 4 to 5 times faster than other PostScript® laser printers in its price range.

Visibly faster. The RealTech laser printers’ high performance Weitek RISC processor prints complex documents 4 to 5 times faster than other non-RISC laser writers in their price range. ATM font rendering technology builds raw type characters 4 to 5 times faster. The RealTech uses a new version of the Sharp printer engine that prints 9 pages per minute.

Based on Adobe PostScript® Level 2...
the next generation of Adobe’s page description language, which has become the industry standard for defining pages of integrated text and graphics. It contains a number of performance, function and print quality enhancements that save printing time and improve quality. PostScript® Level 2 is compatible with all current application software that supports the PostScript® language. In addition, PostScript® Level 2 offers new capabilities, including forms handling, graphic patterns support, and new half-tone algorithms.

Visible faster.
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Genius-level memory.
One pool of memory is available for all resource needs. Memory is dynamically allocated and automatically reclaimed; no arbitrary memory restrictions exist. Disk space management is improved to eliminate fragmentation and improve transfer of information from the hard disk to RAM.

HOW REALTECH STACKS UP

PERSONAL LASER PRINTERS

<table>
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<th>RealTech Laser</th>
<th>Apple LaserWriter 985</th>
<th>NEC Model 95</th>
<th>TI microLaser Turbo</th>
<th>GCC BLP IIs</th>
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<td>Cons</td>
<td>Only available through HARDWARE THAT FITS 1-800-972-3018</td>
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<td>Expensive options</td>
<td>Expensive options</td>
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<td>Only expandable to 4 mb RAM</td>
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<td>Optional 2nd paper tray</td>
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Optional env. feeder $269
Optional 2nd paper tray $299

HARDWARE THAT FITS
610 South Frazier
Conroe, Texas
77301
Seiko Instruments
ColorPoint PSX
$6795
Lease: $186/mo.

It's fast! Prints on roll-fed paper or roll-fed transparency to within 1/4" border on all sides, ensuring that the full-color image is printed without reducing the image size. 300 dpi color thermal printer uses 25 MHz RISC processor. 6 Mb RAM standard, upgradeable to 34 Mb. Adobe PostScript® language compatible. Download, process and print images simultaneously; it has multiple frame buffers. Includes three interfaces as standard: AppleTalk, Centronics, and RS-232, plus a SCSI port, allowing users to share the ColorPoint among Macs, PCs, workstations, or a network. The printer continuously polls all interfaces and re-configures automatically to receive incoming data. 39 resident fonts.

Seiko Instruments
ColorPoint PS
$5295
Lease: $148/mo.

Same specifications as the PSX, but with a 16 MHz processor, 6 Mb of RAM standard, upgradeable to 34 Mb.

Seiko Instruments
Personal ColorPoint PS
High quality color! 300 dpi color thermal printer can produce full-bleed comps on plain paper or transparencies. B4 page size allows printed image of 8.53" x 11.917. 6 Mb RAM upgradeable to 10 or 22 Mb. 39 resident fonts, 16 MHz RISC processor.

Seiko Instruments
Smart Label Printer Plus
$175
Can print bar-coded labels. Takes less desk space than a Rolodex® file. Prints labels for envelopes, file folders, diskettes, notebook covers, file cards, name tags, and more. Bar-coding capability makes it useful for tagging low-volume inventory. Includes software (with its own database, text editor and bar-code generator), serial cable and 130 self-adhesive labels.

CoStar Label Printers
AddressWriter
$469
LabelWriter II
$189
The RealTech laser printers come out on top in performance, features, AND price, every time.

RealTech Laser printers are backed by a 1-year warranty. If you're not satisfied, we'll refund your purchase price, minus consumables.*

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LEASING INFORMATION:
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CALL: 1-409-760-2400

HOURS:
8 am-7 pm CST
Toll-free in the U.S. & Canada, too!

$4495
Lease price: $123/month

RealTech Laser 400

TWICE THE PRINTER!
400 dpi/11x17 printer

• High-speed printing (15 ppm, letter size)
• 8 ppm (tabloid size)
• SCSI port
• 2 paper trays included!
• Edge-to-edge printing!

AGAINST THE COMPETITION

11x17 PRINTERS/HIGH-SPEED PRINTERS

<table>
<thead>
<tr>
<th>RealTech Laser</th>
<th>QMS 2210</th>
<th>Hewlett-Packard IIIsi</th>
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<td>11 ppm 11x17</td>
<td>17 ppm 8.5 x 11</td>
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<td>SCSI port</td>
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<td>5 mb RAM upgradeable to 17 mb</td>
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<tr>
<td>Cons</td>
<td>Limited supply</td>
<td>Very expensive</td>
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<td></td>
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<td>Limited to 300 dpi</td>
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<td>1-800-972-3018</td>
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<td>4 mb RAM maximum</td>
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<td>* Optional paper tray $115</td>
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</table>

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The color output shown above is an Aldus Freehand sample file.
In addition to having the best title of any Mac book, The Dead Mac Scrolls offers excellent directions on how to repair older Macs and printers. Despite what its cover and publicity might lead you to think, however, the book doesn’t cover newer units (starting roughly with the IIcx). Actually, I don’t know of any book that adequately covers the repair and servicing of the Mac models that were released within the past three years. On the other hand, older Macs are the units that are most likely to need fixing.

Pick of the Month

Panorama Direct (ProVUE, $99.95; 800-966-7878 or 714-892-8199) is a subset of the excellent Panorama 2.0 database program. It has almost everything the full-featured version has, with the exception of graphics creation and the ability to create macros (it can, however, run macros built by the full version). What you get for giving up some features is a great price and a relatively small package filled with database power.

Panorama has earned a reputation for great speed, because it works entirely in RAM. That means that your file sizes are limited by RAM, of course: In the 976K minimum partition, you can store 7,000 to 8,000 records. The application requires only 461K of disk space and creates small data files.

Data entry in Panorama is easier than in any other database program. Features such as Clairvoyance, which automatically finishes typing entries that it recognizes; AutoCapitalizing, with an obvious function; and Smart Dates, which lets you use dates such as “last Saturday” and “next Monday,” are a pleasure to use when you must accurately enter quantities of data. Panorama Direct’s small size and infrequent need to access (and wake up) your hard drive make it a great PowerBook tool.

Road Tips

Battery life is a major topic of discussion when PowerBook users gather. I get nearly three hours per charge on PeeBee, my PowerBook 140 with 8 megabytes of RAM and an 80-megabyte hard drive with modern friends with similar PowerBook 140s with 4 megabytes of RAM and 40-megabyte hard drives tell me that they rarely get two hours per charge. Although there are several variables to consider, many users still don’t know how to maximize their battery’s use per charge.

Adding memory and using bigger hard drives and modems decrease the use per charge. Each of these things draws small amounts of power, so the drop should also be small, even if you add all three items at once. A dramatic drop in battery life may mean a defective component or a bad installation. Have your dealer check out those possibilities.

You also need to really charge the battery. You can fill all the squares in the Battery DA in two or three hours, but that’s not a full charge. A full charge takes at least seven or eight hours. If you rely on the Battery DA’s readings, you’ll run out of power very quickly.

The worst battery-life abuser is
AppleTalk, which can rob half an hour or more per charge: Turn it off when you're not using it. Train yourself to check the Chooser frequently to make sure it's off. When your PowerBook is running on battery power, turn the screen brightness down to just above Off. In bright sunlight, you might not even need back lighting. Try it, especially if you have the 170 model. These two steps should substantially increase time between recharges.

The third major power consumer is your hard drive. When it's spinning, it uses quite a bit of juice. (The hard drive’s size doesn’t really matter; just being on and spinning is a substantial drain.) Keep your drive off as much as possible. You can set automatic timed shutdowns by using the Portable control panel, but a much better solution is to use Billy Steinberg’s SpinDFkey (part of the PBTools package, which is available as PBTOOL.CPT in Library 3 of zipNet/Mac’s Download & Support Forum). This easily installed Fkey shuts off the hard drive on demand. If you won’t need your hard drive in the next 60 seconds or so, shut it off. (The 60-second rule is important, because starting up a hard drive is the action that consumes the most power, so you don’t want to have to start up again unnecessarily.)

If, after trying these tricks, you still can’t work for more than 90 minutes per charge on your PowerBook, you may have a defective battery.

**Eggs for the Mind**
Both Microsoft Word 4.0 and Word 5.0 have Easter eggs. So far I’ve seen only the one in Word 4.0, but if anyone has found the Word 5.0 Easter egg, I’d like to hear about it. I believe it’s associated with a menu command and has nothing to do with the About box, which is a semistandard location for burying Easter eggs.

Here’s the Word 4.0 Easter egg, which is located in the About box. To view this Hollywood-style tribute to Word 4.0’s production team, select About Microsoft Word from the top of the Apple menu. Position the cursor over the Word icon near the top left corner, hold down the Command key, and click the mouse button. The Word icon drops, and the lights come on. To end the show, simply click the mouse button again. On all the Macintoshs I’ve used to test this egg, the show eventually slows down but never quite stops.

Steven Bobker, a former editor-in-chief of MacUser, currently keeps busy acting as sysop for zipNet/Mac, MacUser’s on-line service, among other projects. He can be reached there at 72511,45 and welcomes all comments.
How To Buy

CD-ROM Drives

The pundits who promised there'd be a CD-ROM drive on almost every desktop may soon be proved right. Sales of these read-only drives, which let you access discs that can contain more than 600 megabytes of information, are finally taking off, and prices are heading down, with some drives available for not much more than $400. Although performance is still sluggish in many cases, new standards are improving throughput. In addition, more and more Mac-specific CD-ROMs are becoming available. These discs are proving especially popular in professional settings, whether for training, reference, or storing such resources as graphics and clip art. If you're in the market for a CD-ROM drive, these pointers will head you toward the right one. For more information, see "Is It Time for CD-ROM?" June '91, page 150, and "Most Valuable Players," March '90, page 150.

By Victoria von Biel

CD-ROM is an acronym for compact disc read-only memory. CD-ROMs look exactly like their audio counterparts, and in fact, you can play audio CDs on a CD-ROM drive.

No, you can't hook up your CD player to your Mac and use it to read CD-ROMs. Unfortunately, CD players have much slower access times than do CD-ROM drives and lack the SCSI interface and error-correction circuitry necessary for computer use.

Why are CD-ROM drives more expensive than CD players? Fewer CD-ROM drives are produced so they cost more to manufacture. They also use more-expensive components.

Although you won't break any speed records with a CD-ROM drive, manufacturers have finally broken away from old standards that shackled performance. NEC now makes some drives that are showing faster throughput than was previously possible, and other manufacturers are sure to follow suit.

Check out the audio software that comes with the CD-ROM drive. Usually in the form of a control panel or HyperCard stack, this software lets you play audio CDs on your drive when you're not using it to access data. Some programs let you do such things as create custom play lists and shuffle tracks.

For the best-quality sound, make sure the drive has RCA preamp jacks that let you hook it up to external speakers; otherwise you're limited to the headphone jack.

Check the volume control — you want something that will give you as much power as possible.

If you'll be using the drive for specific purposes — to access Adobe Photoshop files, for example — test the drive with the software before you buy. You may find significant performance differences among drives.

Some manufacturers bundle free CDs with their drives, but don't let this blind you to the drive's quality — or lack of it.

Dust is a CD-ROM drive's greatest enemy. If you're going to be working in a dirty environment (near an open window or in a room where people smoke, for example), check that the drive's door closes, thus protecting the mechanism.

If the drive has a fan, don't assume that it will protect the mechanism from dust. Hold your hand in front of the fan to make sure that it's blowing air out, not sucking it in.

In the crucial fight against dust, drives with self-cleaning lenses are more reliable, but they're also more expensive.

If you're using System 7, make sure the drive comes with a System 7 driver. Surprisingly, some manufacturers still aren't including this vital piece of software.

Here's how to test a CD-ROM driver's reliability: Mount a disk, drag it into the trash, and then remount it. If the disk doesn't remount, the driver is questionable.
Good news for all you BBS aficionados: Finally, there's a one-stop solution for decompressing the most-popular compression formats, and it's free. StuffIt Expander, from Aladdin Software, decompresses all StuffIt, AppleLink, and Compactor Pro documents. Get it from your local user group or an on-line service such as CompuServe or America Online. To download StuffIt Expander from MacUser's on-line service, ZiffNet/Mac, look for STUFEX.SEA in the Download & Support Forum's New Uploads library.

By Victoria von Biel

Say ahhh: Thinking of buying a new hard drive, monitor, or CPU? Along with your credit card, you might want to take a copy of Maxa Snooper, diagnostic software that performs benchmark tests, seeks out hardware ills, and does the kind of video tests that'll ensure you're getting the best buy for your money. There's a software-only version ($229) that works on any Mac from the Plus on up as well as a hardware/software combo ($299) that includes a NuBus card for diagnosing problems when all you get is that sad-Mac face on your screen. For the ultimate in Mac diagnostics, you can team Snooper with Teknosys' Help!, which finds software problems and incompatibilities. These two programs are bundled in one package from major mail-order outlets. No price was available at press time. 818-543-1300.

Plugged in: PowerBooks are great on the road, and they're not bad around the office either. But if you frequently connect your PowerBook to a hard drive, an ADB device, or a network, dealing with all those cables can be a drag. By letting you set up all the cables and connectors you'll be using in its base unit, BookEndz, from Pilot Technologies, helps you tame some of the chaos. When you're in the office, just pop your PB into the unit and you're all hooked up; when it's time to go, pull it out, and you're on your way. For the PowerBook 100, $149.95; for the PowerBook 140 or 170, $179.95. 612-949-2683. If you thought that Sophisticated Circuits' PowerKey was just an easy way for Mac Classic owners to turn on their machines without reaching behind the computer, think again. When combined with PowerKey Remote and AppleTalk Remote, PowerKey 2.0 lets PowerBook users access hard drives, modems, and other peripherals attached to the Mac back in their office. Download files, send faxes, peruse your E-mail—all from your PowerBook. PowerKey Remote, $49. 206-485-7979.

Vacation reading? You might even want to take this one to the beach with you: HyperCard guru Danny Goodman and designer Richard Saul Wurman have teamed up to produce Danny Goodman's Macintosh Handbook Featuring System 7. Much of the information is presented visually, so you don't have to wade through pages of dry text to find what you're looking for. Even better, each part's divided into beginner, intermediate, and advanced sections, so you can skip the info you don't need. Bantam Computer Books, 212-492-9479. $29.95.
Are you in the market for an integrated program? Here's a quick guide to what makes these all-in-one packages tick.

By Laurie M. Love

By definition, an integrated product brings together several functions — word-processing, graphics, spreadsheet, database, telecommunications, and so on — into one product. Although programs such as Beagle Bros’ BeagleWorks, ClarisWorks, or the soon-to-be released Microsoft Works 3.0 may not be hefty enough for all the work you need to do, they're good choices for users who are new to the Macintosh, experienced Mac users who just don't need all the bells and whistles that full-featured programs offer, and PowerBook owners who are looking for lots of power in a small package.

Most of the integrated packages now available can produce the letter shown at right, which includes a simple logo, text, a spreadsheet, and a chart, and takes advantage of mail-merge capabilities. What distinguishes one integrated product from another lies in the way you use the different functional areas together to accomplish the task. For reviews of the integrated packages now available, see “Swiss-Army Software,” June '92, Buyer’s Guide page 44.

Santa Cruz, California-based writer and editor Laurie M. Love is author of Using ClarisWorks, published by Addison-Wesley.

Most integrated programs include a charting capability. Although all charts are based on a selection of spreadsheet data, each product differs in the way you create charts and in the charting options available (see Figure 3). The easiest, most seamless way to create a chart is to select the data, choose a menu command (or press a keyboard equivalent), and see the chart appear on your screen. ClarisWorks and Microsoft Works 3.0 both follow this simple procedure, placing the chart in the document as a graphic object. In BeagleWorks, a dialog box appears before the program draws the chart, asking you to name the chart and specify its location on-disk. When the program has finished drawing it, the chart appears in a separate window as a draw document.
Mail-Merge

Mail-merge — in which data from the database module such as names and addresses, prices, or inventory information is automatically added to documents — fits naturally into integrated programs. In this example, mail-merge was used to add the address, greeting, and dues owed.

Most programs handle mail-merge the same way; they let you merge database information from an open database document into an open word-processing document. In ClarisWorks, however, you can merge database information into a text frame that can then be added to a spreadsheet or chart.

Word Processing

You probably wouldn't buy an integrated program to get such complex word-processing features as indexing or fancy formatting, but you may be surprised at the sophisticated features that are available. Most offer some advanced word-processing capabilities such as a thesaurus and macros. In addition, GreatWorks offers tab fills and multiple columns with variable widths, both Microsoft Works and ClarisWorks let you create footnotes, and ClarisWorks lets you link text frames (or spreadsheet frames) so that text flows from one frame to the next.

Combining Data Elements

Generally speaking, integrated programs take either a modular or a frame-based approach to integrating data among the various modules. In the modular approach, you create different types of data in separate documents and then copy the data from the native module and paste it into the document in which you're working. In a frame-based approach, data is embedded in the document, which makes sharing data among modules much more seamless.

Microsoft Works relies heavily on the modular approach. To add a spreadsheet and a chart to a letter like the one shown here, you first use the spreadsheet module and then move the completed spreadsheet and chart to the word-processing document by copying and pasting them one at a time. Once pasted, the spreadsheet data becomes editable text, but mathematical relationships are not maintained, nor is the link between the spreadsheet's data and the chart.

ClarisWorks uses a frame-based approach. A ClarisWorks frame is an object that acts as a view into another application's environment, giving you complete access to that other environment's menus and commands. For example, to add a spreadsheet and chart to a document in ClarisWorks, you use the spreadsheet frame within your document and then chart its data. The spreadsheet frame and chart are objects that become part of the document; you don't create or save them separately.

Tool Palette

The core of an integrated program is often its tool palette, which is where you find tools for drawing objects and accomplishing module-specific tasks such as creating text or spreadsheets. In most integrated products, the drawing tools are available in any module. An exception is Beagle Bros' BeagleWorks, which doesn't have a common tool palette, although the frame tool, which creates frames, is available no matter what module you're using.

Each product's tool palette has its own advantages: ClarisWorks' palette remains constant across all applications' environments and includes a spreadsheet and text tool as well as drawing tools (see Figure 1). To access the features of another application area, you simply click on the corresponding tool to get access to the menus and commands of one environment from a document created in another.

BeagleWorks has module-specific tool palettes; you can access commands from either the menu or the tool palette of the module you're currently using (see Figure 2). The tool palette in Symantec's GreatWorks offers the most-powerful drawing tools, including a spray can, Bezier curves, and gradient fills.

Figure 1: The ClarisWorks tool palette includes text and spreadsheet tools that let you create frames for these modules within any application environment.

Figure 2: The BeagleWorks tool palette varies from module to module. From it, you can access menu commands.

Figure 3: The GreatWorks charting option lets you create picture-column charts as well as standard bar and pie charts.
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CIRCLE 89 ON READER SERVICE CARD.
The 30-Minute Tune-Up

Four easy steps to boost your Mac's — and your own — productivity.

By Bob LeVitus

Printing been a little slow ever since you installed System 7? Can't locate your favorite font? Need to scroll for five minutes before you find what you want on the Apple menu? If you've answered yes to any of these questions, it's time to tune up your Macintosh. But don't worry, we're not talking pliers and wrenches here — you can boost performance (your Mac's and your own) by merely installing a new system enhancement from Apple and by more efficiently managing and organizing the contents of your System Folder.

1. Tune It Up!

The first step is to get ahold of Apple's System 7 Tune-Up, which comes on one floppy disk, including an Installer. You can get it at no charge from on-line services, user groups, and Apple dealers, and it's packaged with new Macs. System 7 Tune-Up is easy to install: Just double-click on the installer icon, and the program does the rest. Once you've installed it, you'll see fewer "out of memory" messages and you'll have more memory available for application programs. You'll also experience faster, more reliable printing. You can check to see if System 7 Tune-Up is already installed on your Mac by going to About This Macintosh on the Apple menu. If there's a dot to the right of the system-software version number in the top right corner of the dialog box, the program is installed.

System 7 Tune-Up consists of a new Chooser, a new File Sharing extension, and new printer drivers for the LaserWriter and StyleWriter as well as an extension called System 7 Tuner that provides better memory management, particularly if you have 4 or fewer megabytes of RAM. System 7 Tuner has been available for several months, and there have been very few reports of bugs or incompatibilities — if you don't already have it, I recommend that you find a copy and install it as soon as possible.

Incidentally, Apple has indicated that system-software enhancements, such as QuickTime, and minor bug fixes, such as System 7 Tune-Up, will now be supplied as single-disk installers rather than as new system-software revs. This is good news, because it will reduce the frequency and complexity of your system-software updates.

2. Manage Your Extensions

Now let's open up that System Folder and dive in. The first thing we'll look at are System 7 extensions, otherwise known as control panels (cdevs) and extensions (INITs). When you drag a file of either type into your System Folder, the Finder informs you that these items need to be stored in special places inside the System Folder in order to be available to the Mac. It politely asks if it may put them where they belong. Once that's done, your Mac tells you where it's stashed the files.

This system's very slick but not necessarily what you want. Why not? Well, for one thing,
A special MacUser Labs section with the latest product information in these 4 areas:
• 21" Autosync Monitors—Testing two of the largest autosync monitors.
• StyleWriter and DeskWriter Printers—New and improved. Are they for you?
• Wax Thermal Color Printers—A challenger arises in this affordable color printing category.
• Hi-Res PostScript Printers—Offering exceptional & speedy high-end output. Just like MacUser!

SEPTEMBER AD CLOSE: Tuesday, June 23, 1992
items, my Extensions folder 32. Because I never want them all to load at the same time, I use Startup Manager to create different sets for different tasks. For example, I have a file-sharing set, which includes all the file-sharing and remote-access extensions; a QuickTime set, which includes QuickTime and Wild Magic; and a CD-ROM set, which includes the CD-ROM and Foreign File Access extensions. When I turn on my Mac, I choose a set based on the tasks I expect to perform. For me, living without an extension manager would be hell.

3. Put More on the Menu

Now it's time to move on to what is undoubtedly one of System 7's finest and often most underutilized features, the Apple Menu Items folder. First and foremost, you can and should put aliases for frequently used applications, documents, and folders in there. Go ahead and do it now; I'll wait. Once you've done this, your most frequently used files will always be handy when you need them — just pull down the Apple menu, and there they are. (I also keep aliases for frequently used files and folders on the desktop, so I have more than one way to open them quickly.)

As excellent as System 7's Apple menu is, there are several inexpensive utilities that make it even better. The best of these are extensions that add hierarchical menus to the Apple menu. Look for NowMenus (part of Now Utilities), HAM (Microseeds), SuperMenu (part of Connectix's HandOff II package), or MenuChoice (shareware; available from user groups or on-line services such as MacUser's ZiffNet/Mac). When you install one of these puppies, it's like putting your Apple menu on steroids. Any folder or alias of a folder in your Apple menu sprouts a hierarchical arrow so you can open any file or folder it contains by merely clicking and holding down the mouse as you scroll through the Apple menu.

Each of these utilities has slightly different features. For example, HAM and MenuChoice create a folder in your Apple Menu Items folder called Recent and store a list of recently opened folders there for easier access. SuperMenu and NowMenus let you pop up the Apple menu anywhere on the desktop by clicking while holding down a modifier key or keys. This feature is particularly useful if you have a large monitor or more than one monitor. SuperMenu has another nice feature that lets you choose a smaller font for displaying its pop-up menu.

4. Manage Your Fonts

The final step to organizing your Mac is to sort out your fonts. Happily, the dreaded and nonintuitive Font/DA Mover is obsolete under System 7. These days, installing a font is as easy as dragging its icon (or icons, if it's a PostScript font) onto the System Folder. The Finder automatically places the files where they belong — screen (or bit-mapped) fonts in the System file itself, PostScript printer (or outline) fonts in the Extensions folder.

### The System 7 File: Managing Extension Manager

Apple's Extension Manager 1.6 utility lets you take care of extensions and control panels, but you can also use it to manage other items that are loose in your System Folder, such as applications or startup sounds or screens. Here's how, thanks to Mark Simmons, of Berkeley, California:

- Open the Extension Manager control panel, click on the button labeled 1.6, and then click on the button labeled Configure. This brings up a window that lets you add new file types to Extension Manager's scrolling list of what's in your System Folder.
- You can find out what a file's type extension is by using ResEdit or a utility such as DiskTop.

Here are a couple of ways to use this feature:

1. **Add the file extension for applications (APPL) to the lower list in the Configure dialog box (just ignore the upper list).**

Applications you have in the System Folder, such as PrintMonitor, will now show up in the list on Extension Manager's initial screen, letting you turn them on or off.

2. **Control the contents of your Startup Items folder by storing aliases of the programs and files you want to open on startup, rather than the programs themselves.** By adding adrp (the type extension for a file alias) and fdrp (the type extension for a folder alias) to Extension Manager's list on the initial screen, you can disable these aliases if you don't want a particular program to open on startup.

Submit your favorite System 7 tips by mail or by modem in Zmac's System 7 forum (please include your address as well). If you submit the month's best tip, you'll not only receive notoriety and fame but you'll also get a spiffy "I Beat the System" T-shirt.
No Wild, No Wildlife.

The California desert tortoise is losing ground. Its young are being crushed by motorcycles and off-road vehicles. Sheep and cattle grazing are diminishing an already scant supply of food while mining and road building are destroying the tortoise’s natural habitat.

The fact is that the tortoise population has declined as much as 90% over the last fifty years. This drop is a true biological indicator of how severely the desert ecosystem is at risk.

The Sierra Club works to save wildlife by saving the wilderness. We have a history of victories. And, we believe with your help, the three-million-year-old desert tortoise can win back its native turf.

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Power Tools
BEATING THE SYSTEM

System 7 font management is painfully slow, and if you use a lot of fonts, your System file soon swells to massive proportions with all the screen fonts it contains.

But as simple as System 7’s font management is, if you use a lot of fonts, there is a better way: a font manager such as MasterJuggler or Suitcase II.

Font management under System 7 has two major drawbacks. First, it’s painfully slow, especially on slower Macs. When you drag a font into or out of the System file, you can wait a long, long time to regain control of your Mac. The second problem is that if you use a lot of fonts, your System file soon swells to massive proportions with all the screen (or TrueType) fonts it contains. Although the number of fonts in your System file has no impact on your system software’s RAM usage, having too many installed can be inconvenient and can chew up disk space at an alarming rate.

MasterJuggler, from ALSoft, and Suitcase II, from Fifth Generation Systems, address both of these problems: Both install and uninstall fonts far more quickly than System 7 does and compress your fonts so they take up less disk space. They also let you put any type of font — screen, TrueType, PostScript-printer font — in any folder on any volume.

I prefer MasterJuggler. It’s half the price of Suitcase II — about $25 if you buy via mail order — and it has several useful features not found in Suitcase II. For example, Juggler includes a sound manager that lets you assign different sounds to such events as startup, shutdown, restart, disk insertion and ejection, and file launch. It also includes a file launcher, which, although no match for HandOff II or OnCue, is extremely handy.

Although the tune-up I’ve outlined here covers just the basics, it should make your Mac easier to work with. In coming issues, we’ll look at more you can do to streamline your Mac.

Bob Lefitus is the author of Mr. Macintosh, Second Edition.
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Compiled by Gregory Wasson

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**PowerBook**

If you place an alias of the Battery control panel in the Startup Items folder, it will appear on the desktop when you start up, and you can easily tell how much power is left in the battery.

And don't forget that adding an alias of your hard drive to the Startup Items folder on any Mac lets you view the whole desktop at a glance as soon as you've booted up, without having to double-click on the hard drive's icon.

Brian D. Udell, M.D.
Fort Lauderdale, FL

**Microsoft Word 5.0**

To copy headers and footers into a new document, simply select and copy (Command-C) the old document's last paragraph return (turn on paragraph display by pressing Command-J if necessary) and paste (Command-V) the paragraph return into the new document. It doesn't matter how many pages long the old document is. When you display the headers and footers in the new document, you'll find that the old header or footer text has also been copied and pasted.

The footers and headers remain in the new document even if you delete the pasted paragraph return.

Diana J. Guffey
Huntington Beach, CA

**Finder (System 7)**

One of the more productive things you can do with System 7 is create dividers or headers in a window that's in icon view. Here's how:

Create a new folder (Command-N), and name it; using bullets (Option-8) or other symbols works well for creating dividers. Use a drawing program to create a borderless white rectangle that will fit over the folder's icon in the Get Info box (accessible from the File menu or by pressing Command-I). Copy the rectangle to the Clipboard, select the folder's icon in the Get Info box, and paste the rectangle over the icon. Now when you view this folder by icon, you'll see only its name.

Robert B. Woodward
Atlanta, GA

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Robert B. Woodward
Atlanta, GA

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**Microsoft Word 5.0**

With Word 5.0's Border Shading feature, you can easily produce white type on a black background (see Figure A). It looks great for headings in text or tables.

Here's how to do it: First select the text (a thick, sans serif font works best). In the Character dialog box (Command-D), choose bold for the style and white as the text color. Click on OK.

With the text still selected, choose Border from the Format menu. Select 100 percent from the Shading option (to create a solid black background), and click on OK.

If you don't want the black background to stretch across the page, adjust the right margin on the ruler.

To apply inverted headings quickly, save this format as a style. If you plan to reuse the same heading text, save it in the Glossary or the Scrapbook.

Patrick Houlihan
Greenwood, MS

[You can vary this basic procedure to produce attractive headings or chapter titles by changing the text's alignment, by using a text color other than white, or by using a border shade other than 100-percent black. — Ed.]

---

**Figure A:** You can use Word 5.0's Border command to create attractive section or chapter headers.
**Microsoft Excel 3.0**

You can add or subtract from the \&p command in Excel’s Page Setup dialog box. For example, if you type \&p+10 (there can be no spaces between the characters, or it won’t work) in the Header or Footer section, the first page will have page 11 in its header or footer and so on. This is useful if you’re printing spreadsheets or graphs that need to be inserted in the middle of a report.

Dan Rosman
Concord, CA

If you’re creating Excel applications for clients, there are at least two things you can do to make the application easier to use:

1. When creating a macro that will take 30 seconds or so, incorporate the MESSAGE function into the macro to let users know, via the message/status bar, what to expect. For example, \=MESSAGE(TRUE, "Values are being reset. Please wait ...") is sufficient to describe what’s taking so long. Be sure to use \=MESSAGE(FALSE) to clear the status bar when the work is finished.

2. Suppress screen updating when creating macros, especially if users see only the end result or if the task takes a long time. For example, \=ECHO(TRUE) displays all the actions until \=ECHO(FALSE) is encountered.

Douglas A. Jankuski
Plymouth, MN

**WordPerfect**

WordPerfect’s file selector usually defaults to the WordPerfect folder, which is a nuisance if you group documents into folders other than the application folder. It’s also annoying that Page Setup selections can’t be saved as a part of a style even though they can be saved in a document file.

The solution to these problems is simple: First, start WordPerfect, and then select your default style and make whatever changes you want in the Page Setup dialog box. When you’ve saved the document as you normally would, save it as a WordPerfect stationery pad, and put it into the same folder that contains your WordPerfect documents. If you’re using System 7, you can also create an alias of the document and place it into the folder from which you usually launch WordPerfect. It’s a good idea to paste the WordPerfect application icon on to the stationery document so other users will know to double-click on it.

From now on, whenever you want to use WordPerfect, double-click on the stationery pad’s alias. Not only will you open to an empty document that is set up exactly the way you want but your file selector will also default to the WordPerfect document folder instead of to the application folder.

David W. Binnion
Hillsboro, OH

**FreeHand**

Most people use FreeHand 3.0’s auto-trace tool to trace line-art bit maps, but it can also be used to trace FreeHand objects. Using this technique lets you create complicated objects by overlaying...
several simple objects and auto-tracing them. (You should know that FreeHand can’t trace items at their highest resolution.) The trace will include the outline of the entire group of objects rather than each component plus the insides of the various shapes as they overlap. It’s easy to delete any shapes you don’t want.

Wayne Folta
New Carrollton, MD

Spectre
In Spectre 1.0 there’s a fourth, little-known perspective. To access it, type GOD at any point after the game has started, and you’ll see the game from a view far above the game field. To get back to the normal perspectives, simply press the Tab key. This trick is particularly helpful in the network-play mode.

Jason George
Palos Verdes, CA

Adobe Illustrator
If you have a complicated design containing many individually drawn pieces tinted with various colors (colored confetti, for example), it can be difficult to select a certain set of pieces — such as all the red pieces of confetti — if they’re not grouped. (Hint: When you create a design of this sort, try to group items of the same color to begin with.) Rather than going back and forth from Preview mode (where you can’t edit) to Artwork mode or trying to select items with the two views open at the same time, try this:

Preview the artwork with only the Preview view open, and with a grease pencil or a china marker circle the desired items right on your computer screen. Go back to the Artwork view, and you can easily spot the items you want to select, because of the removable marks on the screen. The grease-pencil or china-marker marks rub off easily with a paper towel or tissue.

Jeanne Stevenson
Dearborn, MI

FrameMaker
Like most page-layout programs for the Mac, FrameMaker provides no easy way to print out a style sheet for a particular template. But here’s a way to do it:

Open a new document based on the template whose style sheet you want to print. Save the new document in MIF format, and then open it in FrameMaker or in a word processor. You’ll find the template’s paragraph tags listing in the MIF file, beginning at the following line:

```<PgfCatalog...```

The specific formatting for each paragraph tag after that line is bracketed by these lines:

```<PgfTag 'TagName Here'>```

and

```> # end of Pgf```

Any other tags are listed in order and are always bracketed in the same way. It may not be the ideal way to access this information, but with some editing, you can turn this code-like material into a printed style sheet that can be shared by several users.

Dave Valulis
Scotts Valley, CA
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<td>$2195</td>
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<tr>
<td>LC, Quadra 700 &amp; Quadra 900</td>
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By Bob LeVitus and Andy Ihnatko

More Yen

If you've been following our Help Folder discussion on using the Yen symbol in the Chicago font, started by Fred Pollak (“Yen for Chicago,” December '91, page 253) and continued by Kevin Garrett (“Yen Again,” March '92, page 227), we have a correction and some good news. The correction is that the RO# fix Mr. Garrett mentioned does not work under System 7, because this resource only tells the System to use a disk-based System-file resource instead of a ROM resource of the same type as the resource you're overriding. In the case of Chicago, the ROM resource is a bit-mapped font (type FONT) whereas the TrueType resource you want to use instead is an outline font (type sflt).

The good news is that Apple included a new set of Font Manager routines with TrueType. One of them, appropriately called SetOutlinePreferred, tells the system always to use the TrueType version of a font instead of the bit-mapped version — including 12-

FAQ

FAQ

HELP FOLDER

By Bob LeVitus and Andy Ihnatko

...But Were Afraid to Ask

I'll admit it, there are places in everyday life where a little complexity is a good thing. Nuclear reactors, for instance. And, of course, the space shuttle. As I always say, you can never have enough doohickeys in a reusable orbiter.

But we here at Help Folder ain't exactly rocket scientists, so we do appreciate having an occasional simple question thrown our way. Ashamed to lower yourself so? Well, to show our appreciation for your love of simplicity, we'll say that your question was sent in by the object of the title character's affections in Selma Lagerlöf's classic tale, Gosta Berling's Saga.

Q. For good or bad, my bosses have instituted a recycling policy for the whole office. That's fine for the paper pushers, but as the guy who handles all the office computers, I'm left with a big problem: Are floppy disks recyclable? If so, how?

The Countess Elizabeth Sweden

Andy: Prepare to be splattered with red paint and have clumps of trail mix heaved upon you. Even though disks are fundamentally ecostudy creatures (they're made from mostly recyclable materials), chances are that the ecofreaks will be steamed no matter what you do. The EPA and the GSA (a.k.a. the Environmental Protection Agency and the General Services Administration) maintain a bunch of lists of what's recyclable and what's not, and floppy disks don't appear on any of these lists.

So much for the government. More depressing was the lanyard I experienced after calling four nonprofit recycling organizations in the Boston area. So take note, because evidently I'm going to set a national policy for the recycling of floppies here.

First, peel off all labels and toss 'em in the paper-recycling bin. Then remove the shutter and recoil spring and set 'em aside. Crack open the magazine, peel off the inside padding, and toss it in the paper bin, and then toss the magazine and the write-protect tab in the plastics-recycling bin. Cut out the spindle head from the media, and toss it in the cans-recycling bin, along with the shutter and the spring.

Or you can take the vigilante approach, chucking the whole thing in the trash and letting God sort it out. Better still, if you have a whole mess of old, viable disks on your hands, why not donate them to your local high school or library? Sure, you probably shouldn't trust them for important backups or day-to-day files, but that's no reason to remove them from the gene pool, seeing how desperate public organizations are for funds.

If you're really interested in disk recycling, go through the Yellow Pages and chat up any recycling outfits in your area; who knows, there might be a pilot floppy-recycling program in place.

Figure 1: If you have ResEdit 2.1 or later, installing an Fkey is simply a matter of pasting the Fkey into your System file (left). To change an Fkey's ID number, double-click on the Fkey (right). Simply type the ID number (1 to 9) you would like to use.

Figure 2: SetOutlinePreferred is one of the new TrueType routines. The info field (above left) contains the usual information about the resource. The FontManager field (above right) contains the ID number for the TrueType version of the same font.
point Chicago - in ROM. (The TrueType version of Chicago contains both the full extended character set and a large number of extra characters, including the Command-, Option-, Shift-, Tab-, and Delete-key symbols.) This routine needs to be turned on, and you can do so with an FKey called SetOutlinePrefered, created by David Fowler, of Cotati, California. This Fkey lets you)

A Quieter Drive

Q. I have an SE with an Apple 40-megabyte internal hard drive. At what seem to be random intervals, the drive emits a strange sound (as if the read/write heads were vibrating back and forth at a good speed). This behavior takes place while the drive is reading or writing data and sometimes even when the drive isn't busy. If it happens during startup, the drive doesn't mount. Worst of all, it impedes the drive's performance.

My "authorized dealer" told me that it was normal for drives to behave like this. Do you have any idea what the problem could be? Is it time for a new drive?

Andy McClary
via the Internet

Andy: A noisy hard drive is never "normal." All hard drives chatter a bit on startup and shutdown, and during formatting, they can make some sounds that'll rile your house of rodents and large insects, but any banshee-like shrieking during regular use is a sure sign of trouble. Your drive will go down in flames — maybe not today or tomorrow but soon and for the rest of your life. And unfortunately, there's no real fix that doesn't involve replacement. Call the drive manufacturer, and try to get warranty service. If the folks you bought the drive from won't fix it, crack open the case and find out which company built the hard-drive mechanism. Often the mechanism — the metal box making up the guts of the drive — has a longer warranty than the assembled drive! Even if changes of a free repair are nil, you might get a bargain by dealing with the mechanism manufacturer directly. Some of 'em will swap a dead unit for a good one for a somewhat nominal fee. You'll have to swap the mechanisms yourself, but it's really just a matter of unplugging three connectors.

Finally, here's a stopgap measure: If you're absolutely certain you have no effective warranty, try removing the mechanism from the drive, flipping it over, and delicately applying a match-head-sized dab of lithium grease between the drive spindle and the little metal pad that keeps in contact with it on the bottom of the mechanism. More often than not, the source of all that noise is spindle vibration, so sometimes a stingy amount of lubrication effectively shuts things up. Do a complete backup before attempting this — if you slather grease all over the place, the stuff may work its way up the spindle right to the platters, which will permanently destroy the drive. No matter what you do, eventually your drive is going to run down-the-curtain-and-join-the-choir-invisible; in the meantime, however, at least your cohabitants will be able to sleep.

32-Bit Thrills

Q. I recently increased the RAM in my Mac LC from 4 to 10 megabytes. My system software used to take up 1,620K of RAM (according to About This Macintosh on the Apple menu), but after increasing my RAM to 10 megabytes, the system RAM has increased to 3,661K. What happened?

I've noticed that switching to 32-bit addressing fixes the problem, but most of my applications crash while 32-bit addressing is turned on. Is there any other way, other than turning on 32-bit addressing, to free up the 2 megabytes of RAM that has been diverted?

Speaking of 32-bit addressing, why doesn't it work well? Will it ever?

Peter Kennett
USAF/APO

Q. I'm using System 7.0.1 on a Quadra 700 with 20 megabytes of RAM and no third-party extensions or control panels. Even with the disk cache set to 512K and virtual memory, the RAM disk, and 32-bit addressing turned on, the system software still takes up 14-5 megabytes of RAM! How do I get some of that RAM back?

Barry Weise
North Hollywood, CA

Bob: In order to use more than 8 megabytes of RAM on any Mac, you must turn 32-bit addressing on. That's the simple answer, but, of course, there's an exception to the rule. If you use Maxima, RAM-disk software from Connectix (125 Constitution Drive, Menlo Park, CA 94025; 800-950-5880 or 415-324-0727), you can access as much as 14 megabytes of RAM without turning on 32-bit addressing.

Peter, you're out of luck on this one; Maxima requires a 68030 processor or a Mac II with a PMMU chip installed.

I agree that 32-bit addressing doesn't work well. Although every bit of software on my Mac is 32-bit clean, my system crashes more often when 32-bit addressing is turned on. Although I know lots of people who run a variety of applications, control panels, and extensions successfully under 32-bit addressing, it's always been somewhat flaky for me. I turn it on only when absolutely necessary.

The solution for me (and my 32-megabyte IICi) is to turn 32-bit addressing off and then use Maxima to create a 20-megabyte RAM disk. That leaves 12 megabytes of RAM available for running system software and applications, which is almost always enough. I put my System Folder on the RAM disk and boot from it, so my Mac runs a lot faster. Whenever I need to make more RAM available for applications, I reboot with 32-bit addressing turned on and keep my fingers crossed. I've been using this setup for almost a year and can't say enough nice things about it. It's wonderful.

Andy: I'll put it this way: Assuming you're unwilling (a) to wait about a year and a half for 32-bit studliness to become the norm rather than the exception and (b) to write a whole slew of 32-bit-clean apps all on your own, you need Maxima. I know 11 or so people who've used illegal copies of this commercial product, and
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Which is what you use to get out of trouble after you get into it.
all of them sent away for legit copies after one day. Not many products inspire that kind of honesty.

The Start of Noise
Q. I recently bought a PowerBook 140. Every time it needs to make a sound, including the power-up chime, a loud click precedes the sound. If I record something with the microphone, the click cuts off the first tenth of a second of sound (for instance, “people” becomes “click-eople”). Is it just my PowerBook? I've already had the system board replaced once to solve another problem, but that didn't get rid of the click. Help!

Ben Freedman
Calgary, Alberta
Canada

Andy: They all do that. No, seriously, it's not a bug, it's a feature: The click is the result of a real good idea someone at Apple had. The PowerBook cuts off the juice to the internal speaker and the sound input port when they're not in use, to save power. When they're pressed into service, a tidal wave of electrons smashes into the circuit and causes a brief audible click.

It's the same sort of thing you hear when you flick on a cheap AM radio. But then, again, the PowerBook is hardly cheap. Why didn't Apple toss a three-cent capacitor into the circuit to absorb the click? Who knows?

Footnote Fetish
Q. How can I use PageMaker 4.0 to put a footnote (or more than one) on the bottom of the page on which the footnote reference appears rather than in a separate chapter at the end of my book? If it's not possible with PageMaker, which page-layout program (not word processor) can do this automatically or at least easily?

Joesof Isak
Jakarta
Indonesia

Bob: You can sort of do what you want with PageMaker. If you're adventurous and don't mind doing a little programming, you can automate much of the process with PageMaker 4.2's built-in scripting. Or for even more power, check out UserLand Frontier (UserLand Software, 490 California Avenue, Palo Alto, CA 94306; 415-325-5700), a scripting program that lets you write scripts to control almost every aspect of PageMaker 4.2.

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If that sounds like too much trouble for you, check out FrameMaker (Frame Technology, 1010 Rincon Circle, San Jose, CA 95131; 408-433-3311) and Ventura Publisher (Ventura Software, 1517S Innovation Drive, San Diego, CA 92128; 619-673-0172), a pair of page-layout programs that are particularly good at producing long, structured documents. Each can automatically place footnotes at the bottom of the page on which the reference number appears, and each allows extensive control over the footnotes' appearance. I find FrameMaker easier to use and significantly more Mac-like than Ventura Publisher. It's also a darn good word processor, something that can't be said for Ventura Publisher (or PageMaker or QuarkXPress, for that matter).

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LC: Less Coverage?

Q. I recently purchased a Mac LC with a 12-inch color monitor, and I’m having problems getting some applications (especially games) to run properly. The problem is that some of the applications don’t conform to the screen size and part of their images seem to go past the edges of the desktop. Is there an easy solution to this problem, maybe in the form of a system extension?

Jim Watling
Ann Arbor, MI

Andy: A simple problem and, thankfully, there’s a simple solution. The problem: You’ve bought a goofball monitor—a color screen with Mac Classic resolution—and programmers would rather soul-kiss a light socket than rewrite their games to support it (a notable exception: Inline Design, whose Mutant Beach works fine on a 12-inch monitor). The solution: Buy a 13-inch monitor.

To elaborate, games are exceedingly odd pieces of software. White-collar-establishment applications (word processors, database managers, spreadsheet programs) don’t care what size monitor you’re using. Users can always resize windows and scroll, the tool palettes can fit in even the tiniest screen, and anyone who designs a menu bar that’s wider than 512 pixels would have his programmer’s beanie taken away immediately. But games generally don’t take advantage of the Mac interface; they paint and animate all over the screen, so special versions have to be written for each monitor type. Most games are written for a 13-inch color display (640 x 480 pixels), and when you try to play ‘em on a 12-inch screen (512 x 342 pixels), you get to see only one corner.

My advice is to get a new monitor, but if you want to try a software solution, check out Stepping Out II, from Berkeley Systems (1700 Shattuck Avenue, Berkeley, CA 94709; 510-540-5536). It sets up a virtual screen of just about any size. When your mouse pointer reaches the edge of the real screen, the display will scroll to reveal additional real estate. It works just dandy in programs such as PageMaker and Excel, but it’s less of a smash hit with games. You still won’t be able to see more than 512 x 342 dots at once, and if the Lizard King is setting up a mortar off-screen, you’re going to wish you’d spent the $800 for a 13-inch monitor.

To save money, look at third-party monitors such as the Sony CPD-1304, the Seiko CM-1445, or the NEC 3FGX. To save a lot of money, buy an IBM-type VGA color monitor instead. Apple quietly made sure that the LC’s video port would be compatible with these popular (and cheap!) monitors. You’ll need an adapter such as the Mac VGA ($25), manufactured by James Engineering (510-525-7350), to use one of these monitors.

Bob: If you’re buying a new monitor, you may need to buy additional video RAM, because older Mac LCs don’t have enough VRAM to support 256 colors on a 13-inch monitor. By the way, don’t buy that VRAM from Apple—third parties such as Technology Works sell it for much less.

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ROGER EBERT
This Month on ZiffNet/Mac

ZMAC UTILITY

In the complex world of data storage, users are often left wondering what type of device best suits their needs—a hard disk drive, optical discs, removable cartridges, digital audiotape, or something completely different? This month, MacUser introduces a free expert system that can answer the question, Which storage device should I buy?

Developed by Danny Goodman and Shef Syed, this HyperCard 2.1 stack is patterned after their March '92 stack, Which Mac Should I Buy? To use the storage-device stack, you need to provide some basic information such as the size of your budget, the intended purpose of the storage device, and what sort of applications you use. Based on MacUser Labs’ data, the stack provides a selection of the best devices, including “Bottom Line” picks from previous lab reports, for the job at hand.

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Hard (Drive) Decisions

A HyperCard expert system can help you make the right decision about purchasing a hard drive, but sometimes it’s best to get the advice of a living expert. MacUser associate editor Mark Frost is available for consultation from June 15 to 19 in Message Section 5 (Labs & NetWorkShop) of the MacUser Forum (GO ZMC:MACUSER). Mark can tell you when it’s time to step up to a gigabyte drive and when you should stick with your old SyQuest.

Hot New Files

Here’s a batch of recent uploads to ZiffNet/Mac. To make locating the files easier for you, the CompuServe filenames are in parentheses. All the files listed here can be found in the Download & Support Forum (GO ZMC:DOWNTECH).

Carpetbag (CARPET.CPT) is a control panel that makes resources such as fonts, sounds, and Fkeys available to the system without actually installing them in the System Folder—in short, a poor man’s Suitcase II or MasterJuggler. Shareware, $5.

DiskStatus (DISTAT.CPT) is a program that provides a real-time display of the available and used space on all your current drives, including the floppy drive. It is intended to be a startup application under MultiFinder or System 7’s Finder, where it sits quietly on your desktop, ready to provide information whenever you need it. Freeware.

DMM LaserWriter Stuff (LWSTUF.CPT) enhances Apple’s LaserWriter 7 printer drivers by adding features such as the ability to print thumbnail views of several pages on one sheet of paper. Freeware.

FileType Changer (FILETY.CPT) is a HyperCard 2.1 stack that allows you to change the type and creator resources of any file without using ResEdit. This stack supports batch processing. Freeware.

Greg’s Buttons (BUTTON.CPT) is a System 7 extension that replaces the standard black-and-white buttons, check boxes, and radio buttons with new “mondo cool” color 3-D ones. Shareware, $10.

Mariner (MARINE.CPT) is a very slick shareware spreadsheet utility that provides split windows, variable size of rows and columns, charts, and more. It has a tear-off palette that enables you to chart numbers in a graph, bar chart, pie chart, or scatterplot. Shareware, $40.

System 7 Pack! (7PACK.CPT) lets you customize your System 7 Finder without rebooting. It offers features that enable you to increase the speed of Finder file copies, remove the annoying application-substitution dialog box, change keyboard command equivalents in System 7’s Finder, change menu-item names, and add a Quit menu. Shareware, $29.95.

Trimmer (TRIMMR.CPT) is a System 7 control panel that lets you select which fonts you want to include in PostScript files that are printed to disk. Trimmer also includes a check box for excluding the laserprep PostScript header from files saved to disk. Shareware, $10.

Zmac Tip of the Month: Full Text for Less

Want to look up something from a back issue of MacUser? You can get the full text of any MacUser article through Computer Library, an on-line megadatabase that contains articles and citations from 150 computer magazines. However, Computer Library carries a surcharge—$15 per hour plus $2.50 per article. If you need only the issue reference—or want to minimize the Computer Library cost—you should check out the MacUser/MacWEEK Index (GO ZMC:INDEX).

The MacUser/MacWEEK Index, which has no connect charges, lets you search for articles according to product, company, or topic. The resulting citation tells you in which issue the article appeared. If you need the full text of the article, simply note the article number at the bottom of the citation and then go into Computer Library and search by article number. This approach reduces your browsing time and can result in significant cost savings.

MacUser July 1992 241
For many of you, mail order is your primary means of purchasing Macintosh products and services. That's why MacUser has put together the following special section.

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**NETWORKING**

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**SYSTEM LEASING NOW AVAILABLE**

| Macintosh Classic II 4/1 | 1239 | 1370 |
| Macintosh Classic II 8/1 | 1405 | 1569 |
| Macintosh LC II 4/1 | 1900 | 2050 |
| Macintosh LC II 8/3 | 2250 | 2400 |
| Macintosh IIci 5/5 | 2500 | 2650 |
| Macintosh IIci 5/10 | 2700 | 2850 |
| Macintosh Quadra 650 | 2950 | 3050 |
| Macintosh Quadra 950 | 3099 | 3199 |
| Macintosh PowerBook 160/4 | 3299 | 3399 |
| Macintosh PowerBook 180/4 | 3499 | 3599 |
| Macintosh PowerBook 200/4 | 3699 | 3799 |

**MODEMS & FAXES**

| Global Village Teleport A/RB Send/Fax | 175 |
| Global Village FullFax Send/Receive | 225 |
| Practical Peripherals 2400b | 250 |
| Practical Peripherals MaxFax | 275 |
| Sharp Modem v.32 | 300 |
| US Robotics Courier 9900 V.32 | 350 |
| ZoomComm 2400 baud Modem/Fax | 400 |
| ZoomComm 2400 Modem/Fax | 450 |
| Timerol Color QuickInk | 480 |
| Timex Jet/Fax 2400b | 510 |
| Timex Jet/Fax 2400b | 540 |

**PRINTERS**

| Abaton LaserScript LX | 1499 |
| Apple Laserwriter | 1499 |
| Apple Laserwriter III 20Mbi 80C | 2764 |
| Apple Laserwriter III 20Mbi 160C | 3199 |
| Apple Laserwriter III 20Mbi 320C | 3533 |
| Apple Laserwriter III 20Mbi 640C | 3867 |
| Apple Laserwriter III 20Mbi 1280C | 4201 |
| Apple Laserwriter III 20Mbi 2560C | 4535 |
| Apple Laserwriter III 20Mbi 5120C | 4869 |
| Apple Laserwriter III 20Mbi 10240C | 5203 |
| Apple Laserwriter III 20Mbi 20480C | 5537 |
| Apple Laserwriter III 20Mbi 40960C | 5871 |
| Apple Laserwriter III 20Mbi 81920C | 6205 |
| Apple Laserwriter III 20Mbi 163840C | 6539 |

**VIDEO SOLUTIONS**

| Apple 12"/13" 16-bit Color | 242/262 |
| Apple 12"/13" 24-bit Color | 264/288 |
| Apple 12"/13" 32-bit Color | 286/310 |

**GCG PRINTERs**

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**ACCELERATORS & CACHE I**

| Apple 16"/20" Color RGB | 1299/1575 |
| ECC Machines PC-XT/ST | 1299 |
| ECC Machines Monitors | 2079 |
| ECC Machines Monitors | 1795 |
| ECC Machines Monitors | 1795 |
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**SCANNERS**

| HP ScanJet | 189 |
| HP ScanJet | 244 |
| HP ScanJet | 63/119 |

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1MB TI Printer Upgrade $59

SUPERMAC

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Microtek 600ZS $1239

- 600 DPI 24-bit Scanner with Photoshop 2.0
- ScanMatch Calibration Software

Microtek 1850S $1515

- 1850 DPI Color Slide Scanner with Photoshop 2.0

1MB TI Upgrade $49 • Replacement Tuner $55

Painter $234

- Fully Wacom compatible!
- Pressure sensitive drawing!

MICROTEK

Rascade

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Rascade 364 Board $699

24-bit Card with Fram Grayscale Limited Qty

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Daystar 50MHz PowerCache with 68882 FPU $1475

- 68010 PowerPC, SE/30, II, IIGS, IICx, IICx
- NEW! Microsoft Works 5.0
- TextEdit 3.0
- AppleWorks 3.2
- AppleWorks 3.2
- Microsoft Works 5.0
- Microsoft Works 3.0
- Microsoft Works 3.0
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- Microsoft Works 3.0

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*Note: Denotes 1992 MacUser Mass Storage Buyer's Guide*
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1. For how many microcomputers do you buy products?
   (check one)
   - 1-4
   - 5-49
   - 50+

2. Your primary job function is:
   (check one)
   - Administrative/General Management
   - MIS/OP, Communications
   - Marketing/Sales
   - Computer Dealer/ VAR
   - Other

3. Which of the following products have you bought in the last 6 months? (check all that apply)
   - Sofware
     - Accounting
     - Spreadsheets
     - Project Managers
     - Word Processors
     - Database Managers
     - Graphics
     - Integrated Software
     - Utilities
   - Hardware
     - Modems
     - Scanners
     - Personal Computers
     - Printers/Plotters
     - Monitors/Displays
     - Storage
     - Add-in Boards
     - Networking
     - Other

4. If so, what function do you serve in the buying process? (check all that apply)
   - Initiator/Determine Need
   - Selection of Vendor
   - Selection of Seller
   - Other

5. Over the next 12 months, how much will your organization spend on computer products or services? (check one)
   - $0 - $5 million
   - $5 million - $99,999
   - $100,000 - $499,999
   - $500,000 - $999,999
   - $1 million - $49 million
   - $50 million - $499 million
   - $500 million or more

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1. For how many micro computers do you buy products? (check one)
   (01) 1 to 4
e (02) 5 to 49
   (03) 50 or more

2. Your primary job function is: (check one)
   (01) General Management
   (02) Marketing/Sales
   (03) Systems, Programming
   (04) Engineering/R&D
   (05) Finance/Accounting
   (06) Computer Dealer
   (07) Other (please specify)

3. For which of the following products have you bought in the last 6 months? (check all that apply)
   (01) Modems
   (02) Monitors/Displays
   (03) Storage
   (04) Add-in Boards
   (05) Integrated Software
   (06) Networking

4. Which of the following products do you buy at least $500,000 to $999,999 in the last 12 months? (check all that apply)
   (01) Microcomputers
   (02) Printers/Scanners
   (03) Plotters/Drafters
   (04) Telephones

5. How many years have you been in the computer industry? (check all that apply)
   (01) 0-1 year
   (02) 2-3 years
   (03) 4-5 years
   (04) 6-7 years
   (05) 8 or more

6. For the past 12 months, how much did you spend on computer products or services? (check one)
   (01) Under $1,000
   (02) $1,000 to $4,999
   (03) $5,000 to $9,999
   (04) $10,000 to $49,999
   (05) $50,000 to $99,999
   (06) $100,000 or more

7. In the last 12 months, how much is your organization spending on computer products or services? (check one)
   (01) Under $1,000
   (02) $1,000 to $4,999
   (03) $5,000 to $9,999
   (04) $10,000 to $49,999
   (05) $50,000 to $99,999
   (06) $100,000 or more

8. Over the last 12 months, how much has your organization spent on computer products or services? (check one)
   (01) Under $1,000
   (02) $1,000 to $4,999
   (03) $5,000 to $9,999
   (04) $10,000 to $49,999
   (05) $50,000 to $99,999
   (06) $100,000 or more
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Prices verified as of 4/29/92

**Other Printers**

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**Texas Instruments**

| microLaser Turbo                   | $1995         | $3125        |

**Scanners**

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**Hard Drives**

Five-Year Warranty!

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<td>2 Gig</td>
<td>3.9 ms</td>
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</table>

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<tr>
<td>OptDisk 128</td>
<td>128 MB</td>
<td>1499.00</td>
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<td>OptDisk 80D</td>
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<td>OptDisk 1080</td>
<td>1080 MB</td>
<td>1699.00</td>
</tr>
<tr>
<td>45 SR (SyQuest)</td>
<td>45 MB</td>
<td>475.00</td>
</tr>
<tr>
<td>88 SR (SyQuest)</td>
<td>88 MB</td>
<td>669.00</td>
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<tr>
<td>DATdrive 268</td>
<td>268 MB</td>
<td>1395.00</td>
</tr>
<tr>
<td>DATdrive 668</td>
<td>668 MB</td>
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<tr>
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### Disk Drives

<table>
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<td>80 MB Tape for Teco</td>
<td>17.00</td>
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<tr>
<td>150 MB Tape for Teco</td>
<td>24.00</td>
</tr>
<tr>
<td>SyQuest 45 or 88 MB cartridge</td>
<td>69.00 / 115.00</td>
</tr>
<tr>
<td>DAT cassette 60 or 90 meter</td>
<td>15.00 / 21.00</td>
</tr>
<tr>
<td>Optical cartridge (512 k)</td>
<td>125.00</td>
</tr>
<tr>
<td>Optical cartridge (256 k)</td>
<td>125.00</td>
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<tr>
<td>Optical cartridge for TDK</td>
<td>299.00</td>
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<tr>
<td>Optical cartridge 128 MB</td>
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<table>
<thead>
<tr>
<th>Model</th>
<th>Resolution</th>
<th>Price</th>
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<tbody>
<tr>
<td>Microtek 600ZS</td>
<td>1200 dpi at 400%—n/a</td>
<td>$2,195*</td>
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<tr>
<td>Howtek Scanmaster 3</td>
<td>1200 dpi at 400%—n/a</td>
<td>$8195**</td>
</tr>
<tr>
<td>La Cie Silverscanner</td>
<td>1200 dpi at 400%</td>
<td>$1,399</td>
</tr>
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</table>

All scans were done at default settings with no corrections. The color images were separated using Adobe Photoshop. The logo was scanned as grayscale and as line art. This entire ad was done on the Macintosh using Silverscanner, Photoshop, Quark XPress and a PostScript Imagerest. The entire production cost was $145.

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*Macworld, June 1991*

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<table>
<thead>
<tr>
<th>INTERNAL</th>
<th>EXTERNAL</th>
</tr>
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<tbody>
<tr>
<td>52MB</td>
<td>$239</td>
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<tr>
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<tr>
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<td>$779</td>
</tr>
<tr>
<td>425MB</td>
<td>$1299</td>
</tr>
</tbody>
</table>

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SyQuest

All MacLand Removable Hard Drives come with our own installation and reference manual, DiskMaster Plus™ formatting utility software, cables, and a one-year warranty. Cartridge not included.

<table>
<thead>
<tr>
<th>44 Megabyte Hard Drives</th>
<th>88 Megabyte Hard Drives</th>
</tr>
</thead>
<tbody>
<tr>
<td>$399</td>
<td>$499</td>
</tr>
</tbody>
</table>

Cartridges:

10 Pak-ea.

$62

5 Pak-ea.

$63

Singles

$64

$95

$99

$105

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  256 Color Card...............$669
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  Monitor & Million Plus
  Color Card......................$799
  (SE/30, li, lix, liic, lix, lfx, & Cuadra)

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Monitor...........................$429
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  Monitor & Million Plus
  Color Card......................$859
  (SE/30, li, lix, liic, lix, lfx, & Cuadra)

Magnavox
14" Color Monitor
Monitor...........................$449
  (Ili, Isi, LC)
  Monitor & 256 Color Card...$729
  (SE/30, ll, li, lix, lcx, lfx, & Cuadra)
  Monitor & Million Plus
  Color Card......................$879
  (SE/30, ll, li, lix, liic, lix, lfx, & Cuadra)

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Orion MacScan Ultra Monitor with Million Plus Color Card.........................$779
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(or write The Nature Conservancy, Box PSA, 1815 N. Lynn Street, Arlington, VA 22209)

CIRCLE 64 ON READER SERVICE CARD.
### Quantum

<table>
<thead>
<tr>
<th>Capacity</th>
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<tr>
<td>52mb</td>
<td>(49mb) LPS</td>
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<tr>
<td>80mb</td>
<td>GO DRIVE</td>
<td>$479</td>
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<tr>
<td>105mb</td>
<td>(100mb) LPS</td>
<td>$335</td>
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<tr>
<td>120mb</td>
<td>GO DRIVE</td>
<td>$529</td>
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<tr>
<td>120mb</td>
<td>(116mb) LPS</td>
<td>$399</td>
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<tr>
<td>240mb</td>
<td>(234mb) LPS</td>
<td>$669</td>
</tr>
<tr>
<td>425mb</td>
<td>(406mb) PRO</td>
<td>$1139</td>
</tr>
</tbody>
</table>

**Quantum drives carry a TWO year warranty. 3.5" Half Height drives are the PRO series. 3.5" Low Profile drives are the LPS series.** *3.5" Low Profile drives for the Mac Classic, LC and LIs.**

**Perfect for Powerbooks; GO-Drives have a ONE year Warranty. Dealer installation recommended. Externals manufactured by ClubMac. Quadra 500 bracket add $10.**

### Seagate

<table>
<thead>
<tr>
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<td>(315) 10.7ms</td>
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<td>420mb</td>
<td>(406) 14ms</td>
<td>$1199</td>
<td>$1259</td>
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<tr>
<td>645mb</td>
<td>(634) 11.9ms</td>
<td>$1615</td>
<td>$1715</td>
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<tr>
<td>645mb</td>
<td>(632) 15.5ms</td>
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<td>$1385</td>
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<td>1.4gb</td>
<td>(1350) 15ms</td>
<td>$2295</td>
<td>$2395</td>
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<tr>
<td>1.4gb</td>
<td>(1307) 13ms</td>
<td>$2849</td>
<td>$2949</td>
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**Seagate drives carry a ONE year warranty that can be extended up to a total of FIVE years. All internals include a mounting kit. Quadra 900 bracket add $10.**

### Fujitsu

<table>
<thead>
<tr>
<th>Capacity</th>
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<tr>
<td>330mb</td>
<td>(314) 9ms</td>
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<td>425mb</td>
<td>(405) 9ms</td>
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<td>$1249</td>
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<tr>
<td>520mb</td>
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<td>$3415</td>
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**Fujitsu drives carry a FIVE year warranty. All internal drives include a mounting kit. Quadra 900 bracket add $10.**

### Maxtor

<table>
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<td>207mb</td>
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<td>330mb</td>
<td>(324) 14.5ms</td>
<td>$969</td>
<td>$1029</td>
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<td>535mb†</td>
<td>(510) 12ms</td>
<td>$1249</td>
<td>$1309</td>
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<td>645mb†</td>
<td>(639) 14ms</td>
<td>$1389</td>
<td>$1489</td>
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<tr>
<td>1.0gb†</td>
<td>(997) 13ms</td>
<td>$1849</td>
<td>$1949</td>
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<td>1.4gb†</td>
<td>(1423) 13ms</td>
<td>$2449</td>
<td>$2549</td>
</tr>
</tbody>
</table>

**Maxtor drives carry a ONE or TWO year warranty depending on model.**

†These drives have a TWO year warranty, and only fit inside Large Macs.

### SyQuest

<table>
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<th>Capacity</th>
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<th>External</th>
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<tr>
<td>Dual 44mb</td>
<td>Includes (2) 44mb and ONE cartridge</td>
<td>$819</td>
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<td>Dual 88mb</td>
<td>Includes (2) 88mb and ONE cartridge</td>
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<tr>
<td>44mb/88mb Combo</td>
<td></td>
<td>$999</td>
<td></td>
</tr>
</tbody>
</table>

**44mb Cartridge $65**

**88mb Cartridge $99**

### ClubMac

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Visa & MC Accepted. No Surcharge • All Prices, specifications, features and system requirements subject to change without notice • Not responsible for typographical errors • All Hard drives carry a 30 day money back guarantee • Prices do not include freight • All specs are from the manufacturer.
How to succeed in business.

POWER TIE

POWER LUNCH

POWER DRIVE

HARD DRIVES

<table>
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<th>MBs</th>
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<td>NA</td>
<td>$2699</td>
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REMOVABLE

- SyQuest 44MB: $449
- SyQuest 88MB: $599

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CD-ROM: $539

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SYSTEM 1 - 30 Day MBG
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SAM.
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- Integrated Full Audio Capability
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- Emergency Eject
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(24 HRS)

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**TOLL FREE AUSTRALIA:**
0014-800-125-875

Prices & Specifications Subject to Change Without Notice.
All external drives available in your choice, Zero-Footprint or Compact Portable case.

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<thead>
<tr>
<th>MB</th>
<th>INTL EXTL</th>
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<th>$299</th>
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High speed drive selections available for all Mac II models, Classic, SE & SE/30

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Prices & Specifications Subject to Change Without Notice.

For a limited time, with any drive purchase, you can buy Redux™ or Init Picker™ by Microseeds Publishing, or CalendarMaker™ by CE Software. Any one, $20; any 2, $33.95; all three, $44.95.
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**Business Card**

A forum for innovative, unique, low-cost and hard-to-find Macintosh hardware, software, and miscellaneous products and services.

### Hardware

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**TMS PRO SERIES DRIVES**
Two Year Full Warranty

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**TMS REMOVABLE SUBSYSTEMS**
SyQuest Two Year Full Warranty

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MacUser July 1992 299
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<thead>
<tr>
<th>Model</th>
<th>Price</th>
<th>Quantity</th>
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<tr>
<td>SE 1/40</td>
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<td>IIX 5/120</td>
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<tr>
<td>CLASSIC II</td>
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<td>IIX 5/120</td>
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<td>LC 14/40</td>
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<td>LC 114/80</td>
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<td>IGEKAI</td>
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<td>12X2X Electronics</td>
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<td>12X19 printer</td>
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<td>CM-145/4 14</td>
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<td>2400 dpi color scanner</td>
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<tr>
<td>UMIX UC-650</td>
<td>Adobe photoshop</td>
<td>1388.00</td>
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<thead>
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<th>Model</th>
<th>Price</th>
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<td>322MB</td>
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<tr>
<td>1360MB</td>
<td>FH</td>
<td>15ms</td>
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</table>

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<thead>
<tr>
<th>Configuration</th>
<th>Price</th>
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<tr>
<td>1x8x80</td>
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<td>4x8x80</td>
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<tr>
<td>2x8x80</td>
<td>$68</td>
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- Mac 16MHz Math Processor: $75
- Mac Classic II 16MHz Math Processor: $75

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<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
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<td>CacheCard 64K IIc</td>
<td>$145</td>
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<td>LC 512K VRAM</td>
<td>$59</td>
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Win’ers and Losers

So how did you feel when you heard the news that Microsoft beat Apple in the Apple-versus-Microsoft lawsuit? When Apple seemed to be winning, it looked as though this suit was the only thing that could prevent Microsoft from steam-rollering the entire software business.

Here comes the steamroller.

It was a weird suit, with Apple claiming that Microsoft’s Windows infringed on Apple’s proprietary Mac look and feel. Over the years, depending on your attitude toward either Microsoft or Apple, you’d root for one side and then the other. I guess this fun couldn’t drag on forever.

As you might recall, the suit began over the supposed breach of a 1985 agreement between Microsoft and Apple that gave Microsoft the right to use some aspects of the Mac’s look and feel in its then-new Windows environment. According to one account, the agreement was reached in the first place only because of John Sculley’s inability to say no to Bill Gates, who threatened to stop all Mac development at a critical moment if Apple stood in his way. Good timing for Mr. Bill, because the future of the Mac wasn’t all that certain. So Sculley caved in. Apple would later sue, saying that version 2 of Windows wasn’t covered by the agreement, as if the number somehow meant something. Was Apple’s original intent to give Microsoft a license for something that could never be upgraded or improved? What kind of a deal is that?

On the other hand, why would Apple give anyone such a license if the intention of the licensee was to create a Mac look-alike that would run on a cheap PC platform? The licensor might as well put a gun to his own head.

This all became beside the point when the case degenerated into a look-and-feel suit. And now, if Borland can follow Microsoft’s lead by beating Lotus in a similar suit across town, it appears that this kind of case will go the way of the dodo.

What I hate to see is the already arrogant Microsoft given yet another opportunity to gloat and snicker over the inability of anyone to successfully challenge the company in any way. Still, it seems that the right side won.

In fact, the entire screen-copyright and look-and-feel concept really sucks. We don’t need this kind of limitation on developers, who traditionally have built new ideas on past ideas. The Mac screens were predated by Xerox’s, and everyone knows it. Xerox didn’t beat Apple in a suit, so why should Apple beat Microsoft?

Another overlooked aspect to all this is that Apple was actually one of the earliest promoters of the litigious tactic of suing every bastard who looked cross-eyed at the company. This was especially true during the Apple II glory days, when hapless low-budget bozos were bringing in the odd Apple II clone from Taiwan. I recall one poor sap being blasted by both barrels from the Apple legal war room. The guy brought in a couple of Pineapple computers or some other crappy clone, and the next thing you know, he was in court, soon to be financially ruined for offering a cost-effective alternative to the then-preciozy Apple II. This scenario repeated itself again and again — as if any one of those two-bit operators were actually a threat to Apple.

Anyway, except for some possible appeals, we can assume that Microsoft will go merrily off and push its agonizing Windows product into the cheap-clone arena — with some sales at Apple’s expense.

What, Me Worry?

I don’t think that any of this will really hurt Apple, though. Smart money that can afford to buy the Apple Mac will always prefer it to the PC. Because Microsoft is showing every indication of becoming more and more greedy, we can expect it to so dominate the PC software business that the premium paid for the Apple alternative may not be all that high. Let’s face it, there is a lot of second-rate software running on the PC, especially when compared with software running on the Mac. Take TrueType (please!), and compare it with PostScript output. True-Type looks dreadful.

Because I write for both PC Magazine and MacUser, I get mail from both camps. Before Windows, I could easily tell at a glance which letters came from PC users and which came from Mac users. Although now PC users have real fonts too, I still won’t have any trouble telling which letters are theirs. The situation may shift, but it won’t change.

After the dust clears from this suit, that’s the way the business will be for Apple and the cloners. The situation will shift, but it won’t really change. Except, that is, for all that damned snickering you’ll hear up in Redmond.
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