SNEAK PREVIEW:
Stunning Low-Cost Printers from Apple

- **STYLEWRITER**: Spectacular output for $599
- **PERSONAL LASERWRITER LS**: Laser performance for $1,299

6 Fax Modems: Clear choices for sharp faxes

- **10 FIX-IT SECRETS**: Easy ways to reduce your repair bills
- **16 LASERJET OPTIONS**: Connecting Macs to HP printers
You do it by the
When we introduced Microsoft® Word six years ago, we weren't planning on making history. We had just one goal, and a fairly simple one at that: to make a word processor that suited people's needs.

Then again, we knew that the people we wanted to suit were a wildly diverse, independent lot: Mac® users. So it made sense to let them tell us exactly what to put into Word.

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First, there were some folks who didn't like tabbing much. Fair enough. For them, we developed Tables—an easier way to set up side-by-side paragraphs, columns of numbers, even forms. No tabs. No hassle.

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Apparently, listening to what people want is a pretty good way to design software.

How else can we explain Word 4.0 being the most popular word processor in Mac history?

And those cards and letters are still coming. "Listen," someone'll say. "In case you guys are working on the next Word..."

Which we are. In fact, if you've got some input for us, feel free to drop us a line. Or if you'd like to find out more about Word, call us at (800) 541-1261, Dept. N26.

Our goal is still simple: to make Word the best word processor around. With the latest technology—translated into human terms, of course.

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Microsoft
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You don't become the most popular word processor in Mac history by thinking big.
Apple’s two new budget printers bring high quality to new lows — low prices, that is.

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Personal Best: Two New Apple Printers
by Henry Bortman and Jon Zilber

Need a budget printer? Apple’s shapely new inkjet printer — the $599 StyleWriter — boasts high-resolution output, a tiny footprint, and TrueType software for the end of the jaggies. Or for $1,299, consider the Personal LaserWriter LS, which brings laser power within more budgets. Find out which printer is best for you. .................. 90

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Product Announcements and Updates

Please send your letters or press releases about new products or upgrades to Michele Stokol, Assistant Editor, MacUser, 950 Tower Lane, 18th Floor, Foster City, CA 94404.

Help Folder

If you’ve got a Mac question or problem, send it to Help Folder, c/o MacUser, at the above address, or for a personal answer to your problem, type GO TECHSUPPORT on Zmac. You should also take advantage of local user groups. You can find the one nearest you by calling Apple toll-free at (800) 538-9696, ext. 500.

Tip Sheet

We love getting tips from our readers. Send your tips to Tip Sheet, c/o MacUser, at the above address, or type GO TECHSUPPORT on Zmac. We can’t print every tip, but we’ll try our best to pick the most interesting ones for publication.

Calling All Programmers

We’d like to hear from any programmer who is interested in contributing to our utilities disk or lab-benchmark disk series. If you’re interested, contact Michele Stokol at the above address.

Writing for MacUser

If you have an idea for an article you’d like to write, we’d like to hear about it. Send a query letter with samples of your writing (published, if possible) to Nancy Peterson, Administrative Assistant, MacUser, at the above address, or type GO MACUSER on Zmac. No calls, please. We rarely buy unsolicited manuscripts, so don’t send us a completed article without writing to us first. Allow four to six weeks for a reply.

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Our new reviews editor, Susan Janus, knows what plays well with Mac users—and what doesn’t.

What do MacUser, soccer, and chamber music have in common? Susan Janus, that’s what. As MacUser’s new reviews editor, Susan has the arduous task of sifting through the flurry of press releases and new products that descend on the magazine’s offices each month. Choosing what’s hot enough to review in MacUser requires instinct, experience, a stroke of inspiration, and a touch of mental anguish, reports Susan.

“Fortunately, I have help when I need it. We have a meeting of MacUser minds at least once a month to hash out what’s new and important in Macdom, so I get to draw on the expertise of the entire editorial staff to assist me in making some of the toughest choices.”

Before joining MacUser in January, Susan spent three years at MacUser’s sister publications PC Week and PC Computing. However, she’s no stranger to the Mac.

“From the beginning, I’ve cut my computing teeth on the very first Macintosh, back in 1984. I still have a copy of the original Microsoft Word 1.0, which is fast becoming a collector’s item. I also have fond memories of PageMaker 1.0—remember when system crashes were a way of life and text wrap was just a glimmer in Aldus’ eye?”

What can make the job of reviews editor at MacUser so excruciating is the sheer number of innovative products the Mac platform inspires each year. “When I worked on the PC side of the industry, it was clear that most of the exciting new product developments in the Windows environment were inspired by the Mac. So it feels great to move to where most of the leading-edge ideas actually originate—in the Mac market,” says Susan.

When she’s not assigning and editing product reviews, you might find Susan picking turf out of her teeth (“I play in a very competitive, in-your-face soccer league—it keeps me tough enough to defend myself when a product gets a bad review”) or relieving the tension of magazine deadlines with her violin and passion for chamber music.

What’s on Susan’s agenda for MacUser reviews?

“As reviews editor, I’ll be continuing the broad product coverage that’s kept MacUser readers informed on everything from the esoteric to the mainstream. One area I’ll Be watching closely is workgroup applications—software designed from the ground up for networked users collaborating on a project. This area will be key to keeping the Mac competitive in the 1990s. Since every Mac is shipped network-ready, I expect to see the most innovative development in this area happening first on the Mac. I’ve already taken a peek at prerelease versions of several cutting-edge products due to be released by this summer, so stay tuned.”

About MacUser

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Backdoor Macs

Guy Kawasaki really hit my desk accessory (“The Stealth Mac,” February ’91, page 41). How to sneak a Mac into a mid-sized government agency (approximately 15,000 employees)? Bury the computer police in a paper blizzard. It takes perseverance and a couple of trees to convince them that you think the way they do.

We learned that two words — functional requirements — reach deep into their psyche and, if the situation is handled diplomatically, can legitimize the purchase of a handful of off-brand computers. Six of us compiled a list of more than 250 functional requirements for our jobs as public-affairs specialists. Surprise! The Mac could handle 100 percent of our work — DOS was a distant second at 60 percent.

Dan Himsworth
Bozeman, MT

This letter is about getting Macs into DOS workplaces. I work for an electric company that is 100-percent DOS brainwashed. But it bought a fully equipped SE/30 and a IIfx for one of my projects — thanks to HyperCard and SuperCard and, of course, my astute application of them. In short, I sold the software, not the machine. Naturally the machine had to follow to make the software work.

The company had a database of sample data, but the numbers alone were useless. We needed graphics to show how the samples related to each other. Such phrases as “The database must have editable-graphics capabilities” did the trick. By editable graphics I meant that the program must be able to edit drawings without making users exit from it. This, I reasoned, was needed because it would waste time and effort to have to be constantly moving between programs. Which was true. We had a ton of work to do and little time to do it.

You can get Macs into the land of DOS with applications that only Macs can run. Stuff such as word processing and spreadsheets won’t do it — but stuff requiring rapid-fire graphics might.

Bill D. Johnston
Cary, NC

Guy Kawasaki’s “The Stealth Mac” column ends with the statement “a writer is supposed to portray things as they should be — not as they are.”

His vision of the way things should be includes recommendations to lie and six ways to threaten lawsuits — in a column that’s only 19 paragraphs long!

Where do Apple employees learn their ethics? Could the difference between the Mac and IBM PCs be the result of bad karma?

Milo
Balboa Island, CA

I looked in vain in Mr. Kawasaki’s February article for evidence of tongue-in-cheek writing as he advised lying, misrepresenting, faking, and the like in order to sneak Macs into a

Dear Mr. Sculley ...

If the Apple Portable proved anything, it’s that you can’t be too specific about your wish list. Who’d have thought that it would be important to say, “We want a portable Mac that isn’t too heavy to carry from one end of O’Hare to the other and that you can still see when a flight attendant turns off the cabin lights.” When Apple gets around to unveiling a notebook Mac, wouldn’t you rather not be disappointed?

Speak Up:
What features should Apple include in a notebook Mac?

Send your thoughts to Dear Mr. Sculley, c/o MacUser, 950 Tower Lane, 18th Floor, Foster City, CA 94404.

In October we polled for suggestions on what John Sculley can do to earn his salary — reported to be the highest of any computer executive. The answers were varied, but none of them beat Mr. Sculley’s own: He’s taking a self-imposed pay cut this year.

John Schubert, of Coopersburg, Pennsylvania, answered February’s question of how Apple should provide direct support for its customers by first pointing out existing weaknesses. “The product can be baffling, the owner’s manual is incomplete or cryptic, and your retailers are a bunch of crass goons.” The answer? — “The interim solution is to help the individual customer. The long-term solution is to use customer-support problems as a database to fix the underlying problems. Accordingly, Apple should rotate product managers, technical writers, and sales managers from its customer-support telephone bank.”

Barry Cohen of Brooklyn, New York, points his finger first at the computer buyer: “The real problem with the dealer channel is its unwillingness to pay for the services we require. Computers have become commodities like staplers and paper clips. Commodity products are sold at commodity prices, with a low profit margin for the dealer and little room for support services. We aren’t willing to pay for dealer services by paying a higher price for the products or by buying service contracts.”
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Know When to Folder

I enjoy Thom Hogan's column but have a correction to the one printed in February ("Happy Birthday," page 297).

He says that programs should save preference files in a Preferences folder in their System Folder but that no applications currently do this. Two of my frequently used programs do actually use a Preferences folder. I suggest that you give kudos to Aladdin for StuffIt and to CE Software for DiskTop. StuffIt also generates other folders such as Help, Translators, and Viewers.

Harmon B. Abrahamson
Grand Forks, ND
CE gets an A, and Aladdin gets a B—
Creating three new folders with generic names in the System Folder is no-no unless it's something other applications can use, such as Help or Preferences. Aladdin should create a StuffIt or an Aladdin folder for its Translators and Viewers. —TH

Speedy Optical Drives

In the audio section of your excellent multimedia report ("The Mac User Multimedia Encyclopedia," February '91, Buyer's Guide page 38), you state that erasable optical discs "would prove attractive if access times could be improved substantially" and refer interested readers to an optical-drive lab report in your November '90 issue ("Erasable Optical Drives," page 102), where you first noted their inability to handle the required access-speed needs of direct-to-disc recording and audio editing.

Oddly enough, when I received your November issue, I also received my direct-to-optical-disc Akai DD-1000 audio recorder/editor (International Music, Fort Worth, Texas; [817] 336-5114.) Our studio has since been recording and editing 16-bit CD-quality stereo audio with this system, which incorporates a standard Sony optical drive. It uses removable 650-megabyte cartridges.

The Akai DD-1000 seems to have no trouble with the optical drive's access time. It provides instant playback of any edited sound and equally speedy management of edit-decision lists. I never have to wait to hear playback, even if I'm assembling cuts from several different sound files. Best of all, Akai has selected the Mac as its computer interface.

Joe Van Riper
Charlotte, NC

The Akai product is a specialized $13.500 subsystem that uses a hefty 1-megabyte RAM cache. This speeds things up considerably.

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are driving magneto-optical-drive evolution rapidly. For example, another audio-products company, Eltek (Livonia, Michigan; [313] 462-3155), has rewritten the firmware and software of the same Sony drive that Akai uses and claims a transfer rate of about 309 kbps and access times of around 26 milliseconds—even without resorting to RAM caching. —LT

**DOS-Chauvinist Mail**

The main impediment to Mac users’ taking advantage of the lowest-cost mailing offered by the U.S. Postal Service is that it won’t accept Mac database disks unless they’re in specific DOS format. Why this blatant discrimination? The postal service claims there is not enough demand for a Mac option.

Mac users should be able to use this free upgrade to the ZIP+4 personal-mail lists. The Mac community should write to the postal service and their elected representatives if no action is taken. If all Mac database users would send the postal service a MAC address list in ASCII and request the advertised ZIP+4 free upgrade, we would make an impact and have our mail sent at the lowest possible cost—just as DOS users can do right now.

Niles A. Carter
Austin, TX

**Share and AppleShare Alike**

I challenge Henry Bortman’s statement in the January ’91 Bridges column (page 215) that “Mac users want file servers to look and act like AppleShare servers.” Apple, not Mac users, wants file servers to look and act like AppleShare.

We want a file server that is either much easier to use—especially for file transfer—or that has much-more-sophisticated security. Some say that AppleShare provides easy file transfer, but I think TOPS, from Sitka, best meets these needs. Also, most mail packages let users transfer files painlessly. Neither of these methods requires an AppleShare interface.

On the other hand, network managers want mainframe-quality security and file management—especially multiple levels of security (not just groups and users); a way to automatically maintain past file revisions; and a way to access two accounts simultaneously from the same server.

David Medberry
Layton, UT

You’ve got a point. Although we could debate whether AppleShare or TOPS provides an easier interface for the casual user, you’ll get no argument from us about AppleShare’s shortcomings in the security department. —HB

**Safe Spin**

Your excellent coverage of removable-data-storage disk drives and the benefits they offer Mac users (“Portable Secure Unlimited-Storage Cartridge Drives,” February ’91, page 206) contained some errors that might confuse readers.

The first issue is the hardware levels of SyQuest drives. Although a small number of revision 3 and revision 4 drives had performance problems, these occurred only when the drives shared the SCSI bus with a noisy scanner. We took immediate steps to fix the problem. The article’s author was in error when he attempted to tie this issue to microcode levels.

SyQuest takes its obligations seriously. If users call our technical-support staff at (415) 226-4280 and their drive shows symptoms that are consistent with a noisy peripheral bus, SyQuest will simply exchange the drive.

However, more than 95 percent of all revision 3 and revision 4 drives have performed flawlessly. Since your article appeared, only six SyQuest drives have been returned because of this problem.

Linking the indicator color to the drive level can also confuse the reader. The worldwide change to orange was made more than a year ago to comply with the European safety standards that reserve red only for dangerous situations. All SyQuest drives have an orange indicator, and no changes are anticipated.

Joel Levine
Vice President Marketing
SyQuest Technology
Fremont, CA

We were in close contact with SyQuest for this report, but somehow we received some wrong information. We have no reason to doubt that the indicator light shows only drive activity and not revision level. Note that even if the version number of the drive contains the characters F5E, there is no guarantee that the drive is part of the problematic revisions. —AE

**Hard Drive, Soft Rating**

I am at a loss to understand your rating of the CMS MacStack SD45RM in your February review of cartridge drives (“Portable Secure Unlimited-Storage Cartridge Drives,” page 206). Overall our drive scored very well in your tests. Your evaluation praised the good software and
To be the Mac-to-PC networking standard, you have to offer more than just standard equipment.

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What's more, we support our not-so-standard standards with a complete family of networking products. Like our FlashCard™ interface boards for PCs, which allow any PC to participate in the network regardless of its bus interface-AT/XT, MCA, or Toshiba.

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excellent documentation. You also gave positive marks for the drive’s metal cabinet, UL approval, and auto-switching power supply. Yet we received only two and a half mice, which tied for the lowest rating in your article.

The only negative comment concerned our list price. Your chart shows $1,399, but we have retail for $999 since early January ’91. Quoted retail prices are close to meaningless for firms that sell only through resellers, because dealers demand certain points off retail and then sell at dramatic discounts.

In your previous comparison reviews, I have always clearly understood some relationship between the article and the final ratings — not this time.

Karl Seppala
Director, Apple Products
CMS Enhancements
Irvine, CA

Our speed tests for all SyQuest-based cartridge drives produced similar results, so performance differences had only a minor effect on ratings. The CMS MacStack SD45RM, despite its above-average speed, was faulted for having internal SCSI termination and DIP switches (instead of push-wheel or thumb-wheel controls) to set SCSI ID — neither are easily manageable by the average user.

The list price of $1,399 (which we considered high in the absence of features such as auxiliary AC outlets) was confirmed by CMS in late September ’90. We’re pleased that the price has been reduced — so pleased, in fact, that we’ve raised the CMS MacStack SD45RM’s rating to three mice in this month’s MiniFinders.

We agree that list prices can be misleading. Beginning in March, we started including “street” prices from across the country whenever possible, as a free market-research service. —BM

Safe at Any Speed

In January’s “Thoroughly Modern Modems” (page 100), you reviewed 2,400-bps modems with error-correction and data-compression protocols. Can any of the 9,600-bps modems that use V.42/V.42bis use their correction and compression schemes at 2,400 bps when communicating with the modems you reviewed? If so, it means more justification for upgrading to the 2,400-bps modem with those protocols.

Doug Ivison
Westport, CT

All the 9,600-bps units known to us use error control and compression at 2,400 bps as well as at 1,200 and 9,600 bps.

—SS

Upgrade Inflation

I have a couple of clarifications to Ken Gruberman’s review of MacProteus, the music-sampling synthesizer on a NuBus card (February ’91, page 54).

When you refer to a device incapable of sampling, a better term might be sample playback instead of sampling.

Also, Ken might be paying for his upgrades on Mark of the Unicorn’s Performer too often. I bought Performer 2.2 in May ’88 for $395. There were free upgrades on version 2.2. The version 3.0 upgrade appeared in the summer of ’89 for $95, and it had two free upgrades. In fall ’90, I got the version 3.5 upgrade for $69.

Each paid upgrade of Performer added new features and enhanced an excellent program. I found it to be money soundly invested.

Larry Mueth
Fenton, MO

A Talking Dog

Your review of Spyglass Dicer (February ’91, page 60) accurately described the program and raised issues that we addressed in our latest free upgrade.

But we regret that you did not discuss the program’s significance. It lets scientists visualize volumetric data on a personal computer in seconds, using inexpensive interactive software that requires neither formal training nor programming. In fact, Spyglass Dicer is the only such application — as opposed to a programming environment — available on any computing platform. When you find a dog that talks, you should express some amazement at its ability before correcting its grammar.

Our users confirm that Spyglass Dicer has changed the way they do science. I think your readers should hear that in mind as they consider your comments.

Brand Fortner
Director of Research and Development
Spyglass
Champaign, IL

Spyglass Dicer is a revolutionary product — and indeed, so is the entire Spyglass line. Spyglass has brought mainframe capabilities to the Macintosh, but changing platforms also changes the user’s requirements. Although a supercomputer is used only for computationally intensive
Another new model year. And Canvas is still miles ahead. Lucky you. With brand new models of both the world's top-ranked drawing programs to choose from. Simultaneously.

And MacDraw® Pro isn't a bad try. In fact, it reminds us of another drawing program we've always had the utmost respect for: Canvas 2.1.

Unfortunately for Claris, our new Canvas 3.0 includes enough major enhancements to leave their latest effort idling somewhere back in the dust. Again.

Let's take a look under the hoods. Canvas 3.0 gives you more high-end text handling features. Like binding to curves. Stretched margins. Text wrapping outside — and/or inside — irregular objects, and full kerning & tracking control. Even conversion of PostScript® Type 1 fonts to customizable Bézier outlines.

MacDraw Pro doesn't.

Canvas 3.0 also gives you new built-in translators for important multi-platform formats like CGM, IGES and DXF™. And Open Architecture technology — allowing new tools, effects and translators to be added with ease at any time.

MacDraw Pro doesn't.

You are what you drive. Like Canvas 2.1 before it, the new Canvas 3.0 was developed in direct response to the wish lists of thousands of professional users. Its heritage of performance is proven. Its price is right. And its ease of use is legendary. Which leaves just one last question. If what you draw is important to you, why settle for Claris's sedate sedan when you can get your hands on a dream machine?

Note to Canvas Users:
Registered users who purchase Canvas 2.1 between Jan 1, 1991 and May 31, 1991 qualify for a free upgrade to Canvas 3.0. All Canvas 2.1 users who purchased prior to Jan 1, 1991 can upgrade to the new version for only $99 US. Canvas 1.0 or 2.0 users may upgrade for only $129 US. Prices valid through Aug 1, 1991. Allow 4-6 weeks for delivery. All orders include $10 shipping & handling. International Users: Please contact your local authorized distributor for availability details.

Trading up's so easy to do. But only for a limited time. MacDraw users: Trade up now to the new Canvas 3.0 for just $149 U.S. Just call 1-305-594-6965 and ask for Dept M. (Have your MasterCard, VISA or American Express card number & expiration date ready!) Or mail your MacDraw® program disk to the address below, along with your credit card information or check drawn on a US bank. Offer limited to the US and Canada, and ends Aug 1, 1991.

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### Letters

functions, the Mac can be used to visualize data while the user is writing a report, answering E-mail, creating a presentation, and manipulating a spreadsheet. Therefore, a function such as saving is essential to a Mac user but may not be to a supercomputer user. If Spyglass keeps in touch with Mac users’ needs, its products should receive even wider acceptance.

— RI

A La Carte Support?

Regarding Robert Wiggins’ “Support Woes” column (February ’91, page 29), why doesn’t anyone point out that product support is never free? It doesn’t take a rocket scientist to figure out that whether the vendor charges for it directly or not, the vendor still incurs exactly the same costs — such as overhead and salary to provide service for that caller. These support costs must come from customers who either pay for it upfront when the product is purchased or at the time the call is made.

For example, the average toll-free phone call to WordPerfect costs the manufacturer $20. Let’s assume an average of two calls, or $40, per package sold. The normal software discount to distributors is 60 percent, so the $40 in actual costs to WordPerfect translates to $100 added to the retail price. This means that even if you never use the toll-free support, you’ve paid as much as $100 more than you needed to when you bought the software.

I believe that if you buy an intuitively programmed package with a good manual, you should strongly support a per-call charge for product support. Otherwise you’re just subsidizing users who call without reading the manual.

I do get irritated about paying for support on a per-call or contract basis. But I’d probably get over that irritation quickly if the prices of all my favorite programs dropped by $100 and the cost of support remained about the same, and support becomes an extra cost added to the already high product costs. Consider QuarkXPress and PageMaker, which already have a high price and also charge for support. Business users also wouldn’t fare well.

They would have problems getting purchase orders approved every time they needed support or subscription renewal. It’s much easier for them to pay all costs in one chunk. — RW

Rein in Dvorak . . .

I’m writing to MacUser regarding one of your contributing editors, Mr. John C. Dvorak. I don’t care what he thinks about the political side of Apple. I would much rather read his opinion on such matters as what really are the significant differences between Dvorak’s PC and our Macs, why Apple’s methodologies may or may not be inferior, and what is wrong with the pricing and technical-support policies of the Apple system.

His February column (“Apple Events,” page 400) says so little and yet manages to fill a page. His style of critique is more than a little petulant, and it certainly displays poor upbringing. To say the least, it is impolite to deride someone’s accent or facial mannerisms.

If you cannot corral his acerbic talents, then why not just drop him? I’m sure there are others, maybe less well known for their acidity, who could positively contribute to the debate between Apple devotees and IBM practitioners.

James A. Hauck
Pleasanton, CA

. . . Or Let Dvorak Reign

I’ve always wondered what it would take to incite me to write a letter to the editor. Now I know. John C. Dvorak’s January column (“The Gloom and Doom Boom,” page 346) did it. Often monthly essays are no more than a way to fill a page, and even the authors sometimes seem bored with the process.

Not so this time. Dvorak always makes us think, but this month’s bonus was that he read my mind and eloquently told the whole world how I feel. Thank you and bravo!

Chuck Klein
Orangevale, CA

### Clarification

The review of Spyglass Data (February ’91, page 51) overlooked the fact that the sample image that ships with a standard data card is missing. Let’s say Spyglass Data intended to correct this oversight.

Spyglass Data does retain the original value, which it displays whenever you click on a data element.
Special Upgrade Offer for TOPS Users!

"How is DataClub Different from TOPS?"

DataClub™ is a breakthrough in file server software. It overcomes the limitations of TOPS® conventional peer-to-peer architecture to give you a network that's more powerful, more reliable, easier to use, and easier to expand.

The key is DataClub's new Virtual Server™ technology, which uses available resources around the network to create one powerful, shared disk that is centrally managed and maintained. And this makes a big difference for you.

With DataClub:

- **Folders are always available**
  - DataClub gives users access to the entire shared file system 100% of the time.
  - On a TOPS network, mounted folders disappear when machines shut down or leave the network.

- **Files are easy to get to**
  - All files and folders are found under the single DataClub icon.
  - With TOPS you have to spend valuable time mounting and searching multiple volumes.

- **Location transparency**
  - DataClub's Virtual Server technology allows users to access data without having to know on which machine it's physically stored.
  - TOPS users must know where a file is physically stored in order to access it.

- **No need for publishing**
  - Just store files under the DataClub icon, and they're available to the network.
  - TOPS requires all data to be published before it can be shared.

- **Unlimited scalability**
  - Thanks to its Virtual Server technology, an expanding DataClub network retains its simplicity and actually grows more powerful.
  - As peer-to-peer systems like TOPS grow, they become more and more unmanageable.

- **Add users without reconfiguring**
  - DataClub automatically reconfigures the network whenever hardware is added or removed.
  - On a TOPS network, users have to mount volumes manually every time a new user or disk is added.

- **Centralized backup**
  - You can back up a DataClub network quickly, easily, and without interruption to the system.
  - By contrast, TOPS requires individual backup of each node.

- **Nine levels of security options**
  - DataClub provides the highest Apple-approved security you can get - nine levels.
  - TOPS offers just one.

- **One password per user**
  - With DataClub you only need one password per user.
  - With TOPS you need a different password for each folder, adding more confusion than security.

- **Centralized registered users**
  - DataClub lets you create a single set of users and groups which is valid for all Macs and disks on the network.
  - TOPS has no support for registered users and groups.

- **Complete AFP compliance**
  - DataClub complies fully with the AppleTalk File Protocol standard.
  - TOPS does not. So DataClub is compatible with more applications - especially multi-user databases.

- **Lower cost**
  - Though it's much more capable, DataClub actually costs you less - one third the price of TOPS. And even less than that on larger networks.
  - Any way you look at it TOPS costs you more time and money.

**TOPS used to be the simpler, cheaper network, but DataClub beats it on expense and setup simplicity.**

Phillip Robinson
San Jose Mercury News

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Since 1985 Ehman has been a leader in providing high quality peripherals to the Macintosh market. Our hard drives, monochrome monitors, and removable drives have been a mainstay to the industry, with a name that is well known and highly respected.

Now allow us to introduce the newest member of our family; 20 inches of 8 bit color in a high quality, 72 DPI monitor that end users will love, and budget watchers will adore.

The new Ehman 2-page color monitor. It's as affordable as it is practical. Backed up by a one year warranty and our 30 day money back guarantee the price tag once again demonstrates Ehman's commitment to value on the most popular peripherals.

The other members of the family are all just as cost conscious. From the new super 185MB drives to our popular 45MB removable drive, as well as the monochrome monitors, you'll find our prices
among the lowest in the industry, and our commitment to quality and service the highest.

Ehman has always had what you want most; affordable quality. Now with the introduction of our 2-page color monitor we also have the full line of peripherals you need most.
No one likes to be left out. And with the 10BaseT network hub from Asante™, no one is. The Asante 10T Hub™ comes standard with all the right connections: twelve 10BaseT ports, plus one each for thick and thin Ethernet.™ The media flexibility you need in any office.

Installation is easy, since the 10T Hub requires no special software. And it ships with interchangeable back panels, so you can make your 10BaseT connections two ways: with simple RJ-45 plugs, or a 50-pin connector for a telephone system punch-down block.

The 10T Hub is just another example of networking leadership from Asante, a company that brings you a full line of Ethernet cards for all Macintoshes. Like all Asante products, our hub meets the IEEE Ethernet specifications and is compatible with all popular hardware and software. Reliability is guaranteed with our 5-year, hassle-free warranty.

Plug into the 10T Hub from Asante. It will turn your office into one big happy family.
The decisions you face when buying a printer are endless: price, output quality, PostScript compatibility, and font strategies. . . . Will it ever be possible to print happily ever after?

Once upon a time — it may even have been yesterday — there was a magical kingdom called Cupertinia, presided over by the wise monarch King Macintosh, the User-Friendly. You could tell he was wise because he’d bought Apple at 29 1/2 — twice.

The king had a lovely daughter, Princess Classica. Classica spent her days skipping through the meadows of her father’s kingdom, talking to the butterflies, singing enchanting little songs, and conducting anecdotal market research amongst the peasantry. She also ran a small desktop-publishing business on the side.

“Princess Classica! Princess Classica! Long live the beautiful Princess Classica,” the adoring peasants would shout as she skipped by.

“Princess Classica! Princess Classica! When are we going to have an affordable, high-quality printer for less than $1,000?” the more pragmatic peasants would shout as she skipped by.

Princess Classica was no fool; she knew pent-up demand when she saw it. She also knew that although her popularity was rising high at the time, it wouldn’t take much to lose the loyalty of her public.

The princess wanted nothing more than to keep the people of her kingdom happy. “Father,” she asked the king, “our people seem happy right now. Yet to have a truly blessed kingdom, we must always stay one step ahead of their wish list. What should we do next?”

“You are wise, Princess,” said the king. “Go see what the magicians in my Royal SkunkWorks have up their ample and mysterious sleeves.” So off she went to the Royal SkunkWorks, in a remote corner of the kingdom.

“What can we build for you, your royal princessness?” said the Chief Engineer and Overall Cleverperson.

“I need a PostScript laser printer the masses can afford. That’s the only way to fulfill the promise of Macintosh and keep the people happy.”

“But, milady, they already have low-cost CPUs. The Macintosh Classic has become the single best-selling CPU model in all of computerdom.”

“Yes, but what good is a CPU by itself? Most people still need hard-copy output. And they’re not going to spend more money on the printer than they did on the CPU — or do you think money grows on trees?”

“Oh of course not, milady. Everybody knows money is printed on Rumplestiltskin’s Tektronix Phaser PX color printer. Why, all the details on this and other printers are conveyed in the current issue of MacUser, milady.”

“Hmmmm . . . I’ll have to read that as soon as I get a chance.”

The Chief Engineer continued, “I can make for you a 360-dpi inkjet printer for $599. It will be the highest output quality, but it cannot be PostScript. The leaders of the land of Adobe will not share their PostScript magic with us — at least not at that price. But go forth, and tell the people the good news about the inkjet. In fact, it will be shipped just in time to be previewed in the current issue of MacUser.”

The Chief Engineer went back to his workbench, and the princess went back to her market research.

“The printer is coming,” she proclaimed. “What else do you want?”

“System 7.0! System 7.0! We want System 7.0!” the people shouted.

“Get real!” retorted the princess. “What do you think this is, a fairy tale?”

“Well,” cried the people in unison, “how about if we could use the old VGA monitors we have hanging around from our old PC clones with our new Macintosh LCs?”

“Consider it done,” said the princess. And even though the Royal SkunkWorks had not announced this fact with any fanfare, it was, in fact, true. “What else?”

“A single font standard!”

“Hmmm . . . .”

Uh-oh, thought the princess. Fonts are intimately tied up with PostScript. This request, the princess knew, was beyond the ken of the Overall Cleverperson of the kingdom. So the princess headed off to visit an even cleverer person who lived in the neighboring kingdom, the ruler of the land of Adobe, the beneficent warlock Warnock.

Just a Fontasy

“‘Oh wise and wizardly warlock Warnock,’ cooed the alliterative princess, ‘my people pine for the pizzazz and practicality of PostScript printers.”

“Verily, PostScript is, in sooth, a fine thing.”

“But, your wisdom, PostScript is, in sooth, a fine and expensive thing. Oh, and they want you to clear up this confusing font business.”

“‘Tis true, your princessness. I require a substantial tithe, in sooth, to help capitalize my R&D costs for this fine PostScript.”

“You are indeed a wise warlock, Warnock.
and a talented one — you are able to pronounce *title* and *sooth* in the same sentence. Someone that clever must indeed have some very fine improvements in store for PostScript; with all those tithes, you can afford the finest magicians on your R&D staff. Prithee, what glad tidings are we getting for our less-than-glad tithings?

"Ah! Prepare to be amazed and astounded! Behold! A new font standard!!!" "A font standard is, indeed, a wondrous thing. But is that what is needed to keep my people happy? You already have a fine and wondrous Type I standard. And with the mystical powers of the Adobe Type Manager—the ATM—you have rid our kingdom of the evil and vile jaggies."

"Did you ever notice that evil and vile are anagrams? Or that ATM is an appropriately chosen acronym for this utility that has dispensed much gold into our coffers?"

"Well," said the princess, "money doesn’t grow on trees. But methinks you’re changing the subject. Let’s get back to fonts. My people were all happy with Type 1 fonts, once you opened the spec up to the other type wizards. And ATM elicited many a rousing cheer from amongst the people — including an Editors’ Choice award from the scribes at MacUser. And, indeed, my own kingdom of Cupertinia is releasing its own new font standard — for the truest of all true type (described elsewhere in MacUser’s current issue). What for do we need another font standard? And what about the cheap printers we all want? The people grow restless and talk of visiting the distant land of the Windows people."

"Ah, princess, sit down, and I will explain all. Our new font technology is called Multiple Masters."

A Servant to Multiple Masters

"Consider how ATM does not limit you to just the particular type sizes your font supplier provides," quoth the warlock. "You can set the type size to any number of points, and ATM does the rest. Well, font vendors make some other rather arbitrary design choices—how heavy a font is, how italic its italics are, how serif or sans serif it is, and so on. A Multiple Master font gives you control over a continuum of choices on all of these ‘axes,’ just as you now have continuous control over type size."

"This sounds powerful," said the princess, "but also complicated. My people want simplicity, not complexity. Suppose I’m using a font in a page-layout program and something’s not working. There are too many things that could be responsible. How are my people supposed to keep track of these things?"

"Buy a clue, lady! We’re just characters in a magazine column, after all. If life were that simple, nobody would need to buy magazines, and then where would we be?"

"I never thought of it that way," replied Princess Classica, wondering what René
When I heard “balance sheet,” I broke into a sweat. I know type, advertising, printing. Now I was forced to do our books. No choice.

We were on our third part-time bookkeeper in eleven months, and she was called away suddenly. Sound familiar? But I’m the boss and the buck stops with me. We had bills to pay, payroll checks to write, invoices to send, taxes to set aside.

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

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

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

The familiar with the unfamiliar

atOnce! starts you off with a tutorial that uses HyperCard, one of my old favorites. It was at home.

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

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

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

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

What I didn’t know was costing my company

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

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

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

A hidden bonus that made my day

When our bookkeeper returned, I showed her atOnce! Now she’s back doing the books, even makes sure my plants are green, and I can supervise like a boss should. Putting the books on the Mac gives me the numbers I need when I want them. It lets me take control of income and expenses.

Here’s some free advice: Take control of your own business. Buy atOnce!

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Descartes would have to say about her—"which is a type of Type 1 font," interjected the warlock.

"—which is a type of Type 1 font, and you've got your TrueType fonts—"

"Well, they're not our TrueType fonts. Those fonts came from your kingdom, princess..."

"Your kingdom, my kingdom—what's the difference? My people are still confused. And when things get complicated, the peasants get revolting."

Prints and the Revolution

"Don't talk to me about revolting, princess: We're the folks who made all those 17-fonts-on-a-single-page documents possible. But not to worry."

But the princess was worried. "The world thinks the world of PostScript. In fact, there are lots of people who equate PostScript with all that is good about printing: high resolution, no jaggies, lots of fonts to choose from, rich graphics—"

"Yes, yes, PostScript gives you all of that and more."

"But you don't need PostScript for all that. You never did. There are many fine non-PostScript laser printers, non-PostScript fonts, and non-PostScript graphics programs. It's just that most printer manufacturers figured that anybody willing and able to pay the big bucks for a laser printer would want PostScript to boot."

"And boot it they did! Every time they boot up a PostScript printer, I can just hear those coffers clinking."

"But warlock! Our own magicians have just presented the people with a 360-dpi inkjet printer. That's an even higher resolution than that of most PostScript laser printers — and it lists for less than 600 bucks! And our new non-PostScript laser printer costs less than $1,300."

"Yes, yes, and the wizards from the distant kingdom of GCC have an even less expensive laser printer, listing at less than a thousand pieces of gold, with even better benchmark-test results than those of your own low-cost laser. I've already read MacUser Labs' current report. And not a farthing of those low prices goes for our pretty PostScript," moaned the warlock.

"Hmmm... I'd better get around to reading that issue," thought the princess. The Princess and the P-Word

The princess was still confused about PostScript. Those new printers sound hot, thought the princess — even without PostScript. And a new font type can't hurt anyone — more options can only be a better thing, right? But Princess Classica left the land of Adobe in a state of greater confusion than she was in when she arrived. "I think I have a question," she mused aloud, "but I'm not even sure what it is anymore. This should be a happy day throughout the land. But methinks that all
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these new font choices will serve only to frustrate. Even more so, as I hear that a clone of PostScript called Bauer is coming posthaste from behind the castle walls of the supreme and utter wizards in Redmond, the masters of Microsoft."

"Aahah, you don’t want to enter those Gates," cried a gruff voice behind her. "I’ll bet you two-to-one that I’m the wizard you need to see."

"Two-to-one? Well, those certainly are good odds, but —"

"Exactly! I’m the Wizard of Odds. Five’ll get you ten that you’ve seen my movie?"

"Is that the one where everything is black-and-white until the Mac II arrives?"

"That’s the one. I’m your chief oddsmaker. See, nine times out of ten, the people don’t need anything new to keep them happy. They think they need more than they have, but they really just need to solve their problems. And the key to problem solving is troubleshooting."

"Troubleshooting?"

"It’s like dragon slaying; the secret is to eliminate the easiest opponents first. Nine times out of ten, that’ll solve whatever problem you have."

"OK, Wiz, so what do we do?"

"The trick is to isolate the problem. If you can’t get your printer to print, for example, try to print a very simple document — just text, no fancy fontwork, no graphics. If you can at least print a simple document, you’ve ruled out the causes of 90 percent of all difficulties: loose cables, printer out of paper, power off, and so on."

"That sounds fine," said the princess. "But what if the problems persist?"

"Most people think that problems crop up all on their own, but they almost never do. Usually they arise because you’re doing something differently. Whenever you think you’re doing exactly the same thing you were doing before, think again; chances are something is different. Because the Macintosh does such a fine job of keeping most of the annoying details of its operation hidden from view, it also makes it tough to see what the problem is when things go wrong."

"Your difficulties probably have nothing to do with PostScript," continued the wizard, "or font conflicts, or the other perils that concern you. And once you’ve isolated the trouble, the solutions are usually obvious and easy. So go forth, and tell your people to embrace the new technologies and be happy."

The Morale of the Story

The princess thanked the wizard and returned to her kingdom. "What have you brought to keep us happy?" the people demanded.

And as the princess started to address her subjects, a smile began to spread across her face. "I have brought you the greatest gift of all: Nothing! No more choices to make for a whole month!"

And the people cheered and were happy — for a month.
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Adobe Illustrator 3.0
Adobe Illustrator 3.0 is the premier product for single page design on the Macintosh. Adobe Illustrator 3.0 offers the highest quality designs and illustration capabilities and now includes a powerful new text handling tool allowing for direct, on-screen entering and manipulation of text. Users can create and edit charts and graphs with ease while using new interactive dialog boxes for faster access to features. If this is not enough, every copy of Adobe Illustrator 3.0 comes with Adobe Type Manager. Voted the database environment and greatly reduces the time required for importation and editing images into database records.

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## Accessories

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APC’s UPS1105E and UPS370ci not
only to provide better line filtering
and surge suppression than
most surge suppressors,
but also deliver
backups power during A/C
line failures—giving you
time to perform a
safe shutdown.

UPS 1105E .............................................. $148.
UPS 370ci ............................................... $208.

Dove DoveFax Plus
DoveFax Plus offers the most sought-after fax
software features such as full background
operation when sending or receiving a fax
(with or without MultiFinder); automatic
answer, which allows you to receive a fax
without interruption; redialing, which
guarantees fast delivery; pre-scheduled
transmissions, that allows you to send
multiple faxes after hours when rates are lower; customized cover sheets and more!
With the DoveFax Plus, your Mac turns into a personal voice messaging system, as well as a full-featured
tax machine. The DoveFax Desktop can be upgraded to the DoveFax Plus with the simple addition
of a microphone and software.

DoveFax Plus ........................................ $395.

LISTA Sales & Marketing Manager
In this world of fast paced markets and even faster paced sales,
you must have the marketing software to keep up with the world.
Sales & Marketing Manager is a first party program that improves your
control of all sales and marketing. It allows you to set up individual
companies or divisions. Whether you are one sales person working for
many companies or one company with many divisions you can
now keep full control.

Sales & Marketing Manager ........... $295.

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Smac-A-Mac
($1 Value) for every purchase of $90 or more.

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Classic 1MB Upgrade .................................. 118.
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Virtual-SE/30 Xc, Icx, Hlc 114.
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DayStar Digital
PowerCache 030 Ici
40mhz w/FPU ............................................ 948.
40mhz w/FPU ............................................. 1,165.
50mhz w/FPU ............................................. 1,888.
50mhz w/FPU ............................................. 1,960.

Orange Micro
Orange Micro 386 ............................... $1,695.
Orange Micro Mac 386 V3.0 .................. 1,078.
Orange Micro Card SE .......................... 385.
Orange Micro 386 .................................. 1,685.

Total Systems
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Server .................................................. 995.

Call for our low prices on boards with a math co-processor.

American Power Conversion
UPS 1105E and UPS 370ci
The power to protect your Mac.
APC’s UPS1105E and UPS370ci not
only to provide better line filtering
and surge suppression than
most surge suppressors,
but also deliver
backups power during A/C
line failures—giving you
time to perform a
safe shutdown.

UPS 1105E .............................................. $148.
UPS 370ci ............................................... $208.

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companies or divisions. Whether you are one sales person working for
many companies or one company with many divisions you can
now keep full control.

Sales & Marketing Manager ........... $295.
Over 1600 products for your Mac

**ResumExpert**
Advance your career with professional help. ResumExpert creates job-winning resumes for students to CEO's. Designed by a resume-writing pro, the ResumExpert Software Series is an impressive collection of eye-catching resume and cover letter templates for Microsoft Word 3.0 or 4.0 and WriteNow 2.2. Each of the 10 editions provides over 40 distinctive and completely-formatted layouts. Easy to use - just select the appropriate template and replace the text with your own information. The highly-rated manuals provide expert tips for composing professional quality resumes and cover letters quickly. MacUser rated ResumExpert a 1989 Top 200 Software Product and awarded it 4 mice! **ResumExpert ...... $47**

**Practica Musica 2.0**
$68

**QLTech Giga-Rom, Macademic, or CD7**
Giga-Rom is the largest collection of Macintosh software ever assembled. Files are archived in Bill Goodman's "Compactor" format and indexed with On Location. Macademic is 7,500 programs and related files for Education and Instructional use. Subjects range from the arts to the sciences. CD7 is The largest non-compressed collection of Macintosh software. Over 15,000 files including art, games, demo, and music files with digitized sounds.

**Giga-Rom** $98
**Macademic** $73
**CD7** $49
Call for products not listed

Central Point Software
Mac Tools Deluxe
Mac Tools provides utilities for data recovery, file protection, and disk management. You can make backups of your hard disk whether on Apple tape drive or a set of floppy disks. Other utilities in the collection undelete accidentally-erased files, recover damaged files, compress files, defragment files, and encrypt them. A DA finds "lost" files fast.
Mac Tools Deluxe $78

ASD Software
FileGuard
FileGuard 2.5 protects your hard disk from unauthorized access. With this program you can access privileges to specific folders (including the system folder), to particular users or work groups, and create "drop folders". FileGuard prevents others from copying or erasing the contents of your hard disk and offers password protection for your applications.
FileGuard $138

ZonderVan
Electronic Publishing
macBible
ZonderVan macBible presents several different versions of the Bible to help you understand its meaning more clearly. macBible quickly finds the passage you want to study. It can open five text windows and one special purpose window at once. Three study modes display your Bible to your questions. The word-and-phrase mode locates individual words, phrases, and groups of words. The verse mode displays any range of verses by book, chapter or verse. The Count mode displays statistical information about words or groups of words to complete your study.
macBible $58

Utility

Utilities

Sauce Systems
Descart.
Retrospect 1.2 ...
Bullets
DiskExpress II ...
ASF Software
FileGuard
Baseline Publishing
APD Express Tape ...
INIT Manager ...
Tailing Mouse ...
Beagle Bros. Inc.
Flash...
Berkley Systems Design
Dark 2.0 ...
Stepping Out 2.0...
Casady and Greene
QuickDex...
CE Software
DiskTop 4.0 ...
Quick Keys 2 Version 2.0 ...
Central Point Software
Mac Tools Deluxe
Custom Applications
Freedom Of Press 3.0 ...
Freedom Of Press Light ...
Dantz
Retrospect 1.2 ...
Bullets
Dariana Technology Group
Mac Sleuth System Profiler ...
Quickstart Software
ClickDrive ...
Fifth Generation
DiskHack 2.0 ...
Fast Back II ...
PowerPower 2.5 ...
Pyro 4.0 ...
Suitcase II 1.2 ...
SuperLaserSprocket 2.0 ...
SuperSprint 5.0 ...
S.I.C. Simulations
MacKEEP ...
On Cue ...
Insight Development Corp
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Lexmark
NightWatch ...
QuickClock ...
Kiwi Software
KiwiFinderExtender ...
La Cie Limited
La Cie Serial Talk (Single) ...
Leap Software
Picture Book ...
Microsoft
911 Utilities ...
Virex 3.0 ...
Microseed Publishing
Screen Gems ...
INIT Picker 2.0 ...
Redux ...
Now Software
New Utilities ...
Power Up
Address Book Plus 2.0 ...
Calendar Creator ...
Salient
DeskDoubler 3.0 ...
Symanetics
S.A.M. 2.0 ...
S.U.M. II ...
Norton Utilities ...
Tactile Software
MasterFinder ...

Input and Output Devices

Articulate Systems Inc.
Voice Link ...
Voice Navigator II ...
DataDesk
Mac 101 Keyboard ADB ...
Switchboard ...
Switchboard And Trackball ...
Desk Scanner/W Recognize ...
 Hewlett Packard
Deskwriter (300 Dpi) Printer 758 ...
Kensington
Turbo Mouse (512 & Plus) 108 ...
Turbo Mouse ADB ...
Keytrons
MacPre KB-150 ADB ...
Kodak
Diconix B&W Printer ...
Diconix Color Printer ...
Logitech
Scanner Model 32 ...
Micro Touch Systems
Unimedia ...
MicroSpeed Inc.
MacTrack I (512/plus) ...
MacTrack Talkback ADB ...
Mouse Systems
Little Mouse A ...
Little Mouse (512/plus) ...
Mouse Systems
Little Mouse For ADB ...
Olds
Read III OCR 2.1 ...
Read III Personal 2.1 ...
The Complete PC
Full-page Scanner ...
Half-page Scanner ...
Thunderware
ThunderScan Plus ...
Lightning Scan 400 ...
WACOM - Graphic Tablets
Complete line available ...
Call ...
Broderbund
Kid Pix
Kid Pix is an amazing paint program created just for kids. It combines special effect art tools, picture stamps, sounds and magic screen transformations to turn the computer into a magical art studio. And with Kid Pix, you don't just paint a masterpiece, you hear it too! Every brush and tool has its own unique sound effect. You can even record greetings, poems or music to enhance your creativity.
Kid Pix $31
**FilmMaker**

FilmMaker is the ultimate answer. Whether you're a professional animator who wants to create stunning effects for video, or just someone who wants to put their ideas in motion, FilmMaker allows the user to create professional quality presentations and animations quickly and easily! What takes hours to create in other applications can now be done in just minutes with FilmMaker. FilmMaker is the ultimate answer.

**Microtouch Systems**

**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 you instantly have a Power Keypad with 16 keys available to execute macros (60 in advanced mode). With its one million touch points the UnMouse also performs admirably as a graphics tablet.

** Pixar MacRenderMan**

Pixar MacRenderMan

Pixar MacRenderMan is the complete disk management utility. MasterFinder is the complete replacement for the Mac Finder. Using a concept of window panes as its basic user interface, each pane displays file names from a directory of a mounted drive. MasterFinder's start-up view, the "Pane" View, consists of four panes that can display information on all mounted drives.

**Tactic Software**

**MasterFinder**

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**Toyogo Nemesis GO**

**MASTER Deluxe**

Go combines Japanese philosophy and business strategy into their national game. Go Master Deluxe, winner of the Chaos Manor Users Choice Award (byte 1990), unites the Go playing and teaching abilities of Go Master, the corner-opening tutorial, Joeski Genius, and the life and death consultant, Tactical Wizard.

**Pantone, Inc.**

**Pantone Process Color Imaging Guide**

The PANTONE Process Color Imaging Guide is the perfect companion to all Pantone-licensed software programs. It provides a visual comparison of solid PANTONE Color and process simulations as they would appear on the final printed piece. As many PANTONE Colors cannot be satisfactorily reproduced in four-color process, this publication provides the user with the information to best decide whether to specify spot process color while working on the desktop.

**OpCode Systems Inc.**

**MIDI Play**

**MIDI Translator**

**Note Writer II**

**MIDI Interface**

**MIDI Transport**

**Band-in-a-Box**

**Pro.Composer 2.3**

**EZ Vision**

**Microtouch Systems**

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Jasmine Technologies has consistently finished first in the MacUser Lab's Buyers Guide and we've been praised in every major Macintosh publication for the quality of our drives and for the ease of use in DriveWare, our custom drive utility. DriveWare, provides the best SCSI partitioning, password protection, error correction, diagnostic and help software.

**40 mb Portable Hard Drive $299**

**40 Mb for Mac II, IIX, and IIfx $349**

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The DEST Personal Scan is the first scanner to combine full-page, one pass, hand-held scanning with sheetfed scanning in one desktop unit. Now you can easily read almost any document into your computer: books, manuals, technical documents, even oddly-shaped or overstuffed originals are no problem with the full-page, hand-held unit; or place it into the automatic document feeder and scan up to 10 pages at a time, fully unattended, for real productivity. And best of all, the Personal Scan comes bundled as a kit that includes everything you need to begin scanning today such as: high quality 300 dpi scanning resolution, powerful Recognize! omnifont OCR, graphics editor, cables and interface, one year warranty and comes in MAC and PC models.

**Personal Scan with Recognize $685**

**Recognize OCR Software $515**

**Mass Microsystems**

**DataPak Removable Hard Drives**

Voted the best by the industry critics, it's still the first family of removable cartridge drives for the Macintosh. With 45 megabytes on each removable All Mass Microsystems drive products come bundled with Disk Doubler Utility from Salient.

**DataPak $724**

**DataPak IICx $778**

**Quick Image $748**

**DataPort Drives**

Before DataPort, drives were either inexpensive or well supported, but not both. DataPort backs all its drives, including the mechanism, with a full two year warranty and a 90 day money back guarantee. We can afford to do this because DataPort drives are made with top of the line components and endure rigorous testing. DataPort drives are made by CRU, one of the leading suppliers of drive components.

**DataPort 45Mb $319**

**80Mb External $475**

**LaCie Tsunami 40 mb Drive**

Tsunami drives come initialized with SilverLining, the standard of hard disk utility software, and SilverPlatter, Apple's system, five megabytes of public domain software and Norton Utilities are also included on the drive. Ask your MacAdvisor about the new 2 plus warranty on Tsunami drives.

**Tsunami 40 mb Drive $595**
"Controlling your computer by voice is a science-fiction fantasy that has finally become reality." MacWeek's Bob LeVitus goes on to say:

"**HIGHEST 'WOW' FACTOR OF ANY PERIPHERAL WE'VE SEEN**"

"With Voice Navigator II, your Mac will obey your every command; all you have to do is ask...you can't help being delighted when you see it responding to its master's voice. If that sounds sexy to you, it is." - MacWEEK 10/90

Just say "Open, Close, Print, Zoom, etc..." Voice Navigator II responds as quickly as you speak. Really.

It works so well that our technology won MacUser's 'Most Significant Hardware Product of the Year 1989'. "**WE WERE AMAZED**" - MacUser 3/90

Now imagine PageMaker, Word, Excel, FileMaker, MacDraw, all of your favorite applications running *Up to 50% faster*! So the next time you're next to a Macintosh, be careful what you say - it may be listening!

For more information call toll free 1-800-443-7077

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Articulate Systems
the voice communications company

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Why have we been using keyboards and mice? Because there hasn't been any faster or cheaper way to tell a computer what to do. A new technology is ready to change all that — and it's more than just talk.

Throughout the history of computing, years of effort and millions of dollars have been spent in pursuit of the perfect input device. Keyboards, light pens, joysticks, trackballs, mice, and more have all been tried. Only the keyboard and mouse have showed true staying power.

More recently, OCR (optical character recognition) software and even handwriting-recognition software have made news. But as fads and fashions have come and gone, one technology has remained elusive: the Holy Grail of input technology — voice recognition.

Visionaries have long predicted the coming of voice-controlled computers. Even the most jaded user would agree that truly efficient and effective voice recognition would make computers more accessible (John Dvorak might not agree, but he's more jaded than most).

As the Mac is to a character-based system, a voice-controlled system would be to the Mac: a true computer for the rest of us. Every user — and even potential user — who has ever watched "Star Trek" has yearned for a voice-activated computer like the Enterprise's.

Although highly advanced voice recognition is still a few years away, voice recognition is already here. Like many innovations, it didn't come from a giant corporation — it came from a modest startup company, Articulate Systems, which is committed to advancing this technology.

Articulate Systems has been unusually successful at getting recognition for voice recognition. The 1989 MacUser Editors' Choice Award for most significant hardware product went to Voice Navigator (see "Editors' Choice Awards," March '90, page 92), and the 1990 Eddy for best input device (see "The 6th Annual Editors' Choice Awards," March '91, page 97) went to Voice Navigator II, which is smaller, less expensive, easier to use, more versatile, and more advanced.

A Sound Product

Although Voice Navigator II falls short of Mr. Spock's standards, it's a good start. You can't use it as a dictation device, and the technology is a long way from that level. For some time, the keyboard will remain the primary way to get words into your Mac, with scanners and OCR a practical alternative for inputting large quantities of information.

Voice Navigator excels with short phrases such as commands, making it a mouse alternative rather than a keyboard replacement. You can execute menu items without ever lifting your fingers from the keyboard.

Voice Navigator can also serve as a mouse extension. Have you ever been working in a program with a tool palette (such as PageMaker) and wanted to change tools without dragging the mouse all over the screen and back? This product lets you say "pointer" and the cursor instantly switches to the pointer function. If you have a large-screen monitor or a multiple-monitor configuration, this feature alone makes Voice Navigator worthwhile.

You can link Voice Navigator to various actions, which is rather like using a macro-recording program such as QuicKeys. There are also add-ons such as VoiceWaves, a collection of macro-like instructions for specific programs. To implement VoiceWaves, you simply teach it to recognize your voice.

For Offices, Not Cubicles

Although Voice Navigator is an excellent product, voice recognition is no panacea. John Dvorak has described a sea of desks occupied by people talking to their computers. This conjures up images of offices where the air rings with "No, don't type THAT!" and "Don't listen to HER, listen to ME!" He has a point. Voice-input products are not suited to open-office environments. Voice Navigator's sensitive microphone, for example, although somewhat directional, occasionally picks up extraneous sounds that it treats as commands. Background noise can sometimes mask your voice, rendering the product less useful. Having to repeat commands can get old fast.

In addition to the technical problems of background noise, voice recognition presents psychological problems. Some users feel self-consciousness when talking to a computer, especially if others can hear them. Even if the technical problems are solved, voice recognition is likely to remain more of an option for people who have some privacy.

There's also a problem with yelling. When misunderstood, people tend to repeat themselves more loudly, especially when they're giving commands. This has two effects. For one thing, your voice is different when you shout, so the louder you speak, the less likely the hardware is to understand you. This leads to a cycle of shouting louder and louder, which can be like dealing with a petulant child who refuses to obey you until after you've calmed down. When you've regained a normal speaking voice, your commands are recognizable...
What weighs 9 pounds, fits on an airline tray table, works like a Mac, and is available now?

The Outbound Laptop System.

The Outbound™ is the smallest, lightest, Macintosh®-compatible laptop computer available anywhere—and it’s affordable!

Call 1-800-444-4607 today to find out about our standalone plug-and-play configuration (with Plus ROMs installed).

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To Go Forward You Must Backup

On the Macintosh, creation and storage go hand-in-hand. You create. Then you store. Pretty soon, your hard disk is full of files—each one vulnerable to a hard disk crash. Retrospect will protect your creativity. And offers more than any other backup software: Archiving. Archive files to keep your storage needs in check. Retrospect supports almost any storage device and has compression, encryption, and full file selection. Run it automatically with a built-in calendar.

Retrospect. The Best Backup for Your Creativity.

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A Sound Future

At the current level of technology, voice recognition has moved beyond novelty into the realm of utility. It is now more than a toy. After you're used to the Voice Navigator, you won't know how you lived without it. You can also visualize how much further voice recognition can go.

Voice recognition can make changes in the way you do business. Some changes may be for the better, such as an integrated voice-and-electronic-mail system or the ability to control your Mac remotely via telephone. This capability would let you call your Mac and have it fax an important document to wherever you are in the world.

Other voice-recognition-related changes can be costly. Open offices and cubicle systems are less practical if everyone is talking all the time, for example, so expect to need better soundproofing. Offices may even have to be redesigned.

You can bet that voice-recognition systems will play an increasing role in the proliferation of computer systems. As technology advances, costs decrease, and software that exploits new capabilities is developed, voice recognition will become an integral part of the concept of computing. When you can turn to your computer and instruct it, “Get that guy from Cleveland on the phone, and show me the Chicago figures” and have it not only understand your oblique references (“What guy from Cleveland? Which Chicago figures?”) but also obey you instantly, voice recognition will have enabled the next computer revolution.
How Do You Improve On OCR?

Introducing WordScan.

We took the phenomenal accuracy that earned TopScan™ its coveted five-mouse rating, added features that make it even easier to use, priced it under $600, and called it WordScan.

With the industry's highest accuracy rate, WordScan saves you the time you'd spend correcting mistakes ordinary OCR makes. Because it's so much more accurate, WordScan glides through draft dot matrix, laser print, faxed or photocopied documents that stymie less sophisticated OCR software.

And WordScan's more powerful new features make it even faster and easier to get anything you can scan directly into your word processing, database, page layout or spreadsheet program.

With Deferred Processing™ you can scan things in quickly, walk away and let them process while you do something else.

The Pop-Up Verifier, a WordScan Plus exclusive, lets you proof right on the screen instead of searching through your original copy. Overall throughput is faster.

AutoClipping™ automatically clips and files graphics while WordScan Plus processes text.

And WordScan Plus' unique Style Sheet automatically overrides existing layouts with your new one.

Call 800-544-7051. Get the name of your Calera dealer and get a demonstration of the world's most accurate OCR.

The Most Accurate OCR At Any Price.

OmniPage Owners Upgrade To WordScan Plus For $149.
If you own any Macintosh version of OmniPage, you can upgrade to WordScan Plus for only $149. Check with your dealer for details* or call Calera at 800-544-7051.

*Limited time offer

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Introducing a big improvement over this basic piece of disk handling equipment.

Meet Jukebox Five,™ the handy new disk exchanging machine that takes the manual labor out of loading and unloading diskettes. Jukebox Five hooks up to your Mac® in seconds and works its way through a stack of up to 15 disks—automatically. It’s the most amazing time-saver since the introduction of the tape drive, without the high price.

Jukebox Five is compatible with virtually any Macintosh software, including the top-selling backup program, Fastback II.™ So unattended disk backups are a snap. And it comes complete with a time-saving utility program that lets you format diskettes, copy from hard disk to floppies and duplicate multiple disks without even being there.

To find out more about Jukebox Five, call 1-800-873-4384. Buy Jukebox Five and get a free box of diskettes. Just write “diskettes” on the registration card and return it to us. This is a limited-time offer, so get your hands on one today.

Load it and leave it to process up to 15 diskettes.

Please circle 103 on reader service card.
In Praise of Prodigy

Dear Editor: I was vastly disappointed by Guy Kawasaki’s column regarding Prodigy in your May issue. His column was filled with technical errors, misinterpretations of our actions, and illogical unsupported conclusions about our very fine advertising service.

He, like many other people, does not understand Prodigy’s purpose: To serve as an advertising medium—not as a channel of communication. As an advertising medium, we have every right to run our service as we see fit for the majority of our subscribers.

William Whitebread
Prodigy Services
Upstate New York

(I know that this month’s column will generate this kind of response from PR flacks or Prodigy executives. Rather than give them the satisfaction of writing this letter, I thought I’d write it in advance. Foiled again, IBM.)

This month’s column is about Prodigy and its recent actions to control its subscribers. To make a long face short, Prodigy is an electronic bulletin-board system created as a joint effort by Sears, IBM, and CBS. (CBS dropped out later when Brent Musburger couldn’t figure out how to sign on to the system.)

A controversy recently erupted between Prodigy and some of its subscribers because of Prodigy’s censorship of public messages, initiation of charges for private E-mail messages when they exceed a certain quantity (initially E-mail services were free, but then the volume got too large, so Prodigy changed its mind), and termination of a few dissenting members.

As you would expect, the computer press has leapt up and condemned Prodigy for these kinds of actions and alleged actions. Highly respected gurus such as Steve Levy and Jean-Louis Gassée have trumpeted human rights, free speech, and plain old common sense loudly in Macworld and MacWEEK. Can I tell you something? They’ve got this all wrong—Prodigy has done a great thing for Macintosh.

The Prodigy Way

How’s that? Well, Prodigy has given the Macintosh community concrete, irrefutable, and powerful evidence of Prodigy’s (and by extension, IBM’s) philosophy of personal computing. This philosophy of control and censure is completely contrary to personal computing’s raison d’être: empowerment, communication, and creativity. It’s wonderful ammunition to use against the IBM PC and everything it’s come to stand for.

Prodigy wants to control things, and it’s perfectly within its right to do so. But you have to wonder what it thinks of personal computing. To me, it’s scary, and I would never buy a personal computer from a company that had started a company such as Prodigy. The fruit never falls too far from the tree, as they say.

Think about it: The next time you hear, “I’m thinking of buying an IBM PC,” you don’t have to limit your retort to the standard stuff: “The Mac’s easier to use and has cooler, nicer columnists and better software.” Now you can say, “IBM believes in censorship and bait and switch. It’s un-American to buy an IBM PC.”

Clearly this is an oversimplification of the situation, and Prodigy has its own side of the story. But don’t lie awake at night awash in guilt. For years, IBM has portrayed the Mac as a wimp machine without software. Two can play at the Fear, Uncertainty, and Doubt game. Now it’s our turn.

Not Far Enough

Frankly, for our purposes, Prodigy may not have gone far enough. Maybe it should go further to inflict its vision of personal computing on its customers. Surely saying this will bring a rain of criticism upon me, but only good can come of it. Prodigy will decide to get even tougher and more draconian and antagonize more people, which is good for Macintosh. Or it will lighten up and tolerate more controversy on its service, which is also good for Macintosh.

If Prodigy decides to go the first route and get tougher, allow me to suggest some ways for it to achieve this goal:

1. Screen and edit every message. I mean every message: public, private—everyone. In fact, it would be good if Prodigy could read its customers’ minds to see if they are thinking about sending a controversial message. There must be a way to do this through a new kind of keyboard membrane. IBM always seems to excel at keyboards.

2. Administer personality tests to prospective customers. Prodigy should prevent problems before they happen, so before people can join, they should have to complete a test, get it notarized, and send it to Prodigy. They should be accepted only if they pass Prodigy’s requirements. Joining Prodigy should be as difficult as joining MENSA—and as useful. (Oh no, here comes more hate mail. This time from MENSA members who own guns and just escaped from Singapore.)
SMARTBUNDLE™

The SmartBundle is a collection of four easy-to-use, award-winning applications bundled together at an incredible price—the best value in Mac software today!

And because each application has won a MacUser Magazine Eddy Award recognizing it as the ‘best’ in its field, you know each part of the SmartBundle is extraordinarily capable—a claim other starting Macintosh® packages simply can’t make.

The SmartBundle: Easy, powerful, and affordable... the smart choice in software for new Macintosh buyers!

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*Used on a Macintosh Plus with a 20 megabyte hard disk. Test performed with a 20 megabyte document. **Contains non-English data and a large graphic. All figures are rounded off.

Please circle 87 on reader service card.

GUY KAWASAKI

3. Detect if a person who accesses Prodigy with a Mac works for a company that has standardized on the IBM PC. On detection, Prodigy could furnish lists of offenders to the Mac users’ bosses. Corporate America would surely appreciate Prodigy’s efforts to ensure that its employees use only IBM PCs.

4. Make Prodigy run s-l-o-w-1-y on Macs. This perpetuates the belief that Macs are slow compared with IBM PCs. It will also drive away Mac owners and keep Prodigy pure — safe from the anarchists that we Macintosh owners are. (I hear that this recommendation has already been implemented.)

What You Can Do

So far I’ve focused on how Prodigy can drive customers away from its service and IBM. You can have a hand in this guerrilla operation too. Here’s what you can do to help the Macintosh cause:

1. Join Prodigy if you’re not already a member. (I never said that helping the Mac cause would be without sacrifice.)

2. Send mail to the Prodigy system operators complaining that your children have read obscene, distasteful, and inappropriate messages on the service.

3. Send mail to the Prodigy system operators threatening to boycott the Prodigy advertisers’ products because they are implicitly supporting immoral electronic communication. (This is the nerd version of the boycott of advertisers on the “Married with Children” television show.)

4. Cancel your membership. I think this would drive Prodigy nuts. It would crack down even harder on dissenters. This would then antagonize more people. It would make Macintosh more attractive. It might even make Apple more attractive.

But Seriously, Folks...

Seriously, I hope that Prodigy lightens up and takes a more hands-off attitude. It’s just not a cool way to run this type of service. Don’t tell me Prodigy is an advertising medium. Prodigy is a public bulletin board like CompuServe and America Online. It walks like a duck, it looks like a duck, it sounds like a duck. It is a duck.

Really, more than anyone, I want more people to buy Macs and not IBM PCs, but I don’t want people to do so because Prodigy (and therefore IBM) is so backward. See, when you’re on the winning team, you must play with a certain amount of grace. Not to mention modesty. 🧐
Introducing the PostScript-compatible LaserScript LX.

Forget about having to beg or borrow a printer, because at $1,995 the LaserScript LX is a steal. It's up to 60% faster than a LaserWriter II NTX, with some features the NTX doesn't have. Like four active ports, so you can connect both Macs and PCs to the same printer — with or without a network. And automatic emulation switching, so you can switch between PCL4 and PostScript-compatible languages without using the front panel.

But the most attractive feature of the LaserScript LX is that all this performance won't break the bank — which is important in these economic times. For the dealer nearest you, call Abaton toll-free at (800) 444-5321 or (415) 683-2226. At $1,995, it would be a crime to spend any more.

LaserScript LX
- PostScript & PCL 4 emulation
- 2.5MB standard RAM
- Auto-emulation switching
- 35 resident fonts
- 1 LocalTalk, 2 RS-232, 1 Centronics port
- All ports active
- 25 MHz processor
- $1,995.00*

LaserWriter II NTX
- PostScript & PCL 4 emulation
- 2MB standard RAM
- Manual emulation switching
- 35 resident fonts
- 1 LocalTalk, 1 RS-232, 1 ADB, 1 SCSI port
- Only one port active at a time
- 16 MHz processor
- $4,995.00*

* Suggested retail price. LaserScript, LaserScript LX, Abaton, the Abaton logo, and "We make your ideas easier to publish." are trademarks of Evocex Systems, Inc. Other brand names and product names are trademarks or registered trademarks of their respective companies.

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No one can design a better multi-media presentation than you.

*Introducing the PC-VCR from NEC.* It doesn't take millions to produce a professional-looking presentation. You don't even need a Hollywood contract. All you need is the PC-VCR from NEC, a Macintosh computer with HyperCard 2.0 and the appropriate software. And you can write, design, produce and edit quality presentations right at your desk. The PC-VCR combines the power of video with your personal computer. Letting you create multimedia presentations that are both exciting and easy to understand. Designing a business presentation with the

PC-VCR will save you time and money, too. With NEC's unique software, you can achieve frame accurate indexing and seamless cut edits on VHS and Super VHS through simple mouse commands. It's quick, easy and you no longer have the expense of outside editing houses or video disc mastering. Best of all, the PC-VCR gives you full-motion capability, and allows you to combine that motion with other computer graphics. In other words, the PC-VCR is your chance to write, direct and star in your own production. Doesn't that sound like fun? For more information or location of your nearest dealer, call 1-800-562-5200, ext. NEC. In Canada, call (416) 795-3500.

*PC-VCR compatible with any Macintosh or IBM (and 100% compatibles) computer system with one megabyte of memory, 64K of base DOS memory, plus 384K extended, not expanded, memory. ** Sold separately.
Outward rebound:
Until now, Outbound Systems' laptop computers have required user-supplied Mac ROMs. No more. Outbound [(303) 786-9200] now offers a plug-and-play solution that includes Mac 512Ke ROMs. The trick is that Outbound sells you a 512Ke, installs the ROMs in its machine, and then buys the ROM-less Mac back from you for $100. You never see the 512Ke. Outbound is also cutting the prices of its laptops by $300 to $600.

By Russell Ito

The 68040’s year: Now that the low-end Macs are out, attention is turning to acceleration, specifically 68040 acceleration. Motorola’s 68040 packs more than 1.2 million transistors—four times as many as on the 68030—and consolidates on a single chip a math coprocessor, paged-memory-management unit, and data and instruction caches that are 16 times larger than those on the 68030. As a result, the 68040 is nearly twice as fast as a IIfx (15 MIPS versus 8) and 12 times as fast in simple floating-point calculations (3.6 MFLOPS versus 0.3). Four manufacturers have jumped on 68040 acceleration early. Radius’ Rocket will be the first shipping unit. A NuBus card, it has a unique design that lets the 68040 take over the CPU functions, leaving the Mac CPU (68020/030) to handle all the I/O. The Rocket uses standard SIMMs and can be configured with 1 to 128 megabytes. Radius’ software takes advantage of NuBus block transfer, so the Rocket can pass data across the NuBus at rates up to ten times faster than those of most other NuBus cards. Plus the Rocket has its own PDS (processor-direct slot), so fast daughterboards can be added. Radius has even included QuickDraw and display-list acceleration, in software, so the Rocket takes care of graphics acceleration too. The Rocket is expected to list for less than $4,000. (408) 434-1010. iir’s NuBus card, the Performance/040 Accelerator, is similar to the Rocket. It also leaves the Mac motherboard active to handle I/O functions and uses standard SIMMs. Second-quarter release. $3,995. (404) 781-8643. Fusion Data Systems goes the PDS route, letting the 68040 take over the Mac completely. The TokaMac LC is a PDS card for the Mac LC that uses the Mac motherboard’s RAM while boosting the LC’s performance beyond that of the IIfx. Second-quarter release, $2,995. (619) 481-8427 or Charles Allen (619) 457-0781. Total Systems Integration’s Magellan 040 is also a PDS card, only this time for the SE/30 and Ilsi. It too uses the motherboard RAM. $2,995. (800) 874-2288.

Up to Date . . .

Studio/8, Electronic Arts’ 8-bit-color painting package, has just had its first major upgrade. Version 2.0, which has been revised for the Mac IIi and LC, now supports the Pantone Matching System and additional file formats. $295. (415) 571-7171. Electronic Arts has also dropped the price of Studio/I, its black-and-white painting package, to $79. Inspiration, Ceres Software’s “thought processor,” is now in version 3.0. The latest edition boasts color and improved graphics. $249. (503) 245-9011.
QuickMail Keeps Pace

Following close on the heels of Microsoft's announcement of Mail 3.0, CE Software has announced QuickMail 2.5. Although it's not a complete rewrite, it does pack enough enhancements to make it worthwhile.

For mixed networks, QuickMail 2.5 offers several significant improvements. PC users running PC AppleTalk and the QuickMail Client software can now talk directly to the QuickMail Mac server. For users in environments running AFP-compatible PC network software, such as NetWare, Banyan, 3Com, and LAN Manager, no AppleTalk card is required. The PC QuickMail Client software can send messages to the PC file server that the Mac QuickMail server can retrieve for distribution to the Mac clients. The QuickMail server's polling is automatic, and the mail supervisor can set the polling frequency.

For Mac users — and especially their mail administrators — one of QuickMail 2.5's biggest enhancements is the change to a single-copy architecture. Now, instead of replicating the same message — and its enclosures — ten times for ten different recipients, the server stores only one copy of each and sends notifications to the recipients, which saves space on the server. Version 2.5 also boasts improved timing options and support for Apple's Com Toolbox.

QuickMail Remote users who've found a conventional terminal-emulation program more convenient than QuickMail Remote will be glad to know that Remote now has an interface that looks and functions just like that of regular QuickMail. Finally, QuickMail users will see several small but important improvements. Forwarding messages is now much clearer than it was before (losing your job is less of a possibility, now that you can tell where the message is really going), and address books can be accessed through a pop-up menu.

Although QuickMail 2.5 still doesn't include automatic directory updating, as does Microsoft Mail, CE has included a utility that the network administrator can configure and distribute so users can update their systems just by running the installer.

In the future, CE will introduce a Windows 3.0 client, and it is expected to use its newly acquired Perfect Timing technology to bring out a network-scheduling and personal-calendar system integrated with QuickMail.

CE Software, 1854 Fuller Road, P.O. Box 65580, West Des Moines, IA 50265; (515) 224-1995. Ten-user pack, $599.95; five-user pack, $399.95.

Sony Means Multimedia

Sony has been expected to step to the forefront of multimedia for some time, and it's finally taken the first step. The Sony Vbox is an inexpensive computer/video-interface box that lets you control several Sony consumer-level video products from a computer.

The key to the Vbox is Sony's ViSCA (Video System Control Architecture) protocols, a set of Sony-developed commands for synchronized control of multiple video peripherals, including 8mm VCRs and camcorders. Apple has endorsed the ViSCA standard and is developing a VSCA device driver and tool kit that it will distribute to developers for free. Both Fairallon Computing and MacroMind have already announced plans to support ViSCA in their upcoming multimedia products.

By daisy-chaining seven Vboxes, users can control and switch among as many as seven Sony video devices from a single serial port on the Mac. Control can even include zooming the camcorder in and out.
The Vbox isn’t as big as it appears here, but this inexpensive computer/video interface bodes well for Sony’s future in multimedia.

Although reformatting your hard drive isn’t something you’re likely to do on a regular basis, formatting removable media, such as SyQuest cartridges, is a common occurrence and a formatter that’s easy to live with is a blessing.

FWB, 2040 Polk Street, San Francisco, CA 94109; (415) 474-8055. $199.95.

More Mice

Third-party mice and trackballs are suddenly popping up all over.

Mouse Systems’ A3 Mouse is a three-button optical unit that is A/UX-compatible. The three buttons can be programmed, so macros can be assigned to the buttons and left-handed users can configure the mouse to suit.

EMAC’s trackball, Silhouette, uses a sloped design so the user’s hand and wrist are supported, with the ball itself held between the thumb and forefinger. Ergonomics are behind the unique design.

Spark International’s Cordless Mouse and Trackball use an infrared signal instead of wires to get their messages through the ADB. For long-distance mousing, Spark says, the units can be used up to 15 feet from their receivers.

Many mice. Among the latest third-party offerings are Mouse Systems’ A3 Mouse, a three-button A/UX-compatible unit; Spark International’s Cordless Trackball (the company also offers the Cordless Mouse); and EMAC’s Silhouette trackball.
Ventura Publisher Macintosh Edition

At last Ventura Software brings its venerable long-document-publishing package from the PC to the Mac.

Ventura Publisher Macintosh Edition brings considerable muscle to the task of long-document publishing. But if you’re an experienced Mac user, you’ll have to make painful adjustments to the software’s awkward, unconventional mode of operation. The program may be powerful, but its roots in the DOS world are evident: It doesn’t look, feel, or drive like Mac software.

Bilingual Ventura
Ventura Publisher’s chief strength is that it runs on Macs as well as on PCs. Consequently, it provides one of the best methods for exchanging DTP files in mixed Mac/PC publishing environments. If you don’t need PC/Mac compatibility, your best choice for long and technical documentation may still be FrameMaker, Frame Technology’s publishing package for Macintoshes and UNIX workstations (see review, November ’90, page 54). FrameMaker makes good use of the familiar Mac interface while providing power and functionality equal to that of Ventura’s package.

Ventura Publisher has been the long-document-publishing package of choice in the PC world for some time, running first under GEM/DOS and now under Windows. To its credit, Ventura Publisher Macintosh Edition brings exciting new features to the process of creating long and technical documents on the Mac. The Macintosh Edition supports an incredible variety of both PC and Mac word-processing and graphics file formats. It boasts an outstanding integrated Table Editor and a solid Equation Editor that resembles Microsoft Word’s method of typesetting mathematical equations.

And like any long-document-publishing package worth its salt, the software features powerful tools for cross-referencing, variables, and TOC (table of contents) and index generation across multiple documents. Ventura Publisher also supplies tools for creating and manipulating simple graphics and provides image-control features for halftones. Color support, however, is limited to spot color. You can anchor frames and rotate text and graphics, but Mac users will find the process awkward.

Installing Ventura Publisher requires a hard-drive with at least 4 megabytes of free space available. The program runs in 2 megabytes of RAM, but we found it unreliable with anything less than 3. Ventura Publisher loads all text into memory when you open a document, so the more memory the better.

Like FrameMaker, Ventura Publisher uses a frame-based approach to page layout. When you launch the program, it opens to an untitled document (or chapter, in Ventura parlance). One annoying characteristic requires you to explicitly close any open file before you can open another — the program even dims the Open and New commands until the current file has been closed. PageMaker, another “seriously monogamous” program, can at least close untitled files automatically when you open another file.

Font Management
The first time you use Ventura Publisher, the program scans your system and then creates and saves to disk a Font Width table containing character widths and kerning information for all your installed fonts. Most other Mac applications read this information from the screen fonts. Ventura Publisher reads it from the table it creates and uses the information to
determine line breaks and character spacing. Although at first glance this approach may seem redundant, it actually has a benefit. If a file you’re viewing contains fonts that are not installed in your system, Ventura Publisher selects similar substitutes from your installed fonts and determines the correct character spacing and line breaks by using the width table.

Ventura Publisher’s unique approach to font management has some serious drawbacks, though. The program doesn’t recognize more than 1,024 kerning pairs in any one font and may crash if it encounters more than that number. And because Ventura Publisher ignores kerning pairs beyond its limit as it builds the width table, it has kerning problems with many of the existing Adobe Originals, which have more than 1,024 kerning pairs. What’s more, many more Adobe fonts with more kerning pairs than Ventura Publisher’s limit are expected by the end of 1991. Although you can still use these fonts with Ventura Publisher, the elimination of some kerning pairs may have a marked impact on output quality.

Creating chapters in Ventura Publisher involves several steps. The first will probably occur outside the program, because you will undoubtedly want to generate and edit your text with a separate word processor. That’s because Ventura Publisher’s editing powers are, to put it kindly, anemic. In all its incarnations, Ventura Publisher lacks even rudimentary search-and-replace capabilities — an astonishing shortcoming in a product designed for creating technical documentation.

Ventura Publisher’s chapters don’t actually contain the word-processing files you “import” and format. The program creates links, or pointers, to the external files. It then inserts its formatting codes into your original text. The codes become part of the text file, so if you have to go back and edit or spell-check the original file, you’ll have an unpleasant surprise awaiting you. Even the text you create within Ventura Publisher, such as captions, is exported into external caption files, and all graphics are exported into external files too.

With this in mind, you might view Ventura Publisher as a very sophisticated front end to your word processor that provides preview, file-management, book-building, and cross-referencing features. In light of its DOS origins, this may make sense in the context of Word Perfect 5.1 and Microsoft Word for the PC, which until recently were decidedly non-WYSIWYG. However, its validity in the Mac environment is questionable.

Unruly Files

External text files are quite foreign to Mac DTP habits. Although some people may argue that it’s better to have a myriad of smaller files than one giant, unwieldy typeset file such as that PageMaker creates, it’s also quite apparent that a myriad of external files creates its own set of problems. For example, one 200-page manual we created in Ventura Publisher included a whopping total of 400 external graphic, text, and miscellaneous files. It’s no wonder, then, that Ventura Publisher Macintosh Edition includes Manage Publication and Manage Files commands. You need them to tame your unruly herd of files.

Once your text is ready, you create a Ventura Publisher chapter by setting up page size, columns, and a style sheet that formats the text files. The style sheet contains tags that control the appearance of your paragraphs. Ventura Publisher offers considerable power over the printed word. Here its strength rivals and sometimes even surpasses that of QuarkXPress. Typographical features include automatic drop caps, automatic rules, automatic and manual pair kerning, tracking, and excellent command over vertical justification and spacing. Straddle elements in multicolumn formats are particularly well handled, and true running heads are possible (as they are in FrameMaker).

When you’ve placed your text on pages, you format paragraphs by selecting them with the tags tool and clicking on a tags name in the Tags window. Next, you can
REVIEWS

select individual words within a paragraph and apply attributes such as italic or bold.

In addition to its dearth of Mac operating conventions, Ventura Publisher also exhibits some frustrating eccentricities. It has amazingly few keyboard shortcuts, and the menus are sparse. You have to select text before you can choose Bold, for example, which means you can’t switch to bold, type a word in bold, and then revert to plain text. If you place the cursor at the beginning of a word that appears in bold or italics and then backspace, you don’t delete a space; instead, you delete a hidden attribute code and the word loses its formatting. Even more exasperating, you can’t undo this action. You have to use a special Copy and Paste command to ensure that you pick up the index or other special markers for selected text. Meanwhile, all these codes, although invisible in Ventura Publisher, are written back to the original word-processing files, where they form a kind of obstacle course for future editing.

The Bottom Line

For mixed environments that share files among Macs and PCs, you may want to add an additional mouse to the Ventura Publisher Macintosh Edition’s three-mouse rating. But it’s hard to imagine Ventura’s package winning many converts among users who have cut their DTP teeth on the Mac. For them, FrameMaker presents a much more familiar face and offers long-document-publishing functionality on a par with Ventura Publisher’s but in a far more stable package. And most definitely look elsewhere if you require graphics-intensive design. This is not Ventura Publisher’s strength or promise.

— Gregory Wasson

[Ed.]

Multiplatform Publishing with Ventura Publisher

Ventura Software claims that it has the perfect DTP solution for mixed Mac and PC publishing environments. With Ventura publishing packages that run under the Mac OS, Windows, and GEM/DOS, it would appear that the company’s claim is substantialized. A closer look, however, reveals several flaws in the Ventura multiplatform publishing solution.

Ventura’s support for a wide variety of word-processing and graphics file formats is unequalled. Together, its publishing packages support 30 in all. But MacUser tests showed that although the files created in any of the three Ventura versions are indeed transportable to any other version, the transfer process is anything but seamless. Add to that slight inconsistencies in the interfaces of the three products, and you’ve got a less-than-perfect solution. One source of confusion is that some of the same tools in the Mac and Windows versions have different names — the tape tool (Mac) is christened the paragraph tool in the Windows package, for instance.

Although Ventura Publisher files opened easily in our tests of file transfers between the GEM/DOS and Windows versions, these same files occasionally presented problems when sent to the Mac. The problem was not so much opening PC Ventura Publisher files on the Mac as it was coaxing the files error-free into the Mac Ventura Publisher environment. Problems included clipped graphics, balking at PC Microsoft Word files, and changed hyphenation and line breaks in files generated by the GEM/DOS version.

In Ventura Publisher’s favor, fonts never presented a problem in our file exchanges, because of the unique Font Width tables that accompany publications. We command Ventura for engineering that lets Mac users open and view PC files that contain fonts not installed in their Mac system.

However, Mac-to-PC file transfers were more complicated, because the Windows and GEM versions of Ventura Publisher do not directly read the Macintosh Edition’s files. You must first convert Mac word-processing and Ventura Publisher files to PC Ventura Publisher formats.

In short, although transferring PC Ventura Publisher files to the Mac and back was possible, the process can get time-consuming and complicated. We eventually found workarounds to every file-transfer problem we encountered, but the process is not as well engineered as FrameMaker’s multiplatform (UNIX, NeXT, Mac) approach.

Ventura Publisher file transfers over networks are far easier than those involving floppy disks. But in all cases, Ventura Publisher’s use of the Copy All command — which it requires in order to preserve links and pathnames between external graphics and text files and parent chapters — is in place of the Mac Finder tremendously complicates the process.

Ventura Publisher Macintosh Edition, will be bundled with the product. In addition, version 3.0.1 will make the software compatible with the TOPS INIT, fix minor bugs, and improve on the documentation. A fix for the kerning-pairs problem is not planned for the immediate future. Ventura will send out version 3.0.1 free to all registered users. Add-on spelling and hyphenation dictionaries for 11 languages will be available.

Get Info

Ventura Publisher Macintosh Edition

Published by: Ventura Software, Inc., 15175 Innovation Drive, San Diego, CA 92128; (619) 672-6000.

Version: 3.0

List Price: $795.

Ventura Publisher Windows Edition files don’t always transfer to the Macintosh Edition without errors.
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ColorStudio

Letraset's ColorStudio is a top-notch tool for high-end color-image processing.

For professional-level control over color and high-end output, not even Adobe Photoshop can top the new version of ColorStudio, an image-editing and painting package from Letraset. But be prepared to pay a price to exploit ColorStudio's talents fully. Although dollarwise the new $995 ColorStudio costs a whopping $1,000 less than the original version and costs only slightly more than the $895 Photoshop, Letraset's program is decidedly more complex and difficult to use than Adobe's package.

Industrial Strength

ColorStudio is an indispensable tool for users who work regularly with color images destined for high-end prepress systems such as Hell or Scitex. It's an industrial-strength package that requires a significant investment in hardware and memory. We recommend a Mac II-class machine with at least 8 megabytes of memory, a 32-bit display card, and a large-screen display.

You also need vast quantities of disk space to accommodate the virtual files that ColorStudio creates as you work. A good safety margin for virtual disk space is four times the size of the file you're editing (don't forget to allow for the original file and the saved-as modified version). ColorStudio's high-quality images create huge files — you can easily end up working in the 30-megabyte range. A SyQuest or Bernoulli drive comes in handy for storing large finished art files.

Users well versed in color theory will immediately appreciate the program's exceptional control over color balance. Once you've scanned an image directly into ColorStudio (Letraset supplies drivers for most popular scanners), you can correct shadows, midtones, and highlights in each color component of the image. When you're satisfied with the image, you can save your correction settings and apply them to future scans when you want an exact match between images.

ColorStudio's software-based monitor calibration lets you correct the way on-screen colors are displayed. You can choose to make settings permanent so that calibration operates systemwide for other applications as well. Modification of ColorStudio's Calibration file gives you just about the most accurate picture you can get without add-on hardware.

ABCs of Color

ColorStudio's handling of four-color separations is outstanding. After adjusting the RGB settings to an acceptable level, you can use the CMYK Color Correction dialog box to fine-tune the separations. You can save the CMYK adjustments you make and apply them to future work. You can preview all separations in color or black-and-white. Screen angles and frequencies are user-definable to four decimal places.

ColorStudio provides support for a large variety of proofing systems and film recorders. Letraset also plans to provide auto-correcting output filters for the DuPont 4Cast and Kodak XL 7700 dye-sublimation printers.

Although ColorStudio's tools may be more powerful than Adobe Photoshop's, they're not as easy to learn and use. Several steps are often required in ColorStudio to accomplish tasks that you can complete in one step with Photoshop — for example, converting a 24-bit-color file to 256 shades of gray is a simple menu choice in Photoshop, whereas ColorStudio requires a multistep, lengthy workaround.

The program provides a variety of powerful selection tools. The lasso operates in the standard fashion, as well as in Polygon, Oval, and Auto Selection mode. The Auto Selection mode lets you choose image areas on the basis of color, close hues, color range, and mask. You can refine all selections by additions and subtractions. Selected areas "float" over the main image so you can work on other areas or perform operations without losing the selection. When you're ready to drop the selected area onto the main image, ColorStudio lets you specify feathering values to facilitate anti-aliased, blended edges. You can save all selections as selection regions and then reselect them later, a function similar to Photoshop's Alpha Channel. ColorStudio's selection tools are powerful but complex — the kind that will appeal to professionals but that may frustrate casual users.

ColorStudio provides a powerful mask layer, which it stores as a separate grayscale image. This approach gives you fine control over the brightness, color, and saturation of masked areas. The density of
black in the mask layer controls the degree to which masked areas are affected or protected. You can make masks by painting directly in the mask layer or by copying a portion of the original image into that layer.

**Custom Painting**

As a true-color painting program, ColorStudio again outshines Photoshop with its superior color control. With ColorStudio, you can vary paint opacity on the fly and in 10-percent increments, using numeric keys. Color palettes based on RGB, HSV, and CMYK are easy to set up and store. The palettes are especially useful for work, such as textile design, that requires many variations based on a limited selection of colors.

You can customize the program's painting tools to your heart's content, and you can change tool shapes and functions quickly and easily, using the program's floating palettes. The palettes remain on-screen for instant modifications until you choose to close them. However, you'll need a large display if you want to accommodate all of ColorStudio's palettes, because they take up a hefty share of screen real estate. Once you've modified a tool, ColorStudio lets you name and save the custom settings for future use.

The art of filling objects and areas with color is well implemented. Graduated fills can range from straight ramps to circles to arcs. There is even a triangular gradation that ramps among three colors, something that's very difficult to accomplish in Photoshop. You can combine fill areas to form any variety of shapes and ramps.

**New Shapes Annex**

An optional add-in package for the latest version of ColorStudio gives you drawing as well as painting tools — something you don't get with Photoshop. The $295 Shapes Annex drawing program installs directly into ColorStudio and provides a draw layer over the program's paint layer. You use Bezier control points and handles to manipulate drawings, just as you do with FreeHand and Illustrator. You can also import EPS line art from other PostScript-based packages.

Once you've moved your drawings into their final position over the paint layer, ColorStudio renders them into the paint image as perfectly anti-aliased lines and fills. You can also create custom tools with the drawing package that you can use in the paint layer for blurring, painting, and editing. ColorStudio supplies a variety of special effects, including scaling, stretching, slanting, and rotating. You can also use its filters to create effects. Unfortunately, you're on your own when it comes to figuring out how to use them, because there's not much in the way of documentation about them. Experimentation yields the best results.

ColorStudio is a Rosetta stone of file formats. It can read and write just about any format, including non-Mac formats such as Targa, Scitex, and Crosfield.

**The Bottom Line**

Although ColorStudio may be beyond the scope of most casual users, professionals will appreciate the power and precision of its tools, particularly for sophisticated color-image processing. Once they've gotten beyond the initial confusion arising from the software's complex interface, ColorStudio will open up new vistas to savvy users.

— Doug Barnard
LabVIEW 2

Eddy-award-winning LabVIEW 2 presents an elegant approach to scientific data analysis.

Most engineers, doctors, physicists, and chemists aren’t programmers, yet many of them often need custom software. For these professionals, LabVIEW 2 is a boon, letting them create applications and software instruments quickly and easily in a clear, graphic environment.

Using LabVIEW 2 can actually be fun. It automates and integrates procedures for the acquisition, monitoring, analysis, and presentation of data as well as for the control of laboratory instruments. It interfaces to a variety of lab equipment and eliminates low-level programming of instruments. Not only is LabVIEW’s code reusable but it’s also easy to create a standard user interface for use with a variety of lab hardware. Version 2.1 adds some features and flexibility, fixes some minor bugs, and is a giant leap over version 1.0.

LabVIEW has put Macs into places where no Mac has gone before. NASA projects represent include such categories as chemical-process control, and education. Engineers accustomed to sketching out control items such as knobs, buttons, slides, and switches as well as output items such as graphs and strip charts. You can even build in audible alarms to warn you if a reading goes above or below set limits. These objects are intelligent—that is, a switch knows how to look and behave; how to label itself; and most importantly, how to pass information to and from the block diagram.

Virtual Programming
LabVIEW is based on the concept of the VI (virtual instrument), a software file that looks and acts like a real laboratory instrument on-screen. Each LabVIEW file is a VI comprising two parts: the front panel and the block diagram.

The front panel is the interface to the VI. It can contain realistic-looking (and -acting) control items such as knobs, buttons, slides, and switches as well as graphs and strip charts. You can even build in audible alarms to warn you if a reading goes above or below set limits. These objects are intelligent—that is, a switch knows how to look and behave; how to label itself; and most importantly, how to pass information to and from the block diagram.

Engineers accustomed to sketching out a block diagram before programming a data-acquisition task will feel right at home with LabVIEW. Only in this case, the block diagram is the program, with graphical objects representing programming elements. You choose the functions from the hundreds of objects available on the menus. Connecting them with the wiring tool gives you a block diagram—as well as a program.

The functions that block-diagram objects represent include such categories as digital-signal processing and filtering, numerical and statistical analysis, data input/output, and instrument control. However, the more complicated your VI, the more advanced your knowledge of LabVIEW needs to be. Some of the functions, such as those dealing with strings or arrays, are not obvious at first and will require some learning. Other objects act like little HyperCard stacks to take care of different cases or loops. I highly recommend going all the way through the lengthy tutorial. (National Instruments also offers a class for advanced users.)

One of the best things about LabVIEW is that you can use any VI as a part of another VI. This hierarchical aspect of the block diagram prevents you from reinventing the wheel and lets you use parts of VIs over again. For any VI you create, the Icon Editor lets you create a color or monochrome icon that appears in a menu as a subVI, for easy importing into other block diagrams. Double-clicking on a subVI icon in the block diagram brings up the block diagram for the subVI, which itself may contain other subVIs.

Your newly created subVIs aren’t the only ones on the menus; LabVIEW comes with hundreds of VI files for you to use, copy sections from, or modify. The full installation, which comes on 14 floppy disks, consists of some 650 files occupying 19 megabytes of hard-disk space. (If you don’t need absolutely everything under the sun, LabVIEW can get by with 3 megabytes of disk space.) The VIs that come with the program include drivers for 150 instruments (controls for IEEE-488 GPIB, RS-232/422, and VXI bus instruments) and analysis functions such as complex operations, curve fitting, matrix and vector algebra, and signal generation for simulations.

Facing the Interface
LabVIEW’s interface is so elegant, so filled with innovative labor-saving devices that I wish National Instruments also sold drawing and page-layout software. For instance, LabVIEW has a Tool palette similar in size to the one in PageMaker. Tool palettes can be a pain if you frequently change between tools, but in LabVIEW, pressing the Tab key changes the cursor among the wiring, positioning,
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operating, and labeling tools, so you don’t have to waste time constantly dragging the cursor between your work and the palette.

LabVIEW also features smart pop-up menus. Just Command-click with the mouse cursor on any object in the front panel or block diagram, and the pop-up menu designed to modify that type of object appears. Both pull-down and pop-up menus expand into hierarchical menus and are well implemented. For instance, the Controls menu contains a field of icons, but the icon’s name appears at the bottom of the menu when you highlight one of the icons. This naming convention is much easier to use than dealing with the vast field of icons you sometimes see in drawing programs. Users of older LabVIEW versions will be happy to learn that now almost any object (including wires) can be moved and resized.

The Front Panel window has an innovative feature that would be a boon to graphing programs. To set the numerical range of a graph or a control, just type in the upper and lower limits directly on the chart or control — the intermediate values are automatically calculated and displayed.

For running a VI, both the Front Panel and Block Diagram windows contain a button that runs through the VI once and another that runs it continuously. A big improvement offered in version 1.0 is that VIs are now compiled, which greatly improves their speed. New to version 2.1 is an option in the Save a Copy command that lets you save a VI without the block diagram, so that users can’t muck around with your design. There’s a run-time version for those who don’t want to supply their design a detailed list of changes in plain English. There’s a run-time version for those who don’t want to supply their design.

LabVIEW’s Explain Changes button gives you a hierarchical menu, the name of the selected icon is shown at the bottom. If you think you may have connected something incorrectly, choose Show Help Window from the Windows menu. A Help window (a nonmodal window, in Apple’s terminology) pops up, and it changes as you move the wiring tool over different objects in the block diagram. The Help window describes the various connection points of the object under the wiring tool.

LabVIEW adds a third button to the standard Save and Cancel buttons for saving changes when you close or quit. LabVIEW’s Explain Changes button gives you a hierarchical menu with highly hierarchical file structures.

Of course, you may still be forced to resort to using the documentation, in which case you’re in luck, because it is well written.

The Bottom Line
LabVIEW packs a rich data-gathering environment into a simple, elegant interface. It is also rock solid. I tested LabVIEW on a 128K, where it ran snappily, without a single crash or conflict. LabVIEW can continue monitoring and controlling in the background under MultiFinder.

LabVIEW is not cheap in price or memory. It requires 3.5 megabytes of RAM but runs on any Mac. To see if LabVIEW is right for your situation, I recommend getting the free demo package from National Instruments. The demo is a crippled, black-and-white version with a tutorial that gives you an idea of how it works (National was in the process of updating the demo at the time of this writing). If you can justify the cost, LabVIEW can save you a lot of time and effort.

— John Rizzo

Get Info

LabVIEW 2

Published by: National Instruments, 6504 Bridge Point Parkway, Austin, TX 78730; (800) 433-3488 or (512) 794-0100.
Version: 2.1.
List Price: $1,995; run-time version, $495.
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Expert Service And Support

QMS-PS 410, 815 & 825
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DacEasy Light Checkbook Accounting

DacEasy’s simple, checkbook-based accounting package is worth a look.

Intuit’s Quicken created and popularized the market for checkbook-driven, small-business accounting packages. Quicken proved that running a small business with a checkbook-based ledger system was easy to do and highly functional: Users didn’t have to worry about cumbersome double-entry-bookkeeping accounting, sophisticated posting routines, or adjustments. All they had to do was write a check.

Light Checkbook Accounting from DacEasy typifies the genre. This straightforward, easy-to-use checkbook-driven general-accounting system can find a home in almost any small business or work as a personal-finance package.

The Details

Light Checkbook Accounting has nine menus: File, Edit, Bank, Card, Invoice, Accounting, Report, Misc, and Setup.

The various menu choices offer a logical way to enter the program but do require you to bounce around a little.

The Setup menu, which is the first menu you use, provides the setup screens for personalizing your copy of the program. You simply enter all the necessary name- and-address information as well as an optional password, forms choices, and other customization choices from this menu.

Light Checkbook Accounting comes with an easy-to-modify standard chart of accounts that can handle almost any business and can easily accommodate any slicing and dicing you might want to do for your personal finances. The program makes it easy to edit, add, or delete account information. Once you’ve established a balance in an account, Light Checkbook Accounting is smart enough to stop you from making any changes that would affect the account data’s integrity. However, sometimes this control becomes too restrictive, such as when starting balances need to be adjusted.

To write a check — the activity that triggers all Light Checkbook Accounting’s actions — you use the Bank menu. The program can accommodate two types of checks: manual and computer-generated. The manual-entry facility is streamlined, so using it for record keeping does work. You should use the computer-generated option for multiple check writing or recurring disbursements.

Banking Business

Light Checkbook Accounting handles multiple bank accounts, which is a major feature for small-business users, sole proprietorships, or people with several bank accounts. When you tab to the Paid field, the program automatically brings up the Account Selection window, which lets you choose the account the payment will affect. If the right account is not already set up, the program lets you set it up on the fly. Multiple distributions can be accommodated easily, which makes Light Checkbook Accounting useful for compound payments or fairly sophisticated bookkeeping.

The program’s Deposit/Withdrawal/Adjustment feature provides a straightforward, useful format for entering non-check-related banking activity. You can select multiple bank accounts, and the system keeps track of each entry with a separate transaction number that you can use later for reconciliations. Balances are dynamically updated and serve as a useful cross-referencing tool.

You can quickly view all of Light Checkbook Accounting’s transactions in different ways. You can scan each transaction by using the Transaction window’s Scan button, and after clicking on Scan, you can view your transactions on-screen. You can also select scans from the Misc menu.

The Bank Register option activates the register screen, which is a virtual mirror image of a standard checkbook register. Transactions are again loaded for viewing, and the presentation is logical and clear.

Light Checkbook Accounting’s unique feature is its accounting for credit-card purchases. The package keeps track of credit limits, credit available, current balance, and new charges.

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The QMS-PS 2210 is perfect for a shared printer environment requiring high-quality 11"x17" output. Whether you use Macintosh® computers, IBM®PC's /compatibles or most other mini computers and mainframes, you'll enjoy instant connectivity with AppleTalk®, RS-232 serial and Centronics® parallel interfaces. Should you require non-PostScript printing applications, the 2210 comes standard with HP-GL® and HP® LaserJet® emulations. The 2210 also cuts waiting time with fast page processing made possible by QMS's exclusive ASAP™ (Advanced System Architecture for PostScript) technology and a 68020 microprocessor. That means fast first-page-out performance. Add this to 350 sheet input capacity (600 sheets in the QMS-PS 2220) plus a 20,000 page-per-month duty cycle, and it's easy to see why the QMS-PS 2210 is a true network star!

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As a recognized leader in PostScript printer technology, QMS maintains a commitment to customer satisfaction by providing free, responsive technical support. And to keep your QMS printer operating at its peak, QMS National Service offers a variety of service options. Call us today and see how easy it is to put the true PostScript powerhouse to work for you. Or FAX QMS Product Information at (205) 633-4866.

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sales, or tax accounts. Invoice entry in Light Checkbook Accounting handles multiple-line invoices, automatic sales-tax calculations, days due, advance payments, and payment referencing, and you can print invoices in an attractive, professional format.

You enter all non-check-related or non-credit-card-related accounting transactions through the Accounting menu. The format is a standard debit/credit entry that does not automatically update batch-entry totals. The program can also easily accommodate memo transactions. Each batch of entries can reference a journal code, a transaction number, or a reference number as well as a description.

Other features include budgeting, recording comments with transactions, and a powerful option for bank and credit-card reconciliation. You can also use Light Checkbook Accounting as a POS (point of sale) system: The program automatically stuffs invoices into the Print Invoices window, which you can then print.

The program has a simple inventory system that is nothing more than an electronic scratch pad. It is helpful for small inventories, but it’s not integrally linked into the program itself, so business users shouldn’t rely on it. Finally, Light Checkbook Accounting produces a wide variety of accounting reports, including journals, activity statements, balance sheets, income statements, actual expenses, revenue/expense budgets, variance reports, directories, and even mailing labels.

The Bottom Line
DacEasy Light Checkbook Accounting is a well-done, functional small-business and personal accounting system. If you don’t already own a checkbook-driven accounting system, this program is a solid contender for your dollars.

— Ken Landis

Tempo II Plus and QuicKeys 2

Two revised macro utilities pack similar features but take widely different approaches to Mac automation.

Two programs designed to keep your hands off the mouse as much as possible have recently been upgraded: Affinity’s Tempo II Plus and CE Software’s QuicKeys 2. Both packages make easy work of assigning mouse-issued commands or a sequence of commands to any keystroke, but QuicKeys’ integrated design makes it easier to live with.

Tempo II Plus

Tempo II Plus looks like software by committee. To take full advantage of the program, you have to install three INITs, two FKeys, one DA, and a stand-alone application. This is in addition to macro files and any special-purpose extensions you may need. An installer application takes the drudgery out of setting all this up, but the amount of clutter can easily be disconcerting.

Once you’ve installed all the program’s files, macros are simple to create. As with Apple’s MacroMaker, Tempo II Plus uses a recording-scenario interface. Choose Start Recording from the Tempo menu, perform the tasks you wish to include, stop recording, give the macro a name and a key equivalent, decide whether you want the macro to be available in all programs (a universal macro) or in just a particular application, and click on OK.

To incorporate opening an application or document into your macro, you select Options from the Tempo menu at the appropriate time during recording and select the file from a standard open-file dialog box.

The Options menu item also lets you repeat a macro or branch to another macro, depending on certain user-defined conditions. This feature, along with Tempo’s BitMatch external (explained below), is one area in which Tempo II Plus clearly has an advantage over QuicKeys — the ability to put conditional instructions into macros.

Another nice feature is Autopaste, which lets you select a large amount of text, a graphic, or both and create a macro key to paste that information. A new enhancement also lets you direct sound recordings via the Resource Mover. Using any sound-input device, you can enter sounds directly into any file.

The new version lets you add macros to or remove them from a pull-down menu, using the package’s Tempo+ Viewer application.

Tempo+ Externals is a collection of program patches that add functionality to macros. The new version adds 15 new externals to the 25 of the original package. Many of the 40 externals seem to address deficiencies in Tempo II Plus itself, such as checking to see if a program is running Tempo II Plus is an expanded version of Affinity’s powerful macro package. Tempo+ Viewer is a stand-alone application included in the package that lets you read (but not edit) macro scripts and lets you add macros to or remove them from the Tempo+ menu.
Why settle for an incomplete set of utilities when you can have them all? Presenting MacTools® Deluxe—the most comprehensive, powerful collection ever assembled for the Macintosh.

It lets you find misplaced files, recover crashed disks, undelete trashed files, backup your data, optimize volumes, secure files and folders, quickly copy floppies, organize folders, and even partition your hard disk.

Not only do you get the broadest range of utilities available, but each function sets new standards for performance. For instance, let’s say you want to undelete a trashed file. Using a selective search, MacTools locates likely candidates and lets you view their contents prior to recovery—so you don’t waste time or retrieve unwanted files. No other utility even comes close.

So why settle for some, when you can have it all? MacTools Deluxe...from the leading developer of Macintosh utilities since 1984.

For a free brochure or the MacTools dealer nearest you, call 1-800-445-0412.

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Making Computing Safer, Simpler, Faster.
QuicKeys 2 beats Tempo II Plus in ease of use and overall design. Users can assign any number of commands — including several new extensions that come with QuicKeys 2.0 — to a single keystroke via QuicKeys' QuickPanel.

Thu disk's About file includes a list of full grammars needed to make everything work. The disk's About file includes a list of full or partial application incompatibilities that reads like a who's who of Macdom: QuarkXPress, Radius monitor cdevs, PageMaker 3.0 (4.0 works fine), FullWrite, StuffIt, and many popular INITs and cdevs. It is also incompatible with Apple's DeskTop Manager. In addition, there is an incompatibility on the Ice with CE Software's CE Toolbox cdev (under the Finder only), which is required for such utilities as DeskTop 4.0 and Alarming Events.

QuicKeys 2
QuicKeys 1.2 was a rock-solid macro utility, but it had one glaring deficiency: Creating macros for a sequence of tasks was awkward at best. Happily, CE Software's QuicKeys 2 has eliminated that hassle. Unfortunately, the new product did not come out of the chute as rock solid as it used to be.

As with Tempo II Plus, you create sequence macros by using a recorder-type interface that you access via the pop-out menu from CE's now ubiquitous CE Toolbox section on the DA menu, or you create them through a user-defined QuicKey. Also as with Tempo II Plus, you have the option of recording the macro on a sequence-by-sequenc basis — recording only the specific action — or in real time — literally mirroring every cursor movement, drag, and click. Depending on the situation, one method may work better than the other, but the sequence method executes much more quickly.

As in previous versions, QuicKeys lets you create a macro for a single event through its QuickPanel window. These macros are classified as Alias (a new feature for assigning one keyboard character to another key), Buttons, Click, Date/Time, Extensions (new), File, FKEYs, Menu/DA, Mousies (line up, page down, and so on), Sequence, Specials, Text, and Real Time (new).

The QuicKeys package includes fewer extensions than does Tempo II Plus, partially because QuicKeys itself handles all of the tasks for which Tempo II Plus uses extensions. Some of the QuicKeys extensions include Grab Ease and Paste Ease (similar to Tempo's Autopaste), plus extensions to compress and decompress files using Aladdin Systems' StuffIt Deluxe, which is not included.

Once more, as with Tempo, you can assign QuicKeys macros to the QuicKeys pop-out menu in CE Toolbox. However, you can specify this action when creating or editing the macro without going to another program — a clear advantage over Tempo. Also, you can use QuicKeys' Timer option to execute a macro at a predefined time, on startup, or when you launch an application.

QuicKeys has several other advantages over Tempo — for example, editing sequence macros is much easier with QuicKeys than it is with Tempo. Another advantage is the package's design: Everything is contained in two cdevs — the QuicKeys cdev itself and the CE Toolbox — plus the individual macro files and extensions. As a result, QuicKeys is much easier to use, and it "feels" cleaner. You can also extend the functionality of QuicKeys macros by linking them to other CE Software products, such as QuickMail and Tiles.

On the minus side, QuicKeys 2 was released with several infuriating bugs — unusual for a CE Software product. Most of the problems involved using the Installer, the Timer option, and general operation under the Finder. However, an update (version 2.0.1) was released within 30 days of the initial release. This version seems to have corrected the vast majority of the problems, although many users are still mentioning some more-obscure bugs.

The Bottom Line
Feature for feature, QuicKeys 2 is still the hands-down winner. Its integrated design makes it easier to install and use. The one advantage Tempo II Plus has over QuicKeys is conditional macros. If they're what you need, you'll have to go with Tempo II Plus and learn to live with its fragmented design.

— Tom Petaccia

Get Info

Tempo II Plus
Published by: Affinity Microsystems Ltd., 1050 Walnut Street, Suite 425, Boulder, CO 80302; (800) 367-6771.
Version: 1.2.4.
List Price: $169.95.

QuicKeys 2
Published by: CE Software, P.O. Box 65580, West Des Moines, IA 50265; (515) 224-1995.
Version: 2.0.1.
List Price: $149.
DataLink Modems from Applied Engineering were designed specifically for the Macintosh from the ground up, not "ported over" from MS-DOS designs.

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With the HP DeskWriter, you can

**SECURITY**

**A.M.E.**

**A.M.E. may be the most comprehensive — and potentially dangerous — security package ever.**

You might not expect the maker of the game Crystal Quest to produce a serious security application. Casady \& Greene’s A.M.E. (Access Managed Environment) offers some of the most complete security options and features available for the Mac, but its unforgiving approach makes it suitable only for the brave at heart.

**Lock Down**

A.M.E. can function on any Mac from the Mac Plus on up and requires a hard-disk drive and System 6.0.2 or later. You must use the distribution floppy as a startup disk for installation.

Although A.M.E. makes modest demands in terms of hardware and memory, it does require some steady nerves and stable power during installation. The whole process takes from 15 to 30 minutes. The scary part is that any interruption, be it your cat walking across the keyboard or a power outage, will force you to reinitialize your hard-disk drive and restore your files and applications from backups. Don’t install A.M.E. during a storm.

Installation places an INIT and a DA into your System Folder. The INIT seems amazingly compatible — one user I talked with uses A.M.E. with 45 other INITs on a regular basis and reported no problems with the system. I experienced no conflicts during testing.

A.M.E. goes about its business in a variety of ways. It offers volume lock for your startup drive and any other SCSI/hard drives you’ve protected during the initial setup, which means that no one can gain access to an A.M.E.-protected hard drive by booting the Mac with another System disk.

An A.M.E.-secured Mac forces you to sign on when you start the computer. Initially, someone assigned as the administrator defines access levels and privileges through the A.M.E. DA. You can limit access to programs, folders, disks, and files according to user level. You can even group a selection of files, programs, and so on into an access set — this makes it easy to assign common passwords and protection levels consistently. You can limit access in many ways: read/write, copy restrictions, floppy-drive use, and so on, and you can even restrict access to specific DAs or printers.

The degree to which you can customize all aspects of user access on a user-by-user level is impressive. A good example is A.M.E.’s treatment of passwords. You can configure the environment so that passwords are case-sensitive or are of a certain length. That much is standard. But you can also set an option that forces people to change their passwords at regular
intervals. And you can set a control that locks out individuals trying to guess passwords, for increasingly longer periods of time.

A.M.E. can protect files as well as programs by requiring the use of passwords and/or key disks before a file can be opened or launched. You can also set encryption methods (fast or DES) to run automatically whenever you close a file or sign off as the current user.

Law and Order
System administrators can keep tabs on all aspects of a protected system by using A.M.E.'s outstanding Activities Log. The log permits the monitoring of peripheral usage, file and program launches, and virtually any other event that might occur. You can export the log to databases, word processors, and spreadsheets, providing an easy way for compiling statistics that might be used for billing or tax purposes.

A.M.E. also features a built-in INIT manager, auto-sign-off, and complete file erase. Various aspects of the program act as virus checks (and it comes bundled with Virus RX).

On-line context-sensitive help is always ready for perplexed users — a good thing, because the manual is rather shoddy. It's unattractively designed, poorly proofed, and all too often confusing — cardinal sins in a program that's this complex and powerful.

A.M.E. adopts a hard-line approach to desktop security and is often unforgiving of software that you might use on a regular basis. You cannot use most disk optimizers on an A.M.E.-protected disk. And you cannot run installer programs that must be launched from a floppy. Specifically forbidden are Adobe Separator (you can request a special version of either A.M.E. or Separator to get around this prohibition), Disk Express II, INITPicker, MacLink Plus, TOPS 2.0, and a handful of others. If you have to use any of these programs, you must remove A.M.E. first, which takes as long as installing it.

have it all. (But keep it to yourself.)

The HP DeskWriter printer puts laser-quality printing right at your fingertips.

With a small size and a $995* price tag, the DeskWriter printer easily fits on your desk and in your budget. And its advanced 300 dpi inkjet technology lets you print sparkling text and detailed graphics.

The DeskWriter is also designed for easy use with your Macintosh, and has both serial and AppleTalk interfaces. It even includes scalable and outline fonts. Combine that with the DeskWriter's whisper-quiet operation, and keeping it to yourself will be that much easier. So call 1-800-752-0900, Ext. 1004 for your authorized HP dealer.
REVIEWS

Which activities should be logged?

<table>
<thead>
<tr>
<th>Successful</th>
<th>Failed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signing on and off</td>
<td></td>
</tr>
<tr>
<td>Use of printers</td>
<td></td>
</tr>
<tr>
<td>Use of disks</td>
<td></td>
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<tr>
<td>Insertion of disks</td>
<td></td>
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<tr>
<td>Initialisation of disks</td>
<td></td>
</tr>
<tr>
<td>Use of serial ports</td>
<td></td>
</tr>
<tr>
<td>Opening of files</td>
<td></td>
</tr>
<tr>
<td>File reads</td>
<td></td>
</tr>
<tr>
<td>File writes</td>
<td></td>
</tr>
<tr>
<td>Launching of programs</td>
<td></td>
</tr>
<tr>
<td>Other file operations</td>
<td></td>
</tr>
</tbody>
</table>

Select users ✗ Activities without users

The Bottom Line
A.M.E.'s Activities Log provides detailed information about almost any activity on your Mac, so network administrators may find it useful for auditing computer usage.

A.M.E.'s Activities Log is so great that the first edition of the manual I received even warned that data loss is highly likely if an A.M.E.-protected drive is used by inexperienced users! That's refreshingly honest — but still scary. Although competing products such as ASD's FileGuard and Magna's Empower may not offer the same degree of security as A.M.E., they offer enough functionality to satisfy all but the most demanding computer environment. A.M.E. may have a role for users who need this degree of high-end security (or who have been ordered to use it), but everyone else will want to steer clear. It's a security product that makes you feel insecure.

— Gregory Wasson

Get Info

A.M.E. 11½
Published by: Casady & Greene, P.O. Box 22920, Carmel, CA 93922; (408) 624-7865.
Version: 1.1.3.
List Price: $279 (site rates available).

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For a limited time only, you'll get a $200 rebate when you buy a fully Macintosh-compatible HP PaintWriter color printer. Imagine that.

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You'll see that anything else is unimaginable.
Org Plus for Macintosh

If organization charts keep your business running smoothly, you need Org Plus.

Org Plus, published by Banner Blue, is a software package that does one thing — create organization charts — and it does this well. Organization charts are those collections of boxes connected by lines, with the name and position of an employee in each box. They’re used to provide a visual representation of the company’s structure — who reports to whom.

Banner Blue is no stranger to organization-chart software — it publishes the number-1-selling organization-chart program for DOS computers, but don’t let that turn you off. Org Plus for Macintosh is a Mac program through and through. Banner Blue did things right. Many of its dialog boxes are nonmodal (yea!) and include an Apply button, Undo is available for most actions, and the context-sensitive help is excellent. And, of course, you can exchange files with the DOS version.

Before developing Org Plus, Banner Blue surveyed more than 2,000 organization-chart makers and discovered four important facts: The average organization chart contains 37 people, the average respondent maintains 16 charts of this size, the average chart is updated monthly, and respondents consider it their top priority to create compact charts that show as many positions as possible on a single page.

Building with Boxes

The basic building block of Org Plus is the box. The first thing you do when you start a chart is create a Label Setup, which defines what goes in each box — name, title, department, and so on. Don’t worry if you don’t get something right the first time, because you can change it later for the whole chart or selected boxes.

Once you’ve defined your Label Setup, your new page appears with a single box. All the boxes you create are subordinate to this topmost box, and you can create subordinate boxes to your heart’s content. You can fill in the information as you create a box or create many boxes and type...
Some people believe there only two types of accounting packages. Those that are really meant for use in a home, and those so complex you want to be placed into one.

In between these we proudly place MultiLedger, the accounting package for people who want something complete and well-thought-out, but who may not have the letters ‘CPA’ stenciled on their hat.

**Always operate with the proper tools.** For starters, MultiLedger was designed with all four major functions included (G/L, A/R, A/P, and Inventory). Multiple module programs sometimes require multiple antacids.

Simplicity should never be confused with simplistic. Being logical and straightforward should be natural for all accounting packages. Not so. It doesn’t take genius to arrange menu choices logically, just common sense. As MacWorld said, “MultiLedger has some of the simplest and most logical menus and entry screens of all of the programs I examined, and you’ll never need to know the difference between a debit and a credit unless you want to.” Simple, by design. Call us now at (800) 444-9922 and we’ll be happy to send you a demo disk.

---

**THE ACCOUNTING PACKAGE EVEN THE BOSS CAN HANDLE.**

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You also get one megabyte of RAM, which can save you valuable time. For example, while PLP IIS is printing, your Macintosh can be processing the next page of your document.

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new attributes. Before you print, you can use the Spacing command to adjust the horizontal or vertical distance between boxes. Then if you want the chart to fit on a specific number of pages, you select the Make Fit command before you print. This command is particularly smart if the options you’ve selected won’t reduce the chart enough to make it fit on the number of pages you’ve specified, you’ll see a dialog box telling you the percentage by which you should reduce it in the Page Setup dialog box.

It sounds simple, and it is. The process is so intuitive, you could easily create your first chart without even looking at the manual. But you’d be missing a lot if you didn’t at least give the manual a cursory glance. It’s well written and includes an excellent tutorial you can complete in less than an hour, a complete and well-organized reference section, and lots of time-saving shortcuts.

The Bottom Line
Org Plus for Macintosh is a trouble-free, easy-to-use program that does what it’s supposed to — create organization charts quickly and easily. When your organization changes, you can modify Org Plus charts just as easily.

The package comes with a 30-day, money-back guarantee and includes excellent context-sensitive on-line help. Technical support, which is free (but not toll-free) is prompt, and the staff obviously knows the product well.

If your job responsibilities include generating and maintaining organization charts, you’ll definitely want a copy of Org Plus for Macintosh.

— Bob LeVitus

Get Info
Org Plus for Macintosh

Published by: Banner Blue, P.O. Box 7865, Fremont, CA 94537; (415) 794-6850.

Version: 1.0.

List Price: $195.
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Maybe you have a large network, with a heavy print load. A network you thought required the speed, power and price tag of a LaserWriter IINTX. Well, think again. Because the BLP IIS gives you performance rivaling the IINTX at a considerably lower price: an 8-page-per-minute printer for just $2899. Whether you choose the BLP II or the BLP IIS, you get compatibility not only with Macintosh, but with IBM® and compatibles, using PostScript or the optional LaserJet II emulation. And you get it fast.

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"FILE FORCE can definitely hold its own in the database arena and it runs rings around the flat-file databases in capability." Computer Currents

"What sets this program apart is its impressive array of features." MacWeek

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Find 100 of 1,000 Records 0.02 0.03 0.32
Sort 1,000 Records 0.31 0.32 0.33
Delete 100 of 1,000 Records 0.23 0.25 0.36
Import 1,000 Records 4.25 3.44 1.36

Benchmarks performed on a Macintosh Classic

"For those users who need to move beyond the flat-file managers, FILE FORCE is the logical next step, and we can recommend it enthusiastically." MacWeek

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"ACIUS has paid careful attention to details that simplify life for casual users while offering a significant step up from the traditional flat-file managers such as FileMaker and Panorama." MacUser

To receive your copy of FILE FORCE send us the front cover from your FileMaker or FileMaker Pro manual (any version) along with $149 plus $10 for Federal Express shipping and handling. (California residents please include 6% tax, Santa Clara County residents include 7% tax)

For more information, call (408) 253-3366. Checks, VISA, and MasterCard accepted. No purchase orders please. This offer good in the United States only. Good through May 31, 1991. The suggested retail price of FILE FORCE is $395.
QUICK CLICKS

Publish It! Easy

For gourmet-style page design at blue-plate-special prices, nothing beats Timeworks’ Publish It! Easy. Although you won’t find high-end color-processing tools in this $249.95 package, Publish It! Easy combines word-processing, graphics, page-layout, and presentation capabilities in one package.

Publish It! Easy 2.01 shows improvement to an already solid product. Timeworks has made the program faster and easier to use by automating routine procedures, and it’s even added tools for creating slide presentations. Improved color support and the elimination of some minor quirks completes the list of enhancements in the latest version.

Experienced users of Publish It! Easy are familiar with the program’s library palette, which displays hierarchical menu choices (such as fonts, sizes, styles, and alignments) without making you hold down the mouse button. This lets you use the mouse to select text or objects or try out different choices on the library palette.

Version 2.01’s library palette gives users the flexibility to change the number of linked text frames on a page. The text reflows automatically, so you can try several layouts before deciding which one to use. The library palette also contains commands that automatically create text boxes for headlines and subheads, control paragraph indents, and specify vertical justification.

Version 2.01 supports gray-scale TIFF files. Although color support is still limited to eight spot colors, you can now select colors from Apple’s Color Picker. You can also assign different colors to individual characters or words in a text frame. Publish It! Easy 2.01 doesn’t produce knockouts when you print spot-color separations, however, nor does it support process-color separations or Pantone matching.

To produce a slide presentation with Publish It! Easy, you create a publication in which each page corresponds to one slide. Excellent text and graphics handling, combined with built-in painting and drawing tools, make it simple to produce effective slide shows with standard DTP techniques. There are 49 special effects that take you from one slide to the next.

Timeworks has eliminated some of the annoyances of previous versions. The custom tabs now work reliably, but they need more attention. Although tabbed text printed perfectly in my tests, it still looked out of alignment on-screen. Previous incompatibilities with SuperLaserSpool, SuperMac’s popular print spooler, have been eliminated, and you can now add words to the spelling checker’s dictionary.

If you don’t need process-color separations, Pantone matching, or more than eight spot colors, look no further than Publish It! Easy 2.01.

Timeworks, Inc., 444 Lake Cook Road, Deerfield, IL 60015; (800) 535-9497 or (708) 948-9200. Version 2.01. $249.95.

— Darryl Lewis

Evolution

Evolution, from Image Club Graphics, offers the best value for font conversion. Like the first Mac font converter on the market, Altsy’s Metamorphosis, Evolution converts Type 1, Type 3, and EPS outlines from one format to another. But even Evolution never requires a PostScript printer, it’s tailor-made for users who want high-quality type but can’t afford a high-priced printer.

Using Evolution is simple. Select fonts installed in your System, choose the conversion format (Type 1, Type 3, or EPS outlines), and click on the Convert button.

Unlike Metamorphosis, which lets you generate several conversions at once, Evolution requires two passes to convert a font to both Type 1 and EPS outlines, because the software lets you select only one output format at a time. Evolution also does not produce AFM (Adobe Font Metrics) files, as does the Altsy software.

Evolution does produce sensitivity controls that help with complex fonts that may resist conversion with Metamorphosis. You can also specify a text string to be created with the EPS outline format, and you can output full or partial character sets as printer fonts.

Evolution converts Type 3 fonts produced by a variety of software, including Fontographer (except for version 1.0), Icarus M, and Bitstream. FontStudio compatibility was added recently to Evolution. An old Fontographer font was the only font that stymied Evolution — the program refused to convert it.

You need at least a Macintosh Plus and System 6.0.4 or later to use Evolution. A hard-disk drive is recommended but isn’t essential.

Watch for a new program, FontMonger, from Ares, a company whose staff has been long involved in type-related software. Some of these folks include Russ McCann (Adobe/Emerald City Software) and Larry Applegate, Ernie Brock, and Robin Henson (coauthors of FontStudio). FontMonger may be available by the time you read this. It combines the features of Evolution and Metamorphosis and lets you manipulate characters as ParaFont does. FontMonger’s sleek, intuitive interface makes the other packages look like clumsy DOS imports. It supports TrueType, and costs $99.95.


— Gregory Wasson

MIDisplay

MIDisplay, from Opcode Systems, takes the kinks out of integrating MIDI sequences with Mac-based multimedia presentations. No more little black boxes with blinking lights, yards of cables, and jungles of mysterious connectors. MIDisplay is a HyperCard stack equipped with XCMDs that play standard MIDI files from within HyperCard, Silicon Beach’s SuperCard, and MacroMind Director.

Although MIDisplay’s main job is to export MIDI music files to buttons, stacks, or the Clipboard, it also lets you paste control buttons — including start, continue, and stop — and a MIDI setup button to stacks.

The program also includes goodies for manipulating sequences and tracks. A transposition function lets you change the pitch of individual or entire sequences. Initial volume settings can also be altered in each track. Tempo controls speed up or slow down sequences. Any changes you make, however, affect the entire track, which means that you can’t transpose a trumpet part up one octave for the first three measures of a sequence and then transpose it back down one octave for the remainder of the piece, for example. Multiple changes such as these must be made with a sequencer program and then saved.
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  - 8217 Ishida: The Way of the Stones . . . . 32.
  - 8255 Desktop Music Creativity (CO-ROM) . . 69.
  - 9279 Studio Session MIDI Utility . . . . . . 59.
  - 9297 Studio Session w/Music Library . . . . 99.
  - 6749 XM 3201 CD-ROM Drive . . . . . . . . 699.
  - 9327 Igor Strawinsky (CD-ROM) . . . . 89.

- **Aldus/Silicon Beach** ... 30 day MBG
  - Dark Castle or Beyond Dark Castle ea. $32.

- **Ares Nova** ... 30 day MBG
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  - 7785 Talking Moose 3.0 . . . . . . . . 23.

- **Baseline Publishing** ... 30 day MBG
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- **Bogus Productions** ... 60 day MBG
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  - T-THINK Pascal or THINK C . . . . . . . . 165.

- **Bullseye**
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  - **Voyager** ... 30 day MBG
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- **Casady & Greene** ... 60 day MBG
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  - 6516 The Playroom 1.1 (CP) . . . . . . . . . 29.
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**Passport Designs**
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9442 AudioTRAX—Powerful MIDI sequencer with ability to record & playback 2 digital tracks. 129.

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**Sierra On-Line**
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    6949 OrcihdFAX Modem 1.06 ... 429.

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    6660 OmniSpell 1.0 ....... 69.
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Mac 9600 Plus ...

Rapport 1.3.4 ... 195.

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    3443 NetModem V2400 3.3 ... 339.
    6917 NetModem V.32 (V.42 & V.42 bis) ... 1169.
    6519 EtherGate .......... 1619.
    8189 FastPath IV .... 1889.

*EtherGate/OPM
    4188 TOPS-1 Telecontroller (Din8) ... 23.
    3720 TOPS Flashcard .... 155.

*FileSite
    6264 TOPS Networking Bundle 3.0 ... 187.

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    6619 VersaTerm-PRO 3.5 ... 173.

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Dear MacConnection,

As the President, Owner, Typist, and Janitor of Extraordinary Word Processing, let me thank you from the bottom of my heart. You have saved my life on a few occasions. My budget is a shoestring. I buy products as the need arises. I say I can do the job, order the software from you, and pray I can figure it out quickly. Recently, I got a call for a database job so I ordered one from MacConnection. The next morning, the doorbell rang. I assumed it was a customer, but it was my order! You promise a 24-hour turnaround, but if anything had gone wrong that day, I would have been doomed. Thanks, Kathleen Tauson

MacConnection, for letting me fly by the seat of my pants.

Kathleen Tauson
Extraordinary Word Processing
Boston, MA

“President, Owner, Typist, and Janitor”
### MEMORY & DRIVES

<table>
<thead>
<tr>
<th>SIMMs</th>
<th>2 year warranty</th>
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<tbody>
<tr>
<td>1 Meg SIMMs (80ns)</td>
<td>57.</td>
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<tr>
<td>2 Meg SIMMs Set (80ns),</td>
<td>call</td>
</tr>
<tr>
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<td>7497</td>
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### Applied Engineering

<table>
<thead>
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<th>Product</th>
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<tbody>
<tr>
<td>1.44 Meg High Density Drive</td>
</tr>
<tr>
<td>MacRam Portable with 1 Mb</td>
</tr>
<tr>
<td>MacRam Classic with 0, 1, or 3 Mb</td>
</tr>
</tbody>
</table>

### Cutting Edge ... 30 day MBG

5456 45 Meg Removable Drive—Offers the convenience of removable media with the reliability of Winchester technology. Features the popular Syquest mechanism & includes a cartridge. **$599.**

### Cutting Edge ... 30 day MBG

5736 45 Meg Removable Cartridge               **79.**

### Portable Computer ... 90 day MBG

MacTron 030 Upgrades                           **529.**

### Peripheral Land, Inc. (PLI)

<table>
<thead>
<tr>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacSnap 524XE</td>
</tr>
<tr>
<td>MacSnap 524XS (w/SIMM)</td>
</tr>
<tr>
<td>MacSnap 5098E (4 Mb)</td>
</tr>
<tr>
<td>MacSnap 5098S (4 Mb w/SIMM)</td>
</tr>
</tbody>
</table>

### 40 Meg & 80 Meg Internal Drives for Mac SE, SE/30, IIfx, IIfx, IIfx & IIfx

**call**
separately as a MIDI file.

A generous help stack is provided to answer your questions. Although the layout of the stack is fairly straightforward and the contents comprehensive, a small manual or printable TeachText document explaining the basics would be welcome.

The use of HyperCard, MIDiplay, a MIDI interface, and a multimbral-synthesizer module is a real boon to anyone interested in creating multimedia presentations. There are numerous advantages to using MIDI in this way, including the relatively small amount of storage space required for a MIDI file (versus a digital sound file); the ability to control external devices such as lights, film projectors, and musical instruments; and the availability of prerecorded MIDI files for those without the time or inspiration to compose their own melodies.

Multimedia takes on a whole new sound dimension with MIDiplay, an excellent tool that anyone in the MIDI realm can use to bring audio impact to their presentations.


—Christopher Breen

PlayMaker Football

If you're a fan of both football and computer games, you won't find a better combination of the two than PlayMaker Football. It's a superb game that actually more coaching simulation than play simulation.

PlayMaker Football's monochrome aerial view shows a football field on which animated figures run offensive and defensive plays. The animation is reasonably good, and the game features authentic sounds. An announcer function calls up a dialog box that describes plays run by both teams. These announcements can be saved to disk as a game transcript.

PlayMaker Football works on several levels. At the most basic level, you can select two teams from the ones that come with the package. Generally, you control one team and let the computer control the other. Because the program includes simple AI routines, the computer knows what plays work and reacts accordingly. Beating the computer can be anything but a snap, and you're not restricted to simply watching the plays happen. One player (a quarterback, runner, or middle linebacker) can be controlled by the mouse. As your skills improve, you can add new plays or refine existing ones.

The highest level of play involves building your own team. Each player's attributes can be set individually. You won't be able to create a team of superstars, however, because each team is limited to a certain number of players. Each level of skill and talent you select consumes points. You can build a good defense at the expense of your offense or emphasize the running game over the passing game, but you can't have it all.

After you've built a team, it's time to start building its playbook. It's not enough to be a good armchair coach in order to build a good playbook. You need to know how to run traps, draws, and screens if you expect to create good plays. The manual, two sample playbooks, and on-disk examples can help make you an expert.

Just as in real training camp, building plays means diagramming them on a chalkboard. You can tell each player where to move and what to do. You can set your quarterback, for example, to drop back, pump-fake, roll left, and toss to a halfback, who has faked a pass block and then broken out to the flat. After you save plays, it's best to take them to the practice field and refine them. Once the plays have been set, you use PlayMaker Football's AI features to specify when and how to use them. If you know, for example, that a certain team always runs on first down, be sure a run defense is always called. The AI features are especially crucial in league-type play, where the games are played without human involvement.

Because PlayMaker Football lets you have both teams use password-locked, user-specified playbooks to play, several electronic-football leagues have evolved. There are active leagues on CompuServe's MAUG area (GO MacFun, section 10) as well as on America Online. The program is incompatible with the Ici and later Macs, but Broderbund is expected to supply a fix if you send in the master disk. The game is also heavily copy-protected, requiring you to insert a key disk each time you start up.

These minor annoyances aside, PlayMaker Football is simply the best football game you can get today on any microcomputer.

Broderbund Software, 17 Paul Drive, San Rafael, CA 94903; (415) 492-3500. Version 1.0. $79.95.

—Steven Bobker

Stratego:
The Computer Game

Accolade's Stratego: The Computer Game is not just another weak rendition of the best-selling board game. In fact, Accolade's version improves significantly on the original board game in several ways. For one, although the Stratego computer opponent may seem a bit predictable compared with the human variety, at least it's always ready and willing to play.

Just as in the classic Milton Bradley test of military cunning, Stratego's objective is simple — capture the enemy's flag before the enemy captures yours. Each side deploys an army of 32 officers (valued according to their rank), 1 spy, 6 bombs, and 1 flag. For quick setup, you can choose from a library of 13 preconfigured battlefield formations or create your own and save them to disk.

A typical game takes about ten minutes. You fight battles, defuse bombs, and try to protect your spy. Battles are sparked when two opposing pieces try to occupy the same square on the board. Victory goes to the higher-ranking piece, and ties end in mutual defeat. Because the enemy's strength is hidden until revealed in battle, caution and concentration are rewarded.

The computer opponent has five levels of ability, but even the highest level is somewhat predictable. Stratego more than compensates for this in rule variations. There's Silent Defense, in which only the attacker reveals rank. Playing under Aggressor Advantage rules, the attacker is always the winner in battles against equal-ranking defenders. And Rescue returns one captured piece to the field when a player reaches the enemy's back row.

Besides opponent predictability, Stratego's only other shortcoming is the copy-protection code wheel you must consult each time you launch the application. But these are minor drawbacks of a well-designed game. Stratego offers three different game boards and piece sets as well as impressive digitized sound effects and music. Well tailored to the Mac, it's MultiFinder-friendly and looks great in 8-bit color and monochrome modes.

Accolade, Inc., 5505 S. Winchester Blvd., Suite 200, San Jose, CA 95128; (800) 245-7744 or (408) 985-1700. Version: 1.0. $49.95.

—Owen W. Linzmayer
If a picture is worth a thousand words, then why not use a word processor that processes pictures too?

Nisus® lets you communicate the way the Macintosh works—with words and graphics.

Most people aren't really interested in whether a program is a word processor, a graphics program, or a page layout program. All they really want to do is communicate.

Sometimes, something as simple as a note with an arrow attached is all you need to make your point.

Other times, a little grey background behind some text seems more appropriate. The tools you need to communicate come built into Nisus, or you can place a PICT graphic like the features list on the right.

You can "Place" any page of a Nisus file containing text and graphics into another Nisus file where it becomes a picture called a "Placed Page Graphic." Double clicking this "Placed Page Graphic" will open the original file for editing. Graphics can be drawn or pasted to three different layers: the text layer, behind the text, and in front of the text, giving you total control.

Nisus lets you rotate text, which is very important if you are designing a self-mailer that folds into three panels. Nisus also enables you to print two pages up—right and left—without an even margin. Such a page will lie next to each other.

If you're new to the Macintosh word processing market, you probably want a word processor that is easy to use. If you've been around for a while, you undoubtedly want a powerful word processor. Nisus is shipped with every Macintosh in Korea. You can try either MacWrite or Microsoft Word 4.0. One is easy to use, the other offers power. Both, however, have severe limitations which is why we developed Nisus in the first place.

Nisus has a build-in word processing language which does for word processing what built-in languages do for databases. For example, the language allows you to develop routines to index all proper names, a method to find and correct all double words, periods, and extra spaces, or index every word in a document except those you specifically want to exclude. You choose the features.


This two column format above is actually a separate Nisus file placed into the master file. This gives you total control over how you layout a Nisus document.

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Call today for your free complete brochure describing Nisus in detail. And while you're at it, ask yourself how many more words this ad—created in Nisus—would have taken without the pictures.

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Paragon Concepts, Inc.
980 Highland Drive, Suite 312
Solana Beach, CA 92075
(619) 481-1477
The conventional wisdom was clear: Apple made nice peripherals that cost too much. But Apple's newest high-quality, low-cost printers have just stood the conventional wisdom on its ear.

BY HENRY BORTMAN AND JON ZILBER

When Apple launched the Classic, LC, and IIsi last October, the buying public responded with a resounding cheer. Still, there was a note of quiet while hundreds of thousands of Macintosh users waited for the other shoe to drop: Budget-minded buyers were still looking for budget-conscious printers. The affordable but antiquated 72-dpi ImageWriter II was no match for the sleek new Mac Classic, and most laser printers still carried price tags well in excess of the costs of the new CPUs.

We're still waiting to hear the sound of one hand clapping, but we now know the sound of one shoe dropping: Whooosshhhhh. Whirrrrrrr. That's what you'll hear when you print from either of Apple's two new low-priced printers: the $599, 360-dpi thermal inkjet StyleWriter or the $1,299, 300-dpi Personal LaserWriter LS.

Although the two printers use radically different printing technologies, they have much in common: They're the first printers to ship with TrueType, Apple's new font strategy, which offers flexible, scalable, high-quality, and easy-to-use type. They're both first-time implementations (for Apple) of some impressive new technologies. They're both quiet, nicely designed, and simple to operate. And they're both priced aggressively to compete with popular third-party printers from companies such as Hewlett-Packard and GCC.
New Apple Printers

Figure 1: The many faces of Apple’s StyleWriter. Left to right: the printer solo, for minimum footprint; with the bundled docking sheet feeder; and with the sheet feeder’s output tray extended.

Wait a minute! Did someone say TrueType? Isn’t that part of the long-awaited System 7.0? Yes, but it’s now available as an INIT for System 6.0.7 as well (see the “Truth About TrueType” sidebar).

The Elements of StyleWriter

The StyleWriter is unlike any other Apple printer you’ve ever seen, technologically and designwise. For starters, it sits vertically instead of horizontally, meaning that it takes up very little desk space. It’s also what adults and marketing types call modular but what kids of all ages know as a transformer: Various pieces snap on and swing out, depending on what you need (see Figure 1).

The basic printing unit — about the size of a tissue box turned on its side — can be used by itself for maximum transportability, although its nonfolding base makes it impossible to fit into a standard briefcase. An attachable sheet feeder adds convenience if you’re going to do any

Figure 2: Because Apple’s new printers are targeted at budget-minded buyers, MacUser Labs chose to test them on a Mac Classic. Because Classic owners are unlikely to use the sophisticated drawing and page-layout applications we use in our standard printer tests, we developed custom tests. We created three simple bread-and-butter test documents: a five-page Word document containing four fonts, a two-page Excel spreadsheet containing four fonts, and a simple MacDraw II drawing containing only a few words of text. All the tests used TrueType fonts only.
How It Works: Personal LaserWriter LS Compression

Inside the Macintosh
When you print to the Personal LaserWriter LS, your application sends a list of QuickDraw commands that describe one page of your document to the LS printer driver. (The driver is the file you put into your System Folder that makes the printer show up in the Chooser). The driver generates two lists, one describing the characteristics of each object on the page (a gray rectangle, for example) and the other describing the location of each object on the page.

Object list
- Rectangle
- Oval
- Triangle

Location list
- Top center
- Middle right
- Bottom left

The driver divides the page into sections called bands; the size of each band depends on how much RAM is available in the Mac to be used as a temporary buffer, up to a maximum of 128K. For each band, the driver examines the object/location list and images into the RAM buffer those objects that appear partially or entirely within the band.

Inside the Personal LaserWriter LS
The driver then compresses each line of data in the buffer and sends it out of the Mac's printer (or modem) port to a second 512K buffer on the controller card in the printer.

When the printer controller has received an entire page of compressed data, it decompresses the data one line at a time, sending signals to the laser engine that tell it where to put pixels on the page. As the paper moves through the printer, each successive line of data is decompressed and simultaneously imaged.
New Apple Printers

Table 1: Three Ways to Print

<table>
<thead>
<tr>
<th></th>
<th>Pros</th>
<th>Cons</th>
<th>Ideal Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dot-matrix printer</td>
<td>• About $400 (street price).</td>
<td>• Usually low-resolution.</td>
<td>• Dot-matrix printers will likely be limited to people with very low-end Macs who can’t afford the slow print times of Apple’s StyleWriter or the slightly higher cost of HP’s DeskWriter. Also, people who need to print multipart forms or want inexpensive, low-quality color printing will need dot-matrix printers.</td>
</tr>
<tr>
<td></td>
<td>• Wide-carriage printing.</td>
<td>• Noisy.</td>
<td>• Inkjet printers are ideal for anyone who wants superior resolution but doesn’t want to pay a premium.</td>
</tr>
<tr>
<td></td>
<td>• Networkable (ImageWriter).</td>
<td>• Slow.</td>
<td>• Laser printers may someday become the printers of choice for nearly everyone. The stumbling block continues to be its higher price. For high-volume business use or for desktop publishing, a laser printer is clearly the best choice.</td>
</tr>
<tr>
<td></td>
<td>• Can use color ribbon.</td>
<td>• Inkjet printers are ideal for anyone who wants superior resolution but doesn’t want to pay a premium.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Can print multipart forms.</td>
<td>• No color.</td>
<td>• Laser printers may someday become the printers of choice for nearly everyone. The stumbling block continues to be its higher price. For high-volume business use or for desktop publishing, a laser printer is clearly the best choice.</td>
</tr>
<tr>
<td></td>
<td>• Can use tabloid paper.</td>
<td>• Inkjet printers are ideal for anyone who wants superior resolution but doesn’t want to pay a premium.</td>
<td></td>
</tr>
<tr>
<td>Inkjet printer</td>
<td>• Less than $700 (street price).</td>
<td>• Print may smudge.</td>
<td>• Inkjet printers are ideal for anyone who wants superior resolution but doesn’t want to pay a premium.</td>
</tr>
<tr>
<td></td>
<td>• Quiet.</td>
<td>• Very slow (StyleWriter).</td>
<td>• Inkjet printers are ideal for anyone who wants superior resolution but doesn’t want to pay a premium.</td>
</tr>
<tr>
<td></td>
<td>• Often 300 dpi or better.</td>
<td>• No color.</td>
<td>• Laser printers may someday become the printers of choice for nearly everyone. The stumbling block continues to be its higher price. For high-volume business use or for desktop publishing, a laser printer is clearly the best choice.</td>
</tr>
<tr>
<td>Laser printer</td>
<td>• Fastest.</td>
<td>• Most expensive.</td>
<td>• Laser printers may someday become the printers of choice for nearly everyone. The stumbling block continues to be its higher price. For high-volume business use or for desktop publishing, a laser printer is clearly the best choice.</td>
</tr>
<tr>
<td></td>
<td>• Networkable.</td>
<td>• No inexpensive color.</td>
<td>• Laser printers may someday become the printers of choice for nearly everyone. The stumbling block continues to be its higher price. For high-volume business use or for desktop publishing, a laser printer is clearly the best choice.</td>
</tr>
<tr>
<td></td>
<td>• 300 dpi or better.</td>
<td>• Expensive consumables.</td>
<td>• Laser printers may someday become the printers of choice for nearly everyone. The stumbling block continues to be its higher price. For high-volume business use or for desktop publishing, a laser printer is clearly the best choice.</td>
</tr>
<tr>
<td></td>
<td>• Nonsmudgeable output.</td>
<td>• Laser printers may someday become the printers of choice for nearly everyone. The stumbling block continues to be its higher price. For high-volume business use or for desktop publishing, a laser printer is clearly the best choice.</td>
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<td>• May include PostScript.</td>
<td>• Laser printers may someday become the printers of choice for nearly everyone. The stumbling block continues to be its higher price. For high-volume business use or for desktop publishing, a laser printer is clearly the best choice.</td>
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<td>• Many models to choose from.</td>
<td>• Laser printers may someday become the printers of choice for nearly everyone. The stumbling block continues to be its higher price. For high-volume business use or for desktop publishing, a laser printer is clearly the best choice.</td>
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<td>• Quiet.</td>
<td>• Laser printers may someday become the printers of choice for nearly everyone. The stumbling block continues to be its higher price. For high-volume business use or for desktop publishing, a laser printer is clearly the best choice.</td>
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<td>• Upgrade and expansion options.</td>
<td>• Laser printers may someday become the printers of choice for nearly everyone. The stumbling block continues to be its higher price. For high-volume business use or for desktop publishing, a laser printer is clearly the best choice.</td>
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kind of heavy-duty printing. There’s also a paper-output tray that swings out of the sheet feeder. Ink cartridges cost $22.99 apiece and should last for about 500 pages.

The printing mechanism, manufactured by Canon, is a modified version of that company’s thermal inkjet technology. The Canon BJ-10e Bubble Jet Printer, designed for use with PCs, has been on the market for several months. Similar to the StyleWriter, the BJ-10e costs $100 less ($499), but its optional sheet feeder brings the list price to $589. To use Canon’s printer with a Mac, you need a third-party interface such as GDT Software’s JetLink Express, which adds an extra $249. (Imagine: an Apple peripheral product competitively priced against a PC peripheral!)

The StyleWriter’s output quality is top-notch. Although its price might imply ImageWriter-like output (144 dpi in Best mode), the StyleWriter’s resolution has been cranked up to 360 dpi, higher than that of most laser printers. Text documents generally look similar to their laser-printed counterparts. (In our benchmark tests, we occasionally spotted a stray pixel or two, but you often see these on output from plain-paper laser printers too.) The quality of text is aided by the inclusion of Apple’s new TrueType software (see the “Truth About TrueType” sidebar). In addition, graphics output is far superior to ImageWriter output.

**Here Comes the Smudge**

If you’re thinking there’s got to be a catch, you’re right. The StyleWriter has a couple of Achilles’ heels to go along with its innovative design, razor-sharp output, and low price. For starters, the thermal inkjet technology it uses has a drawback: The ink smears if you get it wet. Even a moist fingertip is enough to streak the ink, although the output generally remains legible.

A more serious shortcoming of the StyleWriter for most users is speed. You get what you pay for: This ImageWriter-priced printer also boasts ImageWriter printing times. In other words: It’s slow. If you’ve never known the speed of laser printing, you’ll find it adequate for light-duty printing. But if you’re used to printing pages per minute, you’ll find it tough to go back to minutes per page.

In our benchmark tests (see Figure 2), the StyleWriter took roughly 15 minutes to churn out a relatively simple (five-page, four-font) Microsoft Word document from a Mac Classic—about seven times as long as most low-end laser printers. That may be acceptable for term papers and correspondence, but it’s too slow for most business applications. And if you think that that sounds like a long time, be warned that the StyleWriter ground away on our two-page, four-font Excel-spreadsheet test file for 23 minutes.

Compared with a laser printer, the StyleWriter crawls. In fact, when tested with a Classic, the StyleWriter was soundly beaten by the ImageWriter on two out of three test documents. Because with the StyleWriter, your Mac’s CPU does all the work of imaging a page (the printer has no “intelligence”), you will see significantly better performance when printing from significantly faster Macs. For example, Apple claims that printing from an Ici is roughly three times as fast as printing from a Classic.

The StyleWriter’s poor performance is exacerbated by...
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HARD DRIVES

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<th>50 MB</th>
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<th>500 MB</th>
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*Q denotes Quantum Drive **Price Includes One Cartridge
New Apple Printers

Figure 3: The low prices of Apple’s new printers are complemented by reduced pricing on the company’s three most expensive models.

the fact that Apple’s PrintMonitor spooler, which comes as part of the Mac’s system software, doesn’t work with the StyleWriter (although Fifth Generation’s $99 SuperSpool does). That’s the bad news. The good news is that Apple plans to correct this problem, perhaps by the time you read this.

The StyleWriter may be slow, but Apple has managed to improve output quality over that of the ImageWriter, with a sixfold increase in the number of pixels on a page, while holding the line on price. At $599, the StyleWriter costs only four bucks more than an ImageWriter II. And given that Apple has no plans to lower the cost of the ImageWriter, there are really only a few reasons to even consider buying one these days: (1) You need a wide carriage for oversized documents; (2) you need color output, which you can get with the ImageWriter’s multicolored-ribbon option; (3) you need an impact printer that works with multipart forms; or (4) you need the AppleTalk-network capability of the ImageWriter but can’t afford a networkable laser printer (the StyleWriter can’t be networked).

If you add a PostScript-emulation program such as Freedom of Press Light to the StyleWriter, you’ll suddenly have high resolution and PostScript compatibility available for about $700 or less (depending on street-price discounts). Although the StyleWriter’s slow output speed makes this option unsuitable for high-volume applications, it might make sense for anyone on a tight budget, students, or businesses that do only light-duty printing.

Low-Cost Laser Printing

Apple’s other new printer is the Personal LaserWriter LS (see Figure 4). On the outside, it looks just like the previous low-priced laser champ from Apple, the Personal LaserWriter SC. It has the same Canon four-page-per-minute LBP-LX engine. The only immediately obvious new component is the price tag: $1,299. That’s $700 less than the cost of the SC.

How’d Apple do it? Early LaserWriters contained nearly all the circuitry of a fully functioning Macintosh. To push prices down, the Personal LaserWriter LS forgoes much of that firmware. In its place, Apple has implemented a proprietary compression scheme that significantly reduces the time it takes your Mac to send a page to the printer. Although the printer controller contains only 512K of
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MacUser April 1991

Please circle 368 on reader service card.
New Apple Printers

The Truth About TrueType

No doubt you've heard about TrueType, Apple's new outline-font technology. Apple has been promising it for more than a year, as a major feature of System 7.0. With the introduction of the StyleWriter and the Personal LaserWriter LS, Apple has decided to unbundle it. These printers ship with a TrueType INIT that works with System 6.0.7 or later.

TrueType can do for you much what ATM (Adobe Type Manager) does: put better-looking type onto your screen and let you print high-quality type without using a PostScript printer.

The TrueType installation disk contains new TrueType-compatible drivers for all Apple printers and a new Font/DA Mover. Also included is a basic set of the fonts that come with Mac system software — Times, Helvetica, Courier, and Symbol — in TrueType format. By the time you read this, other printer vendors should be shipping TrueType-ready drivers for their printers and third-party font vendors should be shipping additional fonts. Many drivers, such as HP's DeskWriter driver, already work with TrueType. One caveat, though: Because TrueType requires System 6.0.7, you'll have to upgrade if you haven't already done so.

Fortunately for those of you who are neither in the market for a new printer nor among those who plan to camp out at ComputerLand waiting for System 7.0 to arrive, Apple will make TrueType available to all System 6.0.7 users, free of charge. (Yes, we said "Apple" and "free of charge" in the same sentence.)

Don't get the misimpression that all TrueType fonts will be free, however. If you want to build your font library beyond the basics, you'll have to buy TrueType fonts, just as today you must buy PostScript fonts. Most major type vendors, including Bitstream, Monotype, and Linotype, will offer their libraries in TrueType format at prices comparable with those of Type 1 PostScript fonts. As an alternative to boxes, several companies have announced TrueType-to-Type 1 conversion utilities, including Ares Software with FontMonger and Allsys with Metamorphosis Professional. However, whether these converted fonts retain the quality of the fonts in their original formats remains to be seen.

Perhaps you're wondering which one's better, TrueType or PostScript. So did we. To judge the quality of PostScript versus TrueType fonts, MacUser Labs did a preliminary comparison of the two technologies on a variety of popular printers, including Apple's two new offerings. Table B contains the results. Unless you're a font fanatic, you'll probably be hard-pressed to distinguish between the two. One thing is

<table>
<thead>
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<th>Table A: Good-Looking Type Without a PostScript Printer</th>
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<tr>
<td><strong>SCREEN</strong></td>
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<td>Bit-mapped fonts are tuned for the Mac screen's 72-dpi display. Each dot of each character is individually placed for maximum screen-display quality. The drawback is that for bit-mapped fonts to look good on-screen, you must install a separate bit-mapped font for each point size of each typeface you want to use. Very large and very small type looks jagged and distorted. Apple typically ships 6, 9-, 10-, 12-, 14-, 18-, and 24-point bit maps for fonts included with Mac system software.</td>
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| **SCREEN** | **ATM (Adobe Type Manager) and PostScript Type 1 Outline Fonts** | **PRINTER** |
| With ATM you don't need a separate bit-mapped font for each point size. You do need to install a bit-mapped font for at least one point size, along with a Type 1 PostScript outline (printer) font, for each typeface you want to display. At point sizes for which bit-mapped fonts are installed, the Mac uses the bit maps to display characters on the screen. At all other sizes, ATM uses the outline font to create the display, eliminating jaggies. |

| **SCREEN** | **TrueType INIT and TrueType Outline Fonts** | **PRINTER** |
| TrueType works in much the same way as ATM does. You must install TrueType outline fonts for each typeface you want to display. Although you need not install any bit maps, the Mac uses bit maps to display type at sizes for which bit-mapped fonts are installed. If ATM and both PostScript and TrueType outline fonts are installed for the same typeface, the Mac will use the TrueType outline to create the screen display. |

TrueType lets your Mac print high-quality type to non-PostScript printers in typefaces for which you have TrueType outline fonts installed on your Mac. If you have PostScript as well as TrueType outline fonts installed on your Mac for the same typeface, the Mac will use the TrueType outline to print to non-PostScript printers (although it will use the PostScript outlines to print to PostScript printers).
Table B: Type Samples

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<tr>
<td>Bit-mapped fonts* (9-, 10-, 12-, 14-, 18-, and 24-point Times Roman installed)</td>
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<td>Adobe Type Manager/Postscript outline fonts (10- and 12-point Times Roman bit-mapped and Postscript Times Italic and Times Bold Italic outline fonts installed)</td>
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<tr>
<td>TrueType outline fonts (Times Italic and Times Bold Italic TrueType outline fonts installed)</td>
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*When only bit-mapped fonts were installed, the spacing on the screen and the ImageWriter output were so distorted that we had to move the large z to see all the 8-point characters.
†We used HP's custom outline fonts to print this sample.
§Because the StyleWriter and the Personal LaserWriter LS ship with TrueType outline fonts, we didn't test their output quality with only bit-mapped fonts installed.

An interesting note: The lowercase Times Italic z from Adobe differs from the same character in Apple's TrueType font. The latter has a swash; the former doesn't.

oku, so which is faster? It looks like a draw. Our stopwatch testing of one application, a print preview in Excel 2.2a, showed ATM to be slightly faster — it took ATM 30 seconds to preview a page on a Classic, versus 35 seconds for TrueType — but Apple claims that TrueType is faster in some other situations.

For those of you who are worried about how peacefully TrueType fonts will coexist with your current bit-mapped and PostScript fonts, our beta tests indicate that you have good reason. The leading, character widths, and kerning for Apple's Times and Helvetica TrueType fonts don't always match those of its equivalent bit-mapped fonts. And if you're using ATM (which also doesn't always match Apple's bit-mapped equivalents), you may find these discrepancies to be even greater if you switch to TrueType. The result is that documents you've formatted with Apple's bit-mapped fonts or with ATM may need to be reformatted when you use TrueType fonts, or line endings and page breaks may change. Both Fifth Generation's Suitcase II (version 1.2.8) and ALSoft's MasterJuggler (version 1.53) support TrueType fonts.

Do you need TrueType? If you aren't using ATM, it's a definite winner. It may slow down your screen display and printing slightly — it takes more time for TrueType to create characters than it takes to display or print old-style bit maps — but type on both your Mac screen and in your printed output will look a whole lot better, especially at large sizes. If you already have ATM installed, you may not need TrueType. It won't hurt anything to install it, but there's no rush. You'll get it automatically when you make the switch to System 7.0 anyway.
New Apple Printers

RAM, it's enough to contain the compressed image of nearly any 8.5-x-11-inch page you care to send it (see the “How It Works: Personal LaserWriter LS Compression” sidebar).

Apple also played some fancy tricks to keep the speed of the data connection from a Mac to an LS high while keeping costs low. Instead of the fast (but expensive and difficult-to-use) SCSI connection of the Personal LaserWriter SC, the LS uses a standard serial connection. The printer externally clocks the Mac's serial port to achieve an amazing 909-kilobit-per-second data-transfer rate, almost four times the speed of the Mac's built-in LocalTalk-network circuitry.

In addition, unlike the StyleWriter, the Personal LaserWriter LS can work with Apple's PrintMonitor spooler. The result: You regain control of your Mac in roughly one-tenth the time you would have to wait without background spooling. You have to be running MultiFinder to take advantage of PrintMonitor — which might mean purchasing a RAM upgrade for your Mac. It's worth it.

All this is unseen and unintrusive to users. What matters is the output quality and performance. Quality is comparable with that of other printers that use the four-page-per-minute LBP-LX engine, such as GCC's PLP II. However, despite the LS' innovative compression and serial-transfer-rate technology, the GCC PLP outperforms the Personal LaserWriter LS. The PLP was 20 percent faster than the LS on our Word test document, 40 percent faster on our MacDraw II test, and twice as fast on our Excel test.

Given that these two printers will probably be around the same price on the street (as we went to press, GCC told us that it was lowering the price of the PLP II to $999), the PLP II appears to have an edge over Apple's newest low-cost laser offering. A final point worth noting: The PLP II can be upgraded to a PostScript printer with a controller-board swap; the Personal LaserWriter LS cannot, although once again, adding a PostScript emulator such as Freedom of Press is an alternative.

The Bottom Line

Apple's two newest printers go a long way toward filling out the company's printer lineup at the low end while at the same time offering some real innovation.

The thermal inkjet StyleWriter ($999), in addition to sporting one of Apple's most innovative designs, makes a huge leap in the quality of output (350 dpi) over the similarly priced ImageWriter (72 dpi). There's a big caveat, though: The StyleWriter is as slow as or slower than its dot-matrix cousin when used with low-end Macs such as the Classic. Classic owners can expect to see Excel documents, for instance, take twice as long to print from a StyleWriter as they do from an ImageWriter.

Apple's other new printer is the Personal LaserWriter LS ($1,299), which offers performance equivalent to that of the Personal LaserWriter SC for $700 less. A clever compression scheme enabled Apple to lower the price without sacrificing speed. Apple's innovation has already had one beneficial side effect: Other manufacturers have moved to lower their own prices to competitive levels.
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- The new Apple StyleWriter™ is a 360-dpi laser-quality printer that combines a price almost anyone can afford with the kind of innovations only Apple can deliver. It's small. It's quiet. It utilizes TrueType” (Apple's new font technology that lets you scale and print characters smoothly and precisely, from the smallest footnote to the most enormous headline). Yet it costs just $599.

- The new Personal LaserWriter LS is a full-fledged, no-compromises, four-page-per-minute LaserWriter. It uses a built-in, high speed serial port, so it won't be slowed down by complicated pages. It also incorporates TrueType. It prints in the background, so you can be working at the same time it is. And it offers a major breakthrough for a LaserWriter: a price of just $1299.

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Sounds great — at least in theory. Until recently, however, we’ve recommended that you stick with old-fashioned paper faxes. When MacUser Labs last tested fax modems (see “The Fax Factor,” August ’89, page 148), the three candidates were plagued by slow transmission and printing speeds and network incompatibility. We strongly
Fax Modems

suggested waiting for the next generation of products. Almost two years and many products later, we're happy to report that the wait's been worth it. Fax modems today are faster and less expensive, and they sport many features that were once exclusive to a few select products. Although not yet perfect, fax modems have come of age.

Because it can draw on the brains of your Mac, even the most basic fax modem offers a host of sophisticated standard features — speed dial, scheduled transmissions, and automatic redial, for example — that are expensive options on paper-based fax machines. What's more, faxes sent via modem look great, because you don't experience the degradation of image quality that you do with paper-based fax machines and because the image can't be skewed by an off-center misfeed.

If you create most of the documents you send on your Mac, a fax modem will serve you well. Other documents need to be digitized by a scanner first. But don't buy a scanner just for faxing — the cost of a scanner plus a fax modem easily outstrips the price of a well-outfitted stand-alone fax machine, which does the job much more conveniently (see "An Inside Look at Scanners," September '90, page 132).

So — which fax modem should you buy? One initial piece of advice: Choose one with a fast fax-transmission speed (9,600 bps) and a data-transmission rate of at least 2,400 bps. We tested six, ranging in price from $449 to $1,099, that have the ability to send and receive both faxes and data at these high speeds. These were the Abaton InterFax 24/96, Computer Friends LightFax 9624, Cypress Research FaxPro, Dove Computer DoveFax, Orchid Technology OrchidFAX, and Prometheus Products MaxFax. The Abaton InterFax 24/96's data performance is enhanced by its inclusion of the MNP (Microcom Networking Protocol) Class 4 error-correction and Class 5 data-compression protocols. These popular protocols enable the InterFax 24/96 to send guaranteed-clean data at speeds well above 2,400 bps — but only to other modems that also use the MNP Class 4 and 5 protocols (see "Thoroughly Modern Modems," January '91, page 100).

Although many slower (and cheaper) fax modems are available, their 4,800-bps fax-transmission speeds translate into higher phone bills, soon canceling out any initial savings — and causing finger-drumming aggravation as well. And if you don't think you'll ever want your Mac to receive a fax, you can buy a send-only fax modem (see the "One-Way Fax" sidebar).

We judged each fax modem for document-conversion efficiency, transmission speed, printing speed, image fidelity, ease of use, and the ability to handle telephone-line impairments. Furthermore, we pass/fail-tested each modem's data-sending

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One-Way Fax

Don't be surprised if you get a postcard from your modem vendor, offering you a send-only fax upgrade for surprisingly little money. Many chip vendors — such as Sierra Semiconductors, Rockwell Communication Systems, and Exar — have added send-only fax capability to their modem chips at relatively little extra cost. If you don't need to receive faxes — or if you already have a fax machine — a send-only fax modem is an inexpensive way to have send-and-receive capabilities and a flowing fax-capabilities in one package. Several companies currently offer send-only fax modems, and many more products are on the way.

The Anchor 24E Mac Pac ($235) is an external 24/96 send-only fax modem from Anchor Automation that features auto-dial/auto-answer and separate data and fax directories. Anchor Automation, 20575 Bahama Boulevard, Chatsworth, CA 91311; (818) 988-6100.

The DataLink LC ($345) is an internal fax modem from Applied Engineering, announced recently at Macworld and designed for — what else? — the Mac LC. Because the LC has only one internal slot, Applied Engineering is doing what a lot of card vendors are doing — it's building more functionality into a single card. Hence the DataLink LC has a place for you to add the math co-processor chip the LC is missing. The DataLink LC also comes in a V.42bis-supported version for $375. (V.42bis is the most recent data-compression standard from CCITT.) Applied Engineering, P.O. Box 5100, Carrollton, TX 75011; (214) 241-6060.

By the time you read this, CMS Enhancements should be shipping the MiniFax ($349), a pocket-sized 24/48 send-only fax modem with software for the Mac and IBM-compatibles. CMS Enhancements, 2722 Michelson Drive, Irvine, CA 92714; (714) 222-6000.

The Eddy-award-winning TelePort data modem, from Global Village, now ships with send-fax software. (Current TelePort owners can upgrade for $60.) The TelePortFax ($265) is a compact package that plugs into the ADB (Apple Desktop Bus) port rather than the modem port and sends data at 2,400 bps and faxes at 4,800 bps. Global Village, 1204 O'Brien Drive, Menlo Park, CA 94025; (415) 329-0700.

The Magic 2400/4800 SendFax ($99) and Magic 2400/9600 SendFax ($149) are two send-only fax modems from MacProducts USA. MacProducts also offers an upgrade path from the Magic 2400/4800 SendFax to the Magic 2400/6600 Send & Receive fax modem. Look for a voice-mail-chip upgrade ($50) that will turn your Magic 2400/9600 Send & Receive fax modem into an answering machine.

MacProducts USA, 5303 Mopac, #218, Austin, TX 78759; (512) 343-9441.

Prometheus offers two new send-only modems: the TravelModem ($299), an internal 24/96 fax modem for the Mac Portable, and the ProModem 24/96 MiniFax ($299), an external for the rest of the Mac series. Both packages include MacKnowledge and MaxFax software, fonts, and cables. Prometheus Products, 7225 S.W. Bonita Road, Tigard, OR 97223; (503) 624-0571.

Two other fax bargains: The MX2400S/48 ($149) and the MX2400S/96 ($169) are external 4,800-bps and 9,600-bps send-fax modems from Zoom Telephonics. Both come with QuickLink II fax and modem software and seven-year warranties. Zoom Telephonics, 207 South Street, Boston, MA 02111; (800) 631-3116.

— Darryl Chan and Stephen Satchell
capability, simply to find out if it worked as advertised. In this year’s fax fox-trot, a few products came close to dancing off with a perfect score — but a couple of entrants stumbled.

Fax Groupies

Like a regular data modem, a single-user fax modem is a hardware device that plugs into the Mac’s serial port on one end and a telephone jack on the other (for a look at networkable fax modems, see the “Networking Fax” sidebar). Not only can a fax modem send data over the phone lines between computers but it is also capable of trading documents (facsimile transmissions) with fax stations — other fax modems or stand-alone fax machines. You can easily exchange documents with millions of fax stations worldwide thanks to agreement among manufacturers on a common standard, or fax protocol.

In the early 1980s, the CCITT (the French acronym that stands for the International Consultative Committee on Telephone and Telegraph, which is an international standards committee based in Geneva) established a digital-communications standard called Group 3. With its data-compression scheme and maximum transmission speed of 9,600 bps, the Group 3 protocol lets most fax machines transmit a full page in less than a minute — several times faster than the analog-transmission rates of the earlier Group 1 and 2 standards. Furthermore, Group 3 offers greater resolution — 203 x 98 dpi in Standard mode or 203 x 196 dpi in Fine mode (see Figure 1).

The CCITT’s new Group 4 protocol is even more advanced, but its widespread use must wait until the world’s phone lines are upgraded to ISDN (integrated-services digital network), a high-speed, all-digital standard that isn’t yet available on a wide scale — and don’t hold your breath. Thus, the lingua franca of modern faxing is still Group 3. Although many modern stand-alone fax machines are compatible with the earlier standards, the six fax modems evaluated this month can talk only to other Group 3 fax stations. Unless you plan to communicate with clients saddled with antiquated equipment, chances are that this won’t present a problem.

Software Solution

Unlike fax machines, whose features are built into hardware, fax modems use software to handle tasks such as automatic dialing, broadcasting, and polling. You needn’t worry about your modem’s quickly becoming obsolete, because improvements in features and performance involve software revisions rather than expensive hardware upgrades.

A fax modem comes with three vital pieces of software: an INIT (startup document) for background sending and receiving; a fax application program for viewing, printing, and otherwise...
Fax Modems

manipulating faxes; and driver software that tells the Mac to treat the fax modem just like a printer or any other Chooser-selectable output device. To make a fax, you simply "print" the document — be it plain text or a sophisticated DTP piece — from the application to the fax modem. A dialog box similar to the Print dialog box lets you specify options such as print quality, page range, and the recipient's fax number (see Figure 2).

When the print operation has begun, however, a fax modem doesn't simply spit a document complete with fonts and formatting codes onto the phone line. The receiving fax machine can't tell fonts from graphics — it deals strictly in black and white dots. The first step, therefore, must be to translate the document into a bit-mapped image.

Because fax modems transmit documents as bitmaps, recipients can't use a word processor to edit a fax message after it's been received by their fax modem. To turn a fax message into an editable word-processing file, you must first save it as a TIFF file and then convert it to text with OCR (optical character recognition) software such as Caere's OmniPage. Several manufacturers are looking into bundling OCR packages with their modems, although none of them would hint at when they'd be so helpful. Our preliminary tests showed that fax-modem-to-fax-modem transmissions could be very successfully converted into text by OCR packages. However, if a fax message originated from a standard fax machine and was even slightly skewed at transmission, satisfactory results might be more difficult to obtain.

But back to sending a message. When you choose Print from the File menu, you give control of the Mac to the fax driver, which first saves a bit-mapped QuickDraw description of each page of the document to a temporary disk file. The driver then uses a CCITT-approved compression technique to reduce the amount of data to be transmitted over the phone line by up to 90 percent. Only after the document has been converted into this compressed-fax-file format — a process that can take more than a minute per page — do you regain control of the Mac.

Unfortunately, current fax software is incompatible with print spoolers, so you can't use a spooler to get back to work any faster. This may seem to be a hassle — but it's still quicker than printing a document, walking down the hall, and then waiting your turn at the office fax machine. Cypress Research promises that the FaxPro 2.0 will soon allow background document-to-fax conversion — you'll regain control of your Macintosh once the QuickDraw description has been spooled to disk, a process that usually occurs in seconds (see the "On the Horizon" sidebar).

Dropping the Dime

With older fax modems, you had to wait for the fax modem to do its dialing, handshaking, and sending to the recipient's fax station before you could regain control of your Mac. Fortunately, fax modems nowadays handle the details of transmission and reception more efficiently. The actual sending of the fax message occurs in the background — even without MultiFinder. Although it's possible to proceed with your work as the fax toils in the shadows, it's best to avoid any CPU- or disk-intensive tasks, because the fax modem may starve for data and abort the transmission. Simple word processing, for example, should work just fine, whereas sorting a database might cause you some problems.

Fax modems typically send a document immediately after the driver has converted it into fax format, but you can also schedule transmissions for a later time or date — to take advantage of lower phone rates, for example. With many fax modems, you simply specify the send time in the Print dialog box. (Be sure your Mac is

Networking Fax

The Mac's built-in LocalTalk-network capability is one of its strongest assets, as it lets workgroups share printers, file and mail servers, and other networked devices — such as fax modems. The Computer Friends LightFax 9624 and the Cypress Research FaxPro have software that turns a single fax modem into a shared, networkable device. You first install fax-client software on all the Macs on your network and fax-server software on your print or file server. You then create two folders (one for incoming faxes and one for outgoing ones) on your network file server, plug the fax modem into the server Mac's modem port and the phone line into the phone jack, and away you go. Sending a fax is virtually the same as sending one from a single-user fax modem.

Sending faxes out through a network works well, but receiving incoming faxes presents a problem — who gets each message? Currently, there is no software that can route an incoming fax automatically, but several vendors are studying this problem. Nonetheless, network fax modems show great promise and should be considered for medium- to large-sized departmental networks. An alternative to a network fax modem is to use your existing E-mail system to send faxes. Solutions' FaxGate ($395) works with Microsoft Mail or E-Software's QuickMail and lets you send mail via BackFAX (running on your server) through your network to a fax station. You can create standard E-mail and send it to a fax phone number in addition to sending it to people on your mail system.

If you want to send fully formatted faxes over E-mail, use FaxGate's MailMaker software. This utility takes output from your word processor, spreadsheet program, RTF package, or other LaserWriter-compatible software and sends it as a true fax. Using MailMaker and FaxGate provides the same functionality as using network fax software such as that supplied by Cypress Research. Incoming faxes can be printed automatically or viewed on a MailMaker-equipped Mac.

— Stephen Satchell
running at the specified time.) The fax INIT will kick in at the designated time and send the document automatically in the background, even if you are working in a different application. (See the “Fax-Modem Goodies” sidebar for information about automatic wake-up utilities.)

Yet another transmission feature is enveloping, which means placing several fax-formatted files in an “envelope” to be sent as a single fax transmission. For example, you might send a client a word-processed proposal along with an architectural drawing. Only the InterFax 24/96, LightFax 9624, and FaxPro feature true enveloping. The OrchidFAX and MaxFax first save a document as a fax file and then append additional documents to that file. Unfortunately, there’s no way to reorder the documents once they have been appended.

The DoveFax provides a call-grouping option — whenever the DoveFax initiates a fax transmission, it gathers any other faxes heading for the same phone number and sends them all as one transmission. Call grouping is a useful feature, but Dove should have included it as a complement to enveloping, not as a replacement for it.

**Figure 3:** Because fax resolution — whether standard or fine — is higher than QuickDraw’s 72 dpi, small type is barely legible on-screen when viewed at actual size (top). Thus, fax applications should offer a variety of view magnifications (bottom), as does the Abaton InterFax 24/96.

**Wide Receivers**

You needn’t run a fax application to receive a fax: When the phone rings, the modem answers and unobtrusively stores the fax to disk. Unless you’ve specifically requested to be notified of incoming faxes, you continue working uninterrupted. Faxes take up lots of disk space, however — a one-page business letter may be 40K, and graphics-heavy documents can easily gobble up more than 100K per page. Fax software stores inbound faxes in proprietary formats, so you need the appropriate fax application to view the faxes you receive — and you need patience as you wait for each fax file to be converted to QuickDraw for screen display.

Because fax resolution is higher than that of the Mac’s 72-dpi screen, most faxes with small type are illegible when viewed on-screen at actual size (see Figure 3). You’ll want to magnify your incoming fax to read it. Except for BackFAX, bundled with the OrchidFAX, all fax applications have multiple view-magnification options. Also useful is the ability to flip a fax 180 degrees — in case it was sent to you upside down, as might happen with a standard fax machine. The LightFax 9624 and the OrchidFAX both lack such an option.

Fax applications only let you view, print, or forward fax documents. To...
**Fax Modems**

**Figure 5: Test Results**

<table>
<thead>
<tr>
<th>Overall Speed</th>
<th>Fax Creation</th>
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<tr>
<td>Better</td>
<td>Worse</td>
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<td>Abaton InterFax 24/96</td>
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<td>Dove DoveFax</td>
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<td>Computer Friends LightFax 9624</td>
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<td>Prometheus Products MaxFax</td>
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### Overall Speed:

We normalized the results of the time it took to create, send, and print a fax with each fax modem, and then we averaged those results to find the overall fastest fax modem. The InterFax 24/96 was the speed leader, followed by the DoveFax, and the MaxFax brought up the rear.

### Fax Creation:

We measured the time it took each fax modem to create a bit-mapped compressed image of a one-page word-processed document. The Mac is tied up completely during this process—and print spoolers can’t ease the burden. The InterFax 24/96 was the fastest, followed closely by the OrchidFAX. The DoveFax and FaxPro were.

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**Fancy Features**

In addition to these basic features, fax-modem software programs offer capabilities (see Table 1)—activity reports, phone directories, and cover pages, for example—that are usually optional on stand-alone fax machines. All automatically create a fax-activity report—great for “Yes, we sent that purchase order on Tuesday” confirmation. Unfortunately, the software that comes with the LightFax 9624 and the MaxFax doesn’t let you export the report. Although the DoveFax software can export the log, it presents the information in a poorly organized fashion.

The FaxPro software allows only one directory, but all other fax-modem programs let you create multiple directories with frequently called names and fax-machine numbers. You can group individuals and then broadcast a fax to the entire group with a single command. With the InterFax 24/96, LightFax 9624, FaxPro, and MaxFax, you can import from existing databases—there’s no need to start from scratch.

The ability to generate cover pages—with names, phone numbers, and number of pages—to accompany outgoing faxes is a particularly useful feature. All six fax-modem packages can create cover pages, but only the LightFax 9624, DoveFax, and OrchidFAX let you add custom text and graphics.

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**Test Results**

MacUser Labs has developed an extensive set of benchmarks to test not only fax-modem performance but document quality as well. We used two different one-page documents: To test speed, we sent a one-page Microsoft Word business letter; to test image fidelity, we transmitted an Aldus PageMaker composite document containing an 8-bit gray-scale TIFF image, a 1-bit PICT line-art object, and various-sized text samples.

We generated all the faxes—at both standard and fine resolution—on a Mac SE/30 and sent them via a PTT (Processing Telecom Technologies) telephone-network simulator to a plain-paper Ricoh 1010L fax machine. Although the results represent averages of multiple tests, real-world times may vary greatly, depending on several factors: the type of document being further manipulate an image, you must export it to third-party applications. Except for that of the Cypress Research FaxPro, all fax applications can convert fax files to TIFF or other standard graphics formats recognizable by painting and page-layout application software.
both fast when used with the Finder but slowed down considerably under MultFinder.

Call Duration:  
The amount of time a modem spends with the phone off-hook determines the cost of a fax transmission. The DoveFax performed the best, and all the others did a respectable job.

Printing Times:  
One of the arguments against receiving fax transmissions on the Macintosh is that, with the single exception of the DoveFax, every fax modem takes a considerable amount of time to print even a simple one-page business letter. Our tests used a LaserWriter INTX printer.

transmitted (text is faster to convert and send than graphics), the computer (more-powerful CPUs convert faster), the receiving fax machine (some are slower than others), telephone-line conditions (line noise can cause fallback to slower transmission speeds), and other software (Multi-Finder and INITs steal time from fax software during conversion and transmission).

Fax Creation. The first test measured the “hassle factor”—the total time from initiating a fax transmission until the cursor reappeared and we regained control of the Mac. This included the time required for the fax software to present various dialog boxes and then convert the Word document to a fax file. (Our technicians paused their stopwatches whenever human interaction, such as choosing resolution, page range, and fax recipient, was required.)

The Abaton InterFax 24/96 under the Finder was the quickest, taking an average of 22 seconds from start to finish, with the Orchid OrchidFAX not far behind at 28 seconds (see Figure 5). The Cypress Research FaxPro and the Dove DoveFax tied in the middle of the pack at 36 seconds. The Computer Friends LightFax 9624 took almost twice as long, and last was the Prometheus Products MaxFax—the leader was nearly three times faster.

Running these same tests under MultiFinder, however, gave very different results. The DoveFax took almost twice as long—an average of 68 seconds—and the FaxPro took more than twice as long—an average of 84 seconds—under MultiFinder than they had under the Finder.

Call Duration. To keep telephone costs down, you must minimize the time spent off-hook—the time the fax modem communicates over phone lines. Only after the modem and fax station have agreed, at the handshaking stage, on transmission variables—speed, resolution, and page width and length, for example—does actual fax transmission begin.

Sending the one-page business letter at fine resolution between two fax machines took only 40 seconds; sending the same letter via fax modem took almost twice as long. It was a tight race, but the DoveFax was the fastest. The MaxFax was the slowest, but Prometheus claims that the modem intentionally waits a little longer than others before sending each line so that the receiving fax machine can properly advance the paper. This might be an important consideration on older, presumably slower fax machines, but the Ricoh 1010L experienced no
problem keeping up with any of the fax modems.

Impairments. The timing tests discussed so far show the results we obtained when sending a document over a perfectly clean telephone line to a stand-alone fax machine. Such “best case” telephone lines are not always available in the real world, however, so we again used the PTT telephone-network simulator to send faxes between a pair of fax modems from the same manufacturer over four industry-standard test lines: a noisy local connection, a noisy land-based coast-to-coast connection, a terrestrial service with digital compression, and a satellite linkup. (For more information on line impairments, see “How It Works: An Encyclopedia of Phone-Line Defects,” January ‘91, page 104.)

The OrchidFAX was the only modem that successfully sent the fax to its twin under all four line-impairment conditions, but quality suffered — the fax showed up with extraneous dots, streaking lines, and splotchy text. The EIA (Electronic Industries Association, a standards group that recommends specifications to CCITT) says that you can expect to encounter these types of line impairments on less than 5 percent of all calls in the U.S. Because the chances of getting two bad lines in a row are extremely low, it’s not terribly significant that a fax modem failed to send under the worst-case scenario. As long as it automatically tries to resend the fax, chances are good that the fax will go through without a hitch the second time around.

Although the DoveFax failed to send over the terrestrial long-line service, it managed to generate the best-looking faxes on the other lines. The InterFax 24/96 did well also, failing only with the satellite linkup. The LightFax 9624, FaxPro, and MaxFax all had problems — broken text, squashed headers, and garbage dots, respectively — even on clean lines. Don’t give too much weight to these results, however, because all the fax modems sent acceptable documents to our stand-alone fax machine.

Printing Time. Although most fax machines automatically print faxes while receiving, fax modems (except the LightFax 9624, which has an option for automatic printing) make you take an extra step. You must launch the fax application, open the fax document, send it to the printer, and then wait — and wait, and wait. Printing the one-page business document on a LaserWriter IINTX took an average of 2 minutes and 40 seconds. The DoveFax was the fastest at just over 1 minute; the InterFax 24/96, LightFax 9624, and FaxPro turned in respectable times of about 2 minutes; and the OrchidFAX and MaxFax had slower-than-average print times.

Image Fidelity. To evaluate image fidelity, we scrutinized the reproduction quality of fonts and graphics on the PageMaker composite document as sent by each fax modem to our plain-paper stand-alone fax machine. The LightFax 9624 simply refused to print the composite page — Computer Friends acknowledged that it was aware of a PICT-sorting problem with certain applications and promised to address this in an update soon.

Even at sizes as small as 6 points, all the other fax modems produced excellent text output — no doubt because we used ATM (Adobe Type Manager) 2.0, which scales outline fonts with impressive results. For good-looking text without ATM, your System file must contain LQ (letter-quality) fonts — the same kind of fonts used with the

Fax-Modem Goodies

Every fax-modem owner eventually faces some grim facts about faxing. For one thing, sharing a fax modem with your telephone is not the most convenient office practice for, say, a small business: When the phone rings, how do you know who — or what — is calling? But unless you’re a power user, you probably can’t justify bringing in a dedicated phone line for faxing.

Fortunately, you don’t have to. Technology Concepts’ Fax Line Manager Model 202 ($169) intercepts the fax station’s telltale beep and automatically determines whether an incoming call is fax or voice. If it’s a fax, the Fax Line Manager routes the call to the fax modem — or mother — and you’re not disturbed; otherwise, the telephone rings normally. Technology Concepts, 1159 Triton Drive, Foster City, CA 94404; (800) 349-0900 or (415) 349-0900.

Energy-conscious faxes have to deal with a second problem — leaving the Mac on all the time in order to receive faxes. You can get around this with a Remote/WakeUp cable ($49.95), from Farallon Computing. Plug one end of the cable into your fax modem’s DB-25 connector (not present on the FaxPro or the DoveFax), and plug the other two connectors into the serial and ADB ports on the back of your Mac; then leave your fax modem in Auto-Answer mode. When someone calls you, the modem detects a ring and sends a “wake up” command to the Macintosh via the ADB port. After all your INITs have loaded during startup, the fax modem receives the incoming fax. (If it was a voice call, the software automatically turns off the Macintosh after a period of inactivity.) Farallon Computing, Inc., 2000 Powell Street, Suite 600, Emeryville, CA 94608; (800) 344-7489 or (415) 596-9000.

The Ringo ET ($68.95), from MacSema, works on the same principle as Farallon’s Remote/WakeUp cable, but it powers up your Mac only after finding a carrier-detect signal on the line, thus eliminating false starts prompted by voice calls. Another useful product from MacSema is the WakeUp board ($199). You can program this NuBus device to turn on the Mac whenever you specify and automatically invoke a macro key to perform whatever tasks you desire. The WakeUp board is compatible with MacroMaker, QuickKeys, and Tempo, to name a few. Although it’s useful for sending scheduled faxes when rates are low, the WakeUp board can also, say, initiate a midnight backup or a predawn E-mail download. After performing the specified tasks, the WakeUp board shuts everything down in an orderly fashion, saving documents and quitting applications cleanly.

MacSema, 2383 Lamb Drive S.W., Albany, OR 97321; (800) 344-7228 or (503) 757-1520.
Figure 6: Printing With and Without ATM

ImageWriter LQ—that are three times the size of those used in the document. For instance, if you use 12-point Helvetica, the software needs the 36-point font when it converts the document to Group 3 format. LQ fonts prevent the jaggies that occur when the fax software tries to compensate for the differing resolution of the Mac's screen (72 dpi) and the Group 3 protocol (203 dpi).

Only Orchid and Prometheus provide LQ fonts with their fax modems; the other vendors recommend using ATM, and MacUser Labs strongly seconds that recommendation (see "Designing for Fax," elsewhere in this issue). ATM gives you more font flexibility and improves the look of fonts displayed on-screen and sent to most output devices (see Figure 6). We also got excellent results with non-PostScript rasterizers such as Freedom of Press.

PostScript interpreter. Using ATM or Freedom of Press, however, won't make incoming faxes look any better—they've already been turned into bit maps.

If you're going to send technical drawings, dimensional accuracy is probably important to you. Fortunately, the FaxPro and OrchidFAX software offers an Exact Size option in the Print dialog box—a welcome option, because most fax modems tend to squash or stretch pages to show text in its best form, at the expense of accurate graphics reproduction.

Only the MaxFax sent good-looking gray-scale graphics. MaxFax software creates a randomized halftone dither of the entire image, with stunning results. Sending the same gray-scale image with any other fax modem resulted in a high-contrast Rorschach inkblot look-alike. (However, some applications—such as PageMaker 4.0—predict more gray-scale images, so you may get acceptable results when sending PageMaker 4.0 files with other fax modems.) Gray-scale images take significantly longer to transmit than text or even line art, because very little compression is possible. Considering that the Mac is the preeminent graphics platform, we're surprised that gray-scale capability isn't part and parcel of every fax modem.

Data Capabilities. In addition to sending and receiving faxes at 9,600 bps, the fax modems we tested can perform double duty, with their Hayes-compatible 2,400-bps data capability. When you're not engaged in transmitting faxes, you can log on to on-line services such as CompuServe, GEnie, or any of the thousands of private bulletin boards across the nation. Of course you'll need telecommunications software to do so, and Computer Friends, Orchid, and Prometheus have thoughtfully provided workable capabilities. (By the way, the OrchidFAX can exchange regular Mac files with other OrchidFAX and AppleFax modems at 9,600 bps.)

To evaluate the data side of the fax modems, we used Software Ventures’ MicroPhone 3.0 to place a call to our local CompuServe access node, enter the Ziff-Davis Zmac Forum, and download a 12K utility from the software library. Each of the modems successfully weathered this pass/fail test.

We then transmitted data files from modem to modem under simulated local and long-distance connections. All the modems worked well. As mentioned earlier, only the Abaton InterFax 24/96 includes the popular MNP Class 4 error-correction and Class 5 data-compression protocols.

Ease of Use

Don't assume that because a fax modem did well in our benchmark tests, it's easy to use. In fact, none of the modems approach the push-button simplicity of most stand-alone fax machines. Some features that would make life with a fax modem easier
Fax Modems

aren't available in all the products. For example, you may want to scale a document before faxing it — but both the InterFax 24/96 and MaxFax send everything at 100 percent. This is particularly annoying if you want to send a large spreadsheet, for example, as a one-page document. And the lack of a Preview feature means that you can't be sure you're sending exactly what you want.

Because we experienced all manner of fax gremlins during testing, we came to appreciate feedback during fax activity. When it comes to providing information, the DoveFax wins hands down with its FaxStatus DA (see Figure 7). You know what's going on every step of the way. The InterFax 24/96 also keeps you well informed but only when you access the Control Panel to monitor fax activity. Most of the other fax modems leave you in the dark, some neglecting to display even the number of the fax machine on the other end of the line.

To use your fax modem for data, you'll want to switch freely between the Data and Fax modes. The InterFax 24/96, FaxPro, and DoveFax detect when you're using telecommunications software, and they switch to Data mode. When you have finished, they automatically revert to Fax mode. With the LightFax 9624, OrchidFAX, and MaxFax, you must manually change modes through software.

A Resounding Yes — But...

When MacUser Labs last examined fax modems, our feeling was that the three products on the market at that time were "anyone's guess". Our first-peek impression is that it's a lastly improved... BackFAX/AppleTalk version ($495) should be shipping by the time you read this. BackFAX/AppleTalk Version ($495) and $195. If you already own the single-user version of BackFAX, you can trade up to BackFAX/ATV for $275 — even if your version came bundled with a modem. If you still have an old AppleFax modem, solutions is selling BackFAX 1.5 software for the low, low price of $29 (plus $6 handling) — but hurry, this generous offer is good only until the end of June 1991. Solutions, Inc., P.O. Box 783, Williston, VT 05495; (802) 865-9220.

Finally, for shattering the speed limit, you might want to consider the Prometheus ProModem 9600M Plus ($959), a 9,600-bps-data and 9,600-bps-fax modem for the Mac Portable from Orchid Technology. It supports MNP 5 data compression and V.42 error correction. In Data mode, it lets you connect with other OrchidFAXes operating at 9,600 bps. Orchid Technology, 45385 Northport Loop W., Fremont, CA 94538; (800) 767-2443 or (415) 683-0300.

For those who want networkable devices, BackFAX/AppleTalk Version ($495) should be shipping by the time you read this. BackFAX/ATV will provide many of the same benefits as Solutions' FaxGate but doesn't rely on use with an E-mail system. The package includes server software and software for five users. Additional five-user software packages will be available for $195. If you already own the single-user version of BackFAX, you can trade up to BackFAX/ATV for $275 — even if your version came bundled with a modem. If you still have an old AppleFax modem, solutions is selling BackFAX 1.5 software for the low, low price of $29 (plus $6 handling) — but hurry, this generous offer is good only until the end of June 1991. Solutions, Inc., P.O. Box 783, Williston, VT 05495; (802) 865-9220.

Many new 24/96 (2,400-bps data, 9,600-bps fax) modems were announced or began shipping after we finished our MacUser Labs fax frenzy. By the time you read this, Cypress Research should be shipping a new, improved FaxPro, the FaxPro 2.0 ($1,099), which features background conversion of transmitted and received faxes, an intelligent resending feature, more-flexible cover sheets, a tab-delimited and exportable activity log, and a host of other new capabilities. Our first-peek impression is that it's a vastly improved product. Cypress Research, 766 San Aleso Avenue, Sunnyvale, CA 94086; (408) 752-2700.

The COMplete Fax/Modem ($599) is an internal 24/96 modem from PSI Integration for the Mac Portable. The COMplete boasts incoming-call detection, which awakens the Mac from Sleep mode to catch any incoming fax messages. The COMport 5/42 ($699) is also an internal fax modem for the Portable; this model supports V.42bis and MNP Class 5 data compression. (V.42bis is the most recent CCITT compression standard, which provides a theoretical transmission rate of 9,600 bps, using a 2,400-bps modem.) PSI also plans to release an external version of the COMport 5/42, the COMStation ($799), with an optional voice add-on module ($149). PSI Integration, Inc., 851 E. Hamilton Avenue, Suite 200, Campbell, CA 95008; (408) 622-1722 or (408) 599-8548.

The MET 962/PP (Pocket Fax) modem is a 24/96 send/receive fax modem from Micro Electronic Technologies. The MET 9624PF is portable — it weighs less than 7 ounces and uses a 6-volt battery or AC adapter — and it supports the MNP Class 5 protocol and the V.42 standard. Micro Electronic Technologies, Inc., 35 South Street, Hopkinton, MA 01748; (508) 435-9057. The OrchidFAX LT ($499) is an internal 9,600-bps-data and 9,600-bps-fax modem for the Mac Portable from Orchid Technology. It supports MNP 5 data compression and V.42 error correction. In Data mode, it lets you connect with other OrchidFAXes operating at 9,600 bps. Orchid Technology, 45385 Northport Loop W., Fremont, CA 94538; (800) 767-2443 or (415) 683-0300.

For those who want networkable devices, BackFAX/AppleTalk Version ($495) should be shipping by the time you read this. BackFAX/ATV will provide many of the same benefits as Solutions' FaxGate but doesn't rely on use with an E-mail system. The package includes server software and software for five users. Additional five-user software packages will be available for $195. If you already own the single-user version of BackFAX, you can trade up to BackFAX/ATV for $275 — even if your version came bundled with a modem. If you still have an old AppleFax modem, solutions is selling BackFAX 1.5 software for the low, low price of $29 (plus $6 handling) — but hurry, this generous offer is good only until the end of June 1991. Solutions, Inc., P.O. Box 783, Williston, VT 05495; (802) 865-9220.

Finally, for shattering the speed limit, you might want to consider the Prometheus ProModem 9600M Plus ($959), a 9,600-bps-data and 9,600-bps-fax modem that supports the V.42 error-correction and MNP 5 data-compression standards. When connected to another MNP-supported modem, its theoretical speed limit is 19,200 bps — but don't expect such blazing performance on most transfers, because file compressibility and phone-line impairments lower actual speeds.

The ProModem 9600M Plus automatically negotiates the highest possible setting with the modem you wish to call. Prometheus Products, Inc., 7225 S.W. Bonita Road, Tigard, OR 97223; (800) 477-3473 or (503) 824-0571.

— Darryl Chan

![Figure 7: Dove's animated FaxStatus DA allows you to monitor fax activity, and it provides enough information for you to track down the cause of any problems that may occur.](image)
Fax modems have come a long way since our last report, but there's still room for improvement. Make sure the fax modem you're considering comes with an ironclad guarantee that you can return it and get your money back if you're not completely satisfied. During testing, our technicians tackled INT conflicts, dodged erratic behavior, and negotiated Byzantine human interfaces. Although we did — finally — get each product to work as advertised, your computer's unique hardware and software configuration may not mesh with a particular product.

Work your way down our list until you find a fax modem that works for you.

The Dove DoveFax ($449) takes top honors. It's an inexpensive gem that turned in a better-than-average fax-processing time, the shortest off-hook time, and the fastest printing time. It sent the cleanest faxes through impaired lines. When it failed to transmit, its FaxStatus DA provided plenty of information. The DoveFax is a polished product with only a few shortcomings to dampen our enthusiasm: Sending several faxes to different destinations is a hassle, because the DoveFax doesn't provide a true envelope capability, nor can it import or export a phone directory. (Dove plans to release a stand-alone application to address this last problem.) And DoveFax under MultiFinder was much slower at creating a fax than it was under the Finder.

The Abaton InterFax 24/96 ($495) was the fastest at creating a fax and had the second-fastest regain-control and printing times, but it spent more time than average off the hook. Like the DoveFax, it performed well over impaired lines, and its documentation and user feedback are superlative. Modern jockeys will appreciate its automatic Fax-to-Data-mode switching and built-in MNP Class 4 error correction and Class 5 data compression. However, faxers may miss some key features — user-definable cover pages, a Preview mode, and scaling, for example.

The Cypress Research FaxPro ($1,099) turned in better-than-average times in all our benchmark tests, but its software is a major liability. Also, creating a fax with the FaxPro under MultiFinder was much slower than doing so under the Finder. Version 2.0 of the FaxPro software should be out by the time you read this, and if it lives up to the impressive demonstration we saw at press time, the FaxPro will be hard to ignore, despite its lofty price tag.

Another modem in need of a software revision is the Orchid OrchidFAX ($599), which uses a custom version of Solutions' venerable BackFAX. Although Orchid thoughtfully provides LO fonts, telecommunications software, high-quality documentation, and a warranty, it's not enough to overcome BackFAX's lack of features. Although the OrchidFAX can send Mac files at 9,600 bps to AppleFax and other OrchidFAX modems and has a fast regain-control time, it delivered below-average performance in the off-hook and printing tests and performed poorly on impaired lines. Furthermore, BackFAX doesn't support enveloping, magnification of received faxes, or import and export of phone directories.

The Computer Friends LightFax 9624 ($449) took too long to prepare our business letter and just plain choked on the PageMaker composite document. Its software has all the earmarks of an IBM port, using "classes" and "cards" in the phone directory and saving each fax page as a separate DOS-suffixed file — but the disjointed, photocopied, and three-ring-bound documentation is the dead giveaway.

Bringing up the rear is the Prometheus Products MaxFax ($449), which finished last in our regain-control, off-hook, and printing tests. It lacks enveloping, scaling, previewing, and the ability to export the activity report. On the other hand, the MaxFax is inexpensive and comes with LO fonts and a full-featured telecommunications application. The MaxFax also sent the best-looking (actually, the only good-looking) gray-scale images — it may be your only choice if gray-scale graphics are a necessity.

In overall performance, the DoveFax and the InterFax 24/96 virtually tied for first place, but the DoveFax (left) had shorter call-duration times. The InterFax 24/96, however, gave more consistent results under MultiFinder and the Finder.

This Owen W. Linzmayer may appear to be the well-known San Francisco free-lance writer, but he is actually an amazing facsimilie.
## Table 1: Features of 24/96 Fax Modems

<table>
<thead>
<tr>
<th>Feature</th>
<th>Abaton InterFax 24/96</th>
<th>Computer Friends LightFax 9624</th>
<th>Cypress Research FaxPro</th>
<th>Dove DoveFax</th>
</tr>
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<tbody>
<tr>
<td>Price (list/street)</td>
<td>$495/$412</td>
<td>$549/$399, stand-alone</td>
<td>$1,093/$825, networkable</td>
<td>$449/$289</td>
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<tr>
<td>General</td>
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<td></td>
<td></td>
<td></td>
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<td>2.13</td>
<td>1.00</td>
<td>1.1.1</td>
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<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Print</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Auto data/fax switching</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Transmission features</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce/enlarge</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Exact size</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Preview</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Polling</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Enveloping</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Call grouping</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td>Phone directories</td>
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<td>unlimited</td>
<td>unlimited</td>
<td>unlimited</td>
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<tr>
<td>Import directory</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<td>Export directory</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>User-definable cover page</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>LC fonts provided</td>
<td>Times, Helvetica</td>
<td>none</td>
<td>none</td>
<td>none</td>
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<tr>
<td>Pages sizes</td>
<td>letter, legal, A4, B4, A3, custom</td>
<td>letter, legal, A4, B5, custom (max. 8.5 x 14 in.)</td>
<td>letter, legal, A4, computer, fanfold, custom</td>
<td>letter, legal, A4, B5, half page, custom</td>
</tr>
<tr>
<td>Reception features</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voice-call detection</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Flip 180 degrees</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Auto-print</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Conversion</td>
<td>TIFF, PICT, paint</td>
<td>TIFF, paint</td>
<td>none</td>
<td>TIFF, PICT, paint</td>
</tr>
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<td>10% - 400%</td>
<td>50%, 75%, 100%, 200%, 300%</td>
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<tr>
<td>Telecommunications software</td>
<td>none</td>
<td>QuickLink II</td>
<td>none</td>
<td>none</td>
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<tr>
<td>Size (W x D x H, in.)</td>
<td>6.5 x 10 x 1.75</td>
<td>6.25 x 10.25 x 1.75</td>
<td>5.75 x 10 x 1.75</td>
<td>3.75 x 6.25 x 1.5</td>
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<tr>
<td>Warranty</td>
<td>1 year</td>
<td>1 year, 30-day MBG</td>
<td>1 year, 30-day MBG</td>
<td>1 year, 30-day MBG</td>
</tr>
<tr>
<td></td>
<td>48431 Milmont Dr.</td>
<td>14250 N.W. Science Park Dr.</td>
<td>766 San Aleso Ave.</td>
<td>1200 N. 23rd St.</td>
</tr>
<tr>
<td></td>
<td>Fremont, CA 94538</td>
<td>Portland, OR 97229</td>
<td>Sunnyvale, CA 94086</td>
<td>Wilmington, NC 28405</td>
</tr>
<tr>
<td></td>
<td>(600) 444-6321</td>
<td>(800) 547-3303</td>
<td>(408) 752-2700</td>
<td>(800) 622-7627</td>
</tr>
<tr>
<td></td>
<td>(415) 683-2226</td>
<td>(503) 626-2291</td>
<td>(919) 763-7618</td>
<td></td>
</tr>
</tbody>
</table>
Finally, an electronic payment system that responds to all your bill-paying needs. **CheckFree**

Imagine using your Macintosh to pay your bills faster and easier than ever before, without the hassles of checks, envelopes, and stamps. Think what it would be like to pay all your bills and do all your recordkeeping with just a few mouse clicks in just minutes per month. Now you can, with CheckFree, from CheckFree Corporation—the nation's leader in electronic payments.

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Many payments can be sent electronically from your account to their destination. Checks or laser-printed drafts are sent to individuals or companies not yet linked to electronic funds transfer networks.

With CheckFree, you don’t have to switch banks, and you can pay any individual or company in the United States. That’s because your payments are cleared through the Federal Reserve System, the same system that clears your checks today.

All CheckFree transactions are automatically recorded by the software and documented in your bank statement. Non-CheckFree transactions can be entered easily, and all your records, as well as specific reports of your finances, can be accessed through a few simple commands. (And that’s especially helpful at tax time.) Plus, you can export CheckFree data to Excel® and Macintosh®.

Any questions? We have the answers. Call our toll-free number right now. Any comments? Here is what the experts say:

“CheckFree makes bill paying a quick, painless task rather than a monthly ritual to be dreaded...” —*PC Magazine.*

“I’d try it, but I wasn’t sure I’d like it. I like it.” —Chris Shipley, *PC Computing.*

Any doubts? If you don’t agree that CheckFree software delivers a faster and easier way to pay your bills, we’ll refund your money! So don’t waste any more time.

**Hardware Requirements:** Macintosh® or higher, 80K drive and a Laser® compatible modem.

*CheckFree® is a registered trademark of CheckFree Corporation. All other trademarks are the properties of their respective corporations.*

**Money-back guarantee on software valid for direct orders only. Expires within 30 days of purchase for a full refund.*

CheckFree® software is available at leading retailers and direct order dealers including Egghead Discount Software®, Electronics Boutique®, Babbage’s®, Waldensoftware®, Software Etc.,® Soft Warehouse®, MacConnection®, and MacWarehouse® (or checks or envelopes or stamps). Get CheckFree today.

CheckFree software is available at retail stores, or by phone for $29.95 plus $4 shipping and handling. CheckFree service is only $9.95 per month for your first 20 payments, then $3.50 per each additional ten payments or portion thereof. That’s not much considering the time you save and hassles you avoid. Plus your first month of service is free. Call 1-800-882-5280.

**CheckFree**
Fax Modems

Table 1: Features of 24/96 Fax Modems, continued

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Orchid FAX</th>
<th>Prometheus Products MaxFax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price (list/street)</td>
<td>$599/$439</td>
<td>$449/$294</td>
</tr>
<tr>
<td>Pros</td>
<td>Fast regain-control time. Long-term warranty. LO fonts. 9,600-bps data transfer with other OrchidFAX modems.</td>
<td>The only gray-scale-capable fax modem. Inexpensive. Good telecommunications software.</td>
</tr>
<tr>
<td>Cons</td>
<td>Long off-hook and printing times. No enveloping or magnification. Can't import or export directory.</td>
<td>Longest regain-control, off-hook, and printing times. Inflexible cover pages. No enveloping. Cannot export activity report.</td>
</tr>
<tr>
<td>General</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software version</td>
<td>1.05</td>
<td>1.05</td>
</tr>
<tr>
<td>Activity report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Print</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Export</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto data/fax switching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmission features</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce/enlarge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exact size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preview</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enveloping</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Export directory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User-definable cover page</td>
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<td></td>
</tr>
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<td>LO fonts provided</td>
<td>Courier, Symbol, Times, Helvetica</td>
<td>Courier, Symbol, Times, Helvetica</td>
</tr>
<tr>
<td>Page sizes</td>
<td>letter, legal, A4, B5, fax, tabloid, custom</td>
<td>letter, legal, A4, B5</td>
</tr>
<tr>
<td>Reception features</td>
<td></td>
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<td>Voice-call detection</td>
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<td>Flip 180 degrees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto-print</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conversion</td>
<td>TIFF, PICT, paint, Quicke Paint, QuickDraw</td>
<td>TIFF</td>
</tr>
<tr>
<td>View magnification</td>
<td>100%</td>
<td>75%, 100%, 206%, 300%</td>
</tr>
<tr>
<td>Telecommunications software</td>
<td>FreeTerm</td>
<td>MacKnowledge 1.02A</td>
</tr>
<tr>
<td>Size (W x D x H, in.)</td>
<td>5.5 x 10 x 1.5</td>
<td>6.25 x 11.5 x 3</td>
</tr>
<tr>
<td>Warranty</td>
<td>2 years</td>
<td>2 years, 30-day MBG</td>
</tr>
</tbody>
</table>

Company

<table>
<thead>
<tr>
<th>Company</th>
<th>Orchid Technology</th>
<th>Prometheus Products, Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>45365 Northport Loop W., Fremont, CA 94538</td>
<td>7225 S.W. Boon Rd., Tigard, OR 97223</td>
</tr>
<tr>
<td>Phone</td>
<td>(800) 767-2443</td>
<td>(800) 477-3473</td>
</tr>
<tr>
<td>Phone</td>
<td>(415) 650-0300</td>
<td>(503) 624-0571</td>
</tr>
</tbody>
</table>

Price (list/street) — The list price is the manufacturer’s suggested retail price. The street price is an average actual price charged by dealers across the U.S. in January 1991.

Software version — Improvements in fax-modem features involve software revisions rather than expensive hardware upgrades.

Activity report — A list of all documents sent to and received from fax stations.

Auto data/fax switching — Automatic return to Fax mode after using the data-modem features.

Reduce/enlarge — Useful when you need to fax an oversized drawing.

Exact size — A fax modem may distort image proportions to send the entire image; an Exact Size option prevents any such changes.

Preview — This feature lets you view a fax before sending it out.

Polling — Calling a remote fax location and requesting a transmission.

Enveloping — Sending more than one fax from different programs in one transmission.

Call grouping — The fax modem groups all other faxes awaiting transmission to the same destination and sends them together.

Phone directories — Databasie lists of names and phone numbers that ease the sending of faxes. Some fax-modem software lets you import an already existing database and export from the directory created with the fax-modem software.

User-definable cover page — The first page in any fax document. Some fax software lets you customize the look of the cover page with fonts and graphics.

LO fonts provided — Letter-quality (LO) fonts can improve the look of faxes you send in the absence of Adobe Type Manager.

Page sizes — What size pages can the fax modem send and receive?

Voice-call detection — Does the fax modem know when it’s receiving a voice call rather than one from another fax station?

Flip 180 degrees — You may receive faxes sent upside down from a fax machine; being able to flip them over is a big help.

Auto-print — Can the fax modem initiate printing to a laser printer immediately on receipt of a fax?

Conversion — Good fax-modem software lets you convert faxes to other formats usable by other applications.

View magnification — Received faxes may be difficult to view at 100 percent because of the differences between fax and QuickDraw resolution. Good fax-modem software should let you enlarge received faxes.

Telecommunications software — Does the fax modem include software you can use to send data, or will you need to buy it?

Size (W x D x H, in.) — The case dimensions, rounded to the nearest quarter of an inch.

Warranty — Look for a money-back guarantee (MBG). Even the best fax modem may not mesh well with your particular hardware and software configuration.
At Prometheus®, our only business is communication products. Consequently, you’ll find we have the best data/fax modems you can buy.

And we’re not the only ones who think we make the best products... MacUser nominated the ProModem® 9600 Plus as the Best New Communications Product for 1990 and also chose it as the ultimate modem for their ULTIMAC in the Sept. 1990 issue. Only Prometheus offers you so much.

**Only** Prometheus offers a complete communication solution! We include cable, fax fonts, fax and data communications software with every data/fax modem we sell.

**Only** Prometheus includes MACKNOWLEDGE™ data communications software (a $125 value!) free with every modem so you can easily access popular on-line services, bulletin boards and other computer systems.

**Only** Prometheus offers a complete line of data/fax modems to suit your communications needs. Prometheus has you covered from our send-only data/fax modems to our new ProModem Ultima, a high-end, 14,400 bps data/fax modem. — All with the same, great fax software!

Guaranteed! We’re so sure you’ll like our ProModems, we’ll let you buy it and try it. If you don’t agree it’s the best product, return it to your dealer within 30 days for a full refund.

---

* This offer is good at participating dealers or for products purchased directly from Prometheus Products, Inc.
The cheapest printer for your Macintosh is the one you already own. If you have an HP LaserJet, take a look at this guide to 16 printer cartridges, software packages, and specialized hardware products to make it compatible with your Mac.

BY JOHN RIZZO

The Hewlett-Packard LaserJet is the most popular laser printer. You can find LaserJet IIs and IIs almost everywhere there are IBM-compatible personal computers. Although the LaserJet's output quality may not be as good as that of many Mac printers, it's probably good enough for the reports and memos that your office churns out by the ton.

Fortunately, there are several easy and inexpensive ways to enable your Macs to print to LaserJets. You can connect a LaserJet to a single Mac or to a network of Macs and PCs, with or without PostScript compatibility.

If your output is limited text, bit-mapped graphics, and other QuickDraw images, you don't necessarily need PostScript compatibility. For example, using standard HP font cartridges with special Mac software, you can print a wide variety of fonts and typographic styles and special effects without PostScript.

However, your options don't depend solely on your output needs; although some of the LaserJet-to-Mac connections are available only with PostScript, others don't support PostScript.

Whatever your configuration, by using the LaserJet you already own, you'll save enough money to pay for that Mac upgrade or jumbo hard-disk-drive purchase you've been putting off.
LaserJet Printers

Doing It the Mac Way

The easiest way to connect Macs to HP LaserJets is to add LocalTalk and PostScript (or a clone) to the printer, especially if you already have a Mac network. LocalTalk is the implementation of AppleTalk network protocols built in to every Mac, and PostScript is the standard page-description language used by every Mac application that prints to a PostScript printer. When you instruct a Mac to print something, it uses LocalTalk to send PostScript page descriptions to the printer. Once you’ve added LocalTalk and PostScript to a LaserJet, the LaserJet becomes simply another printer option when you click on the standard LaserWriter driver in the Chooser.

There are two ways to add LocalTalk to a LaserJet: Install HP’s LocalTalk port (called the Interface Kit for AppleTalk/HP LaserJet), or add an external device that bridges the printer to the network. As for PostScript, you can do it the easy way — add a PostScript-font cartridge — or the inexpensive way — use a software-only PostScript emulator that runs on your Mac (see Figure 1).

HP’s LocalTalk upgrade can be installed in minutes with a screwdriver. In addition to adding the LocalTalk port, the upgrade leaves the LaserJet with a serial and a parallel port, to either of which you can connect PCs. Unfortunately, you can use only one of these ports at a time, and you must reconfigure the printer each time you switch between ports. HP also sells a PostScript cartridge for the LaserJet.

The Pacific Data Products’ PacificTalk and Extended Systems’ BridgePort are external LocalTalk devices that act as logical extensions of the LaserJet — that is, the printer name in the Chooser shows up as BridgePort or as PacificTalk.

Figure 1: LocalTalk/PostScript Setups

Figure 1: Your Mac can print to an HP LaserJet if it has the right connections. In addition to providing the necessary cables and software drivers, you may also want to give the LaserJet fluency in LocalTalk and PostScript. LocalTalk can be added via an external box or with HP’s add-in board. You add PostScript by running emulation software on the Mac or by using a PostScript font cartridge in the printer. Various combinations of hardware and software are possible (several of which are shown here), although not all the options can be mixed and matched. For example, HP’s LocalTalk upgrade requires a PostScript cartridge in the LaserJet.
The BridgePort also supports PCs, which can be plugged into it simultaneously via its serial port and parallel port. Both of these ports, unlike HP's LocalTalk upgrade, can work at the same time as LocalTalk. In addition to connecting PCs to the LaserJet, the BridgePort gives PCs access to Mac-compatible laser printers on a LocalTalk network. The connection to the printer can be made by either a serial or a parallel connection. (Parallel connections are faster and usually more desirable.)

The PacificTalk is a much simpler device, with one LocalTalk port and one parallel port. It costs $200 more than the BridgePort, but it comes bundled with the PacificPage*E, Pacific Data Product's PostScript cartridge, so it costs $250 less than the combination of the BridgePort and HP's PostScript cartridge.

The three LocalTalk adapters performed similarly, with the BridgePort edging out the other two. All three models worked without any problems when tested on a network containing five routers.

### PostScript Emulators

Using PostScript cartridges is a much easier and faster solution than running PostScript emulation software on your Mac, but the software alternatives are less expensive. There are three low-cost emulators: Freedom of Press Light, from Custom Applications (see review, February '91, page 93), UltraScript for the Macintosh, from QMS Software Products (February '91, page 93), and TScript, from TeleTypesetting (August '90, page 62). Note, however, that these packages don't work with HP's LocalTalk upgrade, which requires a PostScript cartridge in order to recognize the LocalTalk port.

The best PostScript emulator on the market is still Freedom of Press, which was the first product of its kind. FOP Light is a slimmed-down version of the full Freedom of Press (which costs five times as much, has more fonts, and supports more printers). The cost of the full version is nearly as much as that of an HP PostScript cartridge, which is easier to deal with and faster and gives you true PostScript. But for those on a tight budget, Freedom of Press Light is a good deal and, combined with Adobe Type Manager, gives you plenty of fonts to work with. At $98, FOP Light has more features than the $195 UltraScript or the $145 TScript.

### One-on-One Solutions

If your Mac isn't part of a LocalTalk network, consider a one-printer, one-Mac solution. Although not as convenient as the LocalTalk/PostScript route, the one-on-one methods are more cost-effective if only one Mac is involved.

There are two parts to this type of solution: the physical connection and the software that provides the logical connection. The physical connection is usually through the serial port, but there are some exceptions. The software supplies the fonts and Chooser drivers used in place of the standard LaserWriter driver.

The most popular of these packages is Insight Development's MacPrint, which comes with a serial cable to transmit from Mac to printer at 19,200 bps. The MacPrint driver operates similarly to Freedom of Press, except that MacPrint uses QuickDraw to describe the characters to be printed. MacPrint supports dozens of font cartridges from HP and third parties as well as the fonts built in to the LaserJet. (You cannot use a PostScript cartridge with MacPrint or the other QuickDraw drivers.)

Included in the package is Font Mapper, a utility that creates bit-mapped screen fonts that correspond to LaserJet-cartridge fonts, giving you WYSIWYG text. It supports 63 font cartridges and internal LaserJet fonts, and its matches are quite good. Font Mapper creates font suitcases (see Figure 2) that you can install into your system by using Font/DA Mover, Suitcase II, or MasterJuggler. If you don't use a font created by Font Mapper, MacPrint creates a printer font based on the QuickDraw screen font. Using the MacPrint fonts is faster and yields better quality, however.

The Print dialog box gives you a choice of high, medium, and low output quality, as a dot-matrix-printer driver does. I saw little discernible difference in print quality among the different settings, but the "low" setting is quite a bit faster at printing graphics.

JetLink Express, from GDT Softworks, is a similar product that includes a serial cable and four outline-font families. It doesn't have access to as many fonts as MacPrint does, but it does have some unique features, such as support for outline fonts. Its outline fonts are not PostScript, but they do let you reduce or enlarge font size without loss of quality. JetLink Express can also perform automatic font substitutions. In addition, its printer driver is the first to support Apple's Communications Toolbox, a new tool for supplying a consistent interface for connectivity products (see Bridges, 31)
A competing product is the Grappler from Orange Micro, which comes in two versions for the LaserJet. The Grappler LS, like MacPrint and JetLink Express, comes with a serial cable and runs at 19,200 bps. The Grappler LX comes with a powered parallel connection. The similarities to MacPrint and JetLink Express end there, however, because the Grappler's software works on a completely different principle. Whereas MacPrint and JetLink Express install a different Chooser driver for each printer (LaserJet++, II, IID, IIP, and III, among others), the Grappler uses Apple's ImageWriter LQ driver. In fact, the Grappler was originally designed for printing to non-Mac dot-matrix printers such as Epson-compatible printers.

Because the Grappler, MacPrint, and JetLink Express don't use Apple's LaserWriter Chooser driver, you can't use the Mac's Print Monitor spooler, which is part of Apple's LaserWriter driver. Without Print Monitor or another spooler, your Mac is tied up until the printing job is finished. The Grappler compensates for this by supplying a built-in print spooler accessible through the Control Panel. This spooler doesn't work as smoothly as Print Monitor — there is some jumpiness when you're typing during a printing job — but it is better than not having a spooler at all. MacPrint and JetLink Express do not have spoolers, but both are compatible with 5th Generation's SuperLaserSpool, which you need to buy separately.

The Grappler does have some disadvantages compared with its competitors. Both MacPrint and JetLink Express are faster than either version of the Grappler. MacPrint is better documented than the Grappler and has many more fonts (although you can add fonts to the Grappler with AlphaBits, an add-on package of Bitstream fonts).

MacPrint is sometimes bundled with third-party hardware. One of these is the JetWriter, from Extended Systems, which takes a unique approach to connecting a Mac to a LaserJet. The JetWriter, an add-on board specifically for the LaserJet IIIP, gives the printer an interface that is a cross between a serial connection and LocalTalk.
The New Price/Performance Printer Standard.

Microtek presents the TrueLaser™ printer. Powered by the AMD 29000, a 32-bit RISC processor that's five times faster than the 68020 found in most Postscript printers. And ten times faster than the 68000 found in PCL or PDL printers.

Right out of the box it gives you 2MB of memory. And it can be configured up to 6MB. It's both Adobe PostScript®™ and HP PCL compatible. Now that's unmatched power at an unmatched price.

The First Laser Printer with TrueImage and TrueType.

The TrueLaser printer is the first printer to ship with TrueImage technology. It includes a bundle of 35 resident TrueType fonts. You also have a printer that's ready for both Windows 3.1 and Macintosh System 7.0. You have absolutely WYSIWYG font display. Faster screen display. And faster printing. That's versatile enough to suit all types.

The Best of Both Worlds. Postscript and TrueImage.

In addition to TrueImage, the TrueLaser printer will also work with every member of your Adobe font library. It beautifully publishes Adobe PostScript®,™ Type 1 and Type 3 fonts. It also accepts and prints documents from Macintosh, IBM PC and PS/2 machines via AppleTalk, Centronics and RS-232 interfaces. It's unique autoswitching capability makes the entire process transparent and invisible. It's perfect as both a stand alone printer or a shared network resource. So join the future without leaving the past.

All This for $2695. Call Today.

At $2695, you also receive a 1 year warranty with 6 month on-site service - a major breakthrough that you can't afford to miss.

Call 1-800-654-4160, or in California, 213-321-2121 for the name of the authorized Microtek dealer nearest you.

And get a first hand look at the only printer that does it all - for a lot less.
you configure the LaserJet IIP for the JetWriter, you set the I/O to parallel, but it's not a parallel interface — the JetWriter only fools the LaserJet into thinking it's parallel. You're actually using a high-speed serial interface, faster than any DOS serial interface. In fact, the JetWriter runs at LocalTalk speeds (230,400 bps), because it actually uses part of the LocalTalk protocols. The part of LocalTalk it doesn't use, however, is the code that lets you share printers; this is strictly a one-Mac show.

One drawback of using only part of the LocalTalk protocols is that you must run your cable from the Mac's printer port, thereby preventing you from connecting your Mac to a LocalTalk network. (You can, however, still connect to Ethernet or token ring via SCSI or add-in boards.) And unlike HP's LocalTalk card for the LaserJet, which also has serial and parallel ports, the JetWriter card has only the one interface. The JetWriter is faster than MacPrint's serial connection but costs almost $200 more. On the other hand, because it comes bundled with the MacPrint software, it is cheaper than the LocalTalk/PostScript solutions.

The JetWriter is also cheaper than another one-on-one solution: PostScript emulation over a serial cable. For $499, Pacific Data sells its PostScript-emulation cartridge on its own, without the PacificTalk LocalTalk bridge it is usually bundled with. You also need the Pacific MacPage Connection Kit ($99), which contains the serial cable and the necessary software.

Freedom of Press can also be used over a serial cable, but only if you're not in a hurry. Using a serial connection set at 19,200 bps, Freedom of Press took about six times as long to print as did either MacPrint over the same serial setup or PostScript over LocalTalk.

### Printer-Sharing Devices

In the DOS market, where networking capabilities are not built in to the CPUs, printer-sharing devices have become fairly popular. These boxes can connect one or more LaserJets to multiple PCs, usually via serial ports. You can add RAM to most of these products for a buffer, which becomes

---

**Figure 4: The Best of Both Worlds**

Figure 4: Extended Systems' BridgePort is a LocalTalk bridge for LaserJets that can also connect to a printer-sharing device loaded with PCs. This also gives the PCs access to any printers on the LocalTalk network. The setup shown here favors the Macs, because the PCs have to go through two devices to reach the LaserJet. To give the PCs the speed advantage, you can connect the LaserJet directly to the printer-sharing device instead of to the BridgePort.
Introducing Generic CADD™—real CADD with a true Macintosh* interface. From first inspiration to final production drawing, it’s the one program that you can use in every phase of your design.

Generic CADD combines drawing ease, drafting precision, and Generic Software’s renowned technical support—all for hundreds of dollars less than the competition.

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It’s CADD that’s worth a closer look.
LaserJet Printers

more important as you add PCs. Several of these devices now also support Macs when you add the correct driver software (see Figure 3).

ASP offers a bundle that includes MacPrint with its Maestro printer sharer, but any driver works. The Maestro also supports VAX and HP 3000 computers, in addition to PCs. There are three Maestro models; the top-of-the-line model 1000 has ten serial input ports and two parallel output ports.

You need DOS software and at least one PC to configure several of Maestro's ports beyond 9,600 bps. And you might want to do this, because the serial ports can be set to 115,200 bps. It's a capable unit; unfortunately, it comes with a bare-bones manual.

The ShareSpool, from Extended Systems, does not directly support Macs, but it works very well in combination with the BridgePort. This is a very good solution if you have a lot of PCs and a Macintosh LocalTalk network. The setup shown in Figure 4 is optimized for good Mac performance, but if PCs are emphasized in your office, you can switch the setup around: Connect the ShareSpool directly to the printer, and hang the BridgePort off the ShareSpool.

Although other printer-sharing devices can be used with the BridgePort, the ShareSpool has several things going for it. It has a parallel input port, which speeds up the connection to the BridgePort. The model 2089 can be totally configured by the DIP switches on the back, without using DOS software. A serial port and a parallel port are available for connecting to printers, although the 2089 can connect to only one printer at a time. Other ShareSpool models can connect to two printers.

Several companies package printer-sharing devices as add-in boards to the LaserJet, giving the LaserJet more ports. ASP's ServerJet, which has ten serial ports and 1 megabyte of RAM for buffer memory, was expected at press time to be outdone by a new version that will connect up to 12 computers and have 4 megabytes of memory. Like the Maestro, the ServerJet supports Macs, PCs, VAXes, and HP 3000s.

Pacific Data Products' Pacific Connect LaserJet board is a low-cost solution with one parallel port and four serial ports that can run at speeds of up to 115,200 bps. It supports Macs if you buy Pacific Data Products' driver kit and also supports MacPage PostScript emulation. As with some of the other printer sharers, you must use DOS software to configure the ports.

---

Table: Sample Performance

**Hewlett-Packard LaserJet III Printing Times**

<table>
<thead>
<tr>
<th>Device</th>
<th>Text</th>
<th>Text/Graphic</th>
</tr>
</thead>
<tbody>
<tr>
<td>BridgePort with HP PostScript</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PacificTalk with Pacific PostScript</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HP LocalTalk with HP PostScript</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grappler FS, serial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grappler FX, parallel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MacPrint, serial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JetLink Express, serial, outline fonts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freedom of Press, serial</td>
<td></td>
<td></td>
</tr>
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**Hewlett-Packard LaserJet II Printing Times**

<table>
<thead>
<tr>
<th>Device</th>
<th>Text</th>
<th>Text/Graphic</th>
</tr>
</thead>
<tbody>
<tr>
<td>JetWriter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MacPrint, serial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HP LocalTalk, HP PS cartridge</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5: There are many possible combinations of font strategies and connection methods and settings, but here is a representative sample of how the products perform under ideal conditions. The chart shows how long (in seconds) it took to print two test documents: a 200-word text document with multiple styles of a single font and the same document with a bit-mapped graphic added. The BridgePort was the fastest LocalTalk connection, but MacPrint over serial cables did quite well compared with the LocalTalk/PostScript combinations. All serial connections were set at 19,200 bps. JetLink Express, which uses outline fonts, did much better than Freedom of Press, a PostScript emulator, which was the slowest driver of all. The LaserJet IIP, a slower printer than the LaserJet III, was used to test the JetWriter, which runs only on the IIP. The JetWriter is the fastest solution for the HP because it runs at LocalTalk speeds. It beat HP's LocalTalk because it uses the MacPrint driver, whereas the HP LocalTalk card requires a PostScript cartridge, which adds processing time.
Now you don’t have to buy a new printer to get ultra-fast, high-resolution output. The Accel-a-Writer™ LaserWriter® Upgrade instantly converts any Apple® LaserWriter to a higher-speed, higher-quality laser printer. It’s the next best thing to owning your own typesetter.

Prints up to 20 times faster. With Accel-a-Writer’s high-speed RISC technology, you can output text, graphics and complicated halftones up to 20 times faster — without shady edges and jagged lines. Plus our 3-level Advanced Memory Management puts your printer to work preparing a second document while your first one’s still printing.

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LaserJet Printers

Extended Systems has several add-ons for the LaserJet. The ShareSpool 2094 gives your LaserJet four parallel ports. Like Extended Systems' external ShareSpool boxes, the 2094 does not support Macs directly, but you can plug in a BridgePort to connect a LocalTalk network.

The Bottom Line

Figure 5 summarizes how quickly various configurations printed our test documents. Speed isn’t the only consideration; although all the alternates offer good output and substantial cost savings over buying a new printer, there’s a trade-off between flexibility and ease of use on the one hand and how much you’re willing to invest in printer add-on hardware and software on the other. One thing is clear: If you want to print to an HP LaserJet from a Mac, the fastest and easiest solution is to add LocalTalk to the LaserJet and pop in a PostScript cartridge, and you’ve finished — without adding a single byte of software to your Mac.

For sites that have a lot of PCs as well as a Macintosh network, Extended Systems’ BridgePort LaserJet-to-

LocalTalk bridge ($495) provides the most benefits and versatility for Mac as well as PC users. The BridgePort excels with its abilities to connect to printer-sharing devices and to let PCs share any LocalTalk printer.

If you have only Macs or if your PCs are on a LocalTalk network, HP’s Interface Kit for AppleTalk/HP LaserJet ($275) is cheaper. Like the BridgePort, it works very smoothly with the HP PostScript Cartridge ($695) installed in the LaserJet.

Font snobs will revel in the “real PostScript” of HP’s cartridge, but if

Table 1: LocalTalk/PostScript Solutions*

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<td>CAI</td>
<td></td>
<td>$495</td>
<td>$275</td>
<td>$695</td>
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<td>Description</td>
<td></td>
<td>external LocalTalk bridge</td>
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<td>font cartridge for LaserJet</td>
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<tr>
<td>Custom Applications, Inc.</td>
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<td>900 Technology Park Dr.</td>
<td></td>
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<td></td>
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<tr>
<td>Bldg. 8, Bilenica, WA 0821</td>
<td>Full version, $495</td>
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<tr>
<td>(503) 667-8585</td>
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<td>Hewlett-Packard</td>
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<tr>
<td>Pacific Data Products</td>
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<td>PacificTalk</td>
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<td>Company</td>
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<td></td>
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<tr>
<td>Pacific Data Products</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9125 Rehoc Rd, San Diego, CA 92121</td>
<td>(619) 552-0800</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Products are rated here solely with respect to their usefulness in printing to HP LaserJets, so ratings may differ from those appearing in reviews in past issues.
LaserMaster Gives You the Power to Print Your Best

And, at 1000 or 1200 TurboRes, Your Best Will Look Even Better

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TEL: (612) 944-8726, FAX: (612) 944-9151

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Please circle 170 on reader service card.
you don’t mind “fake” PostScript, Pacific Data Products’ PacificTalk ($699) is an even better buy. The cartridge included in the package produces professional-quality fonts, and the LocalTalk bridge for the LaserJet performs admirably.

PostScript cartridges are the easiest and fastest way to go, but for those on a shoestring budget, a good option is CAI’s Freedom of Press Light ($98), the most full-featured PostScript emulator short of the complete Freedom of Press ($495). (If you can afford the complete version, you’re better off buying a PostScript cartridge.)

Printer-sharing devices don’t allow for growth the way LocalTalk does and are slower; we recommend using them only if you have a lot of PCs.

Finally, for those who have only one Mac they want to connect to a single LaserJet and don’t need PostScript output, QuickDraw emulators work fine over a serial cable. Our pick here is JetLink Express ($159) from GDT Softworks, which edges out Insight’s MacPrint ($149) thanks to its use of outline fonts. In either case, the trade-off for giving up the PostScript emulation of Freedom of Press is a big increase in output speed.

John Rizzo is MacUser’s technical editor and the author of more than 100 articles about Mac technology and connectivity.

---

**Table 2: One-on-One Solutions, Non-PostScript**

<table>
<thead>
<tr>
<th></th>
<th>Extended Systems JetWriter</th>
<th>GDT Softworks JetLink Express</th>
<th>Insight MacPrint</th>
<th>Orange Micro Grappler</th>
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<tr>
<td><strong>List price</strong></td>
<td>$345</td>
<td>$159</td>
<td>$149</td>
<td>LS (serial), $99</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>high-speed serial board for LaserJet IP (comes with MacPrint drivers)</td>
<td>outline-font drivers, serial cable</td>
<td>QuickDraw drivers, serial cable</td>
<td>LX (parallel), $199</td>
</tr>
<tr>
<td><strong>Company</strong></td>
<td>Extended Systems 6123 N. Meeke Ave., Boise, ID 83711 (208) 322-7575</td>
<td>GDT Softworks, Inc. 4664 Lougheed Hwy., Suite 188 Burnaby, BC V5C 6B7 Canada (800) 662-6222 (604) 291-9121</td>
<td>Insight Development Corp. 2200 Powell St., Suite 500 Emeryville, CA 94608 (415) 852-4115</td>
<td>Orange Micro 1400 N. Lakeview Ave., Anaheim, CA 92807 (714) 779-2727</td>
</tr>
</tbody>
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* Products are rated here solely with respect to their usefulness in printing to HP LaserJets, so ratings may differ from those appearing in reviews in past issues.

**Table 3: Printer-Sharing Devices**

<table>
<thead>
<tr>
<th></th>
<th>ASP Mastro</th>
<th>ASP ServerJet</th>
<th>Extended Systems ShareSpin</th>
<th>Pacific Data Pacific Connect</th>
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<td>internal to LaserJet</td>
<td>external to LaserJet</td>
<td>internal to LaserJet</td>
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<tr>
<td><strong>Comments</strong></td>
<td>Connects up to 10 Macs, PC’s, VAXes, and HP 3000 computers and 2 printers. 1-MB-maximum buffer.</td>
<td>Connects up to 10 computers. 1-MB-maximum buffer.</td>
<td>Connects up to 10 PCs. No DOS software required to configure.</td>
<td>Connects up to 12 Macs, PC’s. 1.25-MB-maximum buffer. Lifetime warranty.</td>
</tr>
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<td><strong>Company</strong></td>
<td>ASP Computer Products 1026 W. Maude Ave. Suite 305 Sunnyvale, CA 94086 (800) 444-6190 (408) 746-2965</td>
<td>ASP Computer Products 1026 W. Maude Ave. Suite 305 Sunnyvale, CA 94086 (800) 444-6190 (408) 746-2965</td>
<td>Extended Systems 6123 N. Meeke Ave. Boise, ID 83711 (208) 322-7575</td>
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Check out the cover of this magazine. Before it was printed — or even separated — words and images were combined, edited, altered, cropped, viewed from across a room, argued over, and altered and edited all over again. What made it possible were two now-essential tools for desktop color publishing that didn't even exist a few years ago: a true-color display system and a color PostScript printer.

Color is here, and it arrived faster and in more places than anyone expected. This MacUser Buyer’s Guide details the current colorful state of the Mac both on the monitor screen and on the printed page. Development is moving so fast in this field that last year’s award-winning hardware may be this year’s also-ran. At the same time, the cost of doing color publishing on the Mac continues to drop, with good color PostScript printers costing only a little more than the original LaserWriter.

These two comprehensive lab reports on true-color display systems and color PostScript printers will help you decide whether it’s time to think about adding some color gear to your Mac.
To Save Over $6000
On Your File Server

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<td>Mac IIci with 80MB</td>
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<td>AppleShare software</td>
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LocalLink is a super fast, 100% AppleShare 2.0 compatible file server. LocalLink's proprietary software enables the network manager to assign users, passwords and privileges. LocalLink is as fast of a server as a IIci. 90 MB to 1GB.
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You can’t beat a 24-bit-display system for color desktop publishing, presentations, or artwork. We tested 20, and they all came through with flying colors.

Nothing wows a crowd like a big, sharp color monitor. Whether you’re selling a client on an ad campaign or selling products at a trade show, the breathtaking realism of true 24-bit color will make your Mac the center of attention. Until recently, however, the expense of all those crisp pixels made 24-bit color the exclusive domain of professional graphic designers — who had no choice but to wait as their Macs slowly drew complex QuickDraw graphics. But 24-bit color is no longer only for big-budget artists and architects, and QuickDraw acceleration is becoming standard on many video cards. Not just faster and more affordable, these systems now consistently deliver higher-quality color than we found in last year’s look at color systems (see “In Living Color,” May ’90, Buyer’s Guide page 32).

If you’re considering upgrading an 8-bit-color display system (monitor, NuBus video card, and cables) or if you are about to enter the world of color for the first time, now may be the time to invest in 24-bit color. Once you have, you’ll have access to a photo-realistic palette of 16.8 million colors, which the Mac creates by using Apple’s 32-bit QuickDraw (the extra 8 bits, called the alpha channel, control effects such as transparency).
If the jump to a 24-bit, true-color system would prove too much for your budget or if you want a color display only for normal office applications, consider equipping a Mac LC with Apple's 16-bit VRAM (video RAM) option, for 32,768 potential colors (see the "LC Option" sidebar). At testing time, no 24-bit 68020 PDS (processor-direct slot) cards were available for the NuBus-less LC — and because it uses a Motorola 68020 CPU, the LC can't accept existing 68030 PDS cards designed for the SE/30.

RGB Roundup

For this report, we subjected 20 color display systems to MacUser Labs' full suite of benchmark tests. We tested complete systems, but many cards and monitors are available as individual components. For example, we tested...
The 13-inch AppleColor Hi-Res RGB Display used with the Macintosh Display Card 8•24 or 8•24 gc showed the advantage that small screens have in convergence testing.

MTF Sharpness:
We compared two on-screen areas — one filled with closely spaced, one-pixel-wide white lines and the other filled with wide, alternating black and white bands. The overall brightness in both areas is nearly equal on a screen with high MTF sharpness, which produces easy-to-read text and fine detail. Generally, MTF scores greater than 50 percent are considered acceptable — only one display system, the RasterOps 24L, failed to exceed this mark.

Color Tracking:
Even the least expensive monitors had good color tracking, providing reliable color at any brightness level. A system with poor color tracking might display a greenish tint in what should be a simple gray square. For accurate color rendition, stick to sharp monitors with excellent color tracking, convergence, and focus, and look into the color-calibration options from Radius or SuperMac.

Maximum Usable Brightness:
A bright screen combats glare, is easier to read for extended periods, and allows for high contrast. We determined the maximum brightness possible without unacceptable loss of sharp focus.

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<tr>
<th>MTF Sharpness</th>
<th>Color Tracking</th>
<th>Maximum Usable Brightness</th>
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<tr>
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<tr>
<td>Better</td>
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</table>

- E-Machines ColorPage T16
- Apple Display 8•24 gc
- Apple Display 8•24
- SuperMac (Sony) 19"
- SuperMac (Hitachi) 21"
- SuperMac (Hitachi) 19"
- E-Machines TX/24
- PCPC II 16" Color
- Seiko Instruments 14" Color
- Mirror ProView/24
- E-Machines T19
- Generation Systems Color 24
- MegaGraphics 2024 16"
- Monitorm Viking C24
- RasterOps 24L
- MegaGraphics 2024 19"
- PCPC II 19" Color
- Sigma Designs ColorMAX 8/24
- Radius DirectColor/24
- Relax Ikegami DM2060

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the Seiko Instruments 14" Color monitor bundled with the RasterOps 264 card, and many of the systems include the National Semiconductor MacLangelo card. We also tested two video cards from Apple: the Macintosh Display Card 8•24 and the accelerated Macintosh Display Card 8•24 gc (both tested with the 13-inch AppleColor Hi-Res RGB Display).

Last year the E-Machines ColorPage T16 with an 8-bit card was one of our top picks; it now looks even better as a 24-bit display. In addition to the T16, we tested three other systems with 16-inch Sony Trinitron tubes: the E-Machines TX/24, the MegaGraphics 2024 16", and the PCPC II 16" Color. The new Ikegami/Sony Trinitron 19-inch and 20-inch monitors were also well represented. Relax Technology
Not an unusual claim for a 4-star restaurant. But for a monitor, it's quite a story. With NEC's multiple-frequency technology, our monitors can accept all kinds of video cards for applications ranging from standard desktop software to large-screen graphics design. And your NEC dealer has several different Macintosh-compatible MultiSync® monitors he'd be glad to show you. In fact, he might even take plastic.

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submitted a 20-inch Ikegami monitor (not the Trinitron model tested last year and still sold by Relax). There were six 19-inch Sony Trinitron systems from E-Machines, MegaGraphics, Radius, RasterOps, Sigma Designs, and SuperMac. SuperMac also sent us two systems with Hitachi monitors for testing.

Four of the tested systems — the Apple Display 8-24c, the SuperMac (Sony) 19”, the SuperMac (Hitachi) 19”, and the SuperMac (Hitachi) 21” — offer video cards with built-in accelerators. QuickDraw acceleration, now a sometimes-expensive option, should become standard in future 24-bit systems (see the “On the Horizon” sidebar).

Do I Really Need It?

If you’re using color in the graphic arts or multimedia, then you should investigate 24-bit display. If you’re now limited to 8-bit color, you probably often see “banding” (or “steps”) in color images — instead of making smooth transitions, colors jump abruptly from one shade to the next.

If all you do is word processing and spreadsheet work, then stick with monochrome or gray-scale systems; they’re cheaper and display a sharper image. And if you do make the move up to 24-bit-color programs, make sure you have the disk storage and RAM to deal with enormous data files (see “Portable Secure Unlimited-Storage Cartridge Drives,” February ’91, page 206, and “Maximum Movable Megabytes: Erasable Optical Drives,” November ’90, page 102). Images created in 24-bit color usually require three times the disk space as 8-bit-color images of the same size.

If you work in a fast-paced graphics-production environment and your Mac would benefit from QuickDraw acceleration, then go for a 24-bit system that at least allows this as an upgrade option. As screen size and the number of pixels increase, 24-bit color costs time as well as money (see the “Acceleration” sidebar).

What Will It Cost?

The list price for display systems we tested ranged from $1,644 (for the Seiko Instruments I4” Color) to $9,148 (for the MegaGraphics 2024 19”); street prices were considerably lower (see Table 1). Depending on features and built-in acceleration, the 24-bit-video card accounts for between 30 and more than 50 percent of the total price of a display system.

All the monitors we tested can display up to 16,777,216 colors. In fact, most monitors capable of displaying 8-bit color can also display 24-bit color and should cost the same; the video card is the only element that raises the price. If you want to upgrade an 8-bit system, you should only have to install appropriate software and a new or upgraded video card in your Mac.

Some card manufacturers (such as SuperMac and Mirror) accept trade-ins or perform reasonably priced upgrades on their older 8-bit cards. As this article goes to press, Apple, Mirror Technologies, and RasterOps offer 8-bit cards as well as do-it-yourself kits for 24-bit upgrades — more companies are sure to follow suit. E-Machines offers a MoreCare option, which allows you to trade in your 8-bit card for its original retail value.

How Quick Can You Draw?

One advantage of color on the Mac is that you can easily change the display’s bit depth — the number of
Introducing the RAVEN Series. The First Macintosh Disk Array With 5.7 ms Average Access and 4.1 MB/sec Sustained Transfers.

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Color Display Systems

Figure A: Macintosh 12" RGB Display Performance

<table>
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<tr>
<th>Number of pixels</th>
<th>Maximum usable brightness</th>
<th>Color tracking</th>
<th>MTF sharpness</th>
<th>Convergence</th>
<th>Focus (subjective)</th>
<th>Geometry (subjective)</th>
<th>Color (subjective)</th>
<th>Nuisance (subjective)</th>
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<td>60</td>
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<td>100</td>
<td>120</td>
<td>140</td>
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13-inch AppleColor Hi-Res RGB Display and Macintosh Display Card 8+24

Figure A: Despite having a lower pixel density (64 dpi) and a slightly smaller active screen area than the more expensive AppleColor Hi-Res RGB Display, the new Macintosh 12" RGB Display is very sharp and bright, with excellent color quality.

bits per pixel, which determines the number of displayable colors. If the bit depth is 1, you’re limited to black or white (two displayable “colors”) but screen updates happen fast. The greater the bit depth, the more processing time is needed to “paint” the screen. Also, the NuBus can transfer only 32 bits of data at a time—thirty-two 1-bit pixels in the same amount of time as four 8-bit pixels or one 32-bit pixel (which has 24 bits of color information).

Assuming that your software program and your current project can use different bit depths, you can tip the balance between image quality and speed by using the Monitors cdev (or the shareware Fkey Switcheroo, available on Zmac) to select a shallower bit depth. If 24-bit mode is too slow, downshift to 16 or even 8 bits, do your editing, and then return to 24 bits for a final look. Only the E-Machines ColorPage T16, T19, and TX/24 and the Radius DirectColor/24 allow 16-bit mode—which is a shame, because it’s faster than 24-bit mode yet rarely looks noticeably different.

Another advantage of the Mac is that you can use more than one display system simultaneously. If you already have an unaccelerated 24-bit-video card that supports NuBus block transfer (which lets video data move in big, fast chunks), then an accelerator card that uses this feature—such as Apple’s state-of-the-art 8+24 gc—can improve the performance of both the monitor attached to the unaccelerated card and the monitor driven by the accelerated card. Some accelerators are also capable of acting as a bus master, able to take control of NuBus traffic—which also helps accelerate multiple displays. However, our testing showed that on-board acceleration in a video card is best, speeding up screen redraw as much as eightfold over a standard card.

One Size Does Not Fit All

Displays are measured in dpi (dots, or pixels, per inch). Apple designed the Mac around the traditional point measuring system (72 points equal an inch) used in the printing industry. The closer a Mac display’s resolution is to 72 dpi, the more closely a supposedly inch-long object will be to an authentic inch on the screen. A screen with a resolution of exactly 72 dpi is often called WYSIWYG—what you see is what you get. If a monitor’s resolution is higher than 72 dpi, it displays more information on the same-sized screen but text appears shrunk, and image sharpness may suffer. However, some graphic artists argue that the more closely packed the pixels in a 24-bit-color display, the better for previewing artwork, especially photos, because the pixel grid is less visible.

You can calculate the dpi of a monitor by dividing the number of pixels (measured horizontally) by the horizontal size of the active display area. For example, the E-Machines ColorPage T16 displays 832 pixels in 11.75 inches to get 71.7 dpi (close enough to be true WYSIWYG). However, the E-Machines TX/24 and the MegaGraphics 2024 16” cram 1,024 pixels into the same screen area, producing a very dense 88 dpi.

Trinitron Challenged

Of the 20 display systems we tested, 17 use the superb Trinitron technology in monitors either built by or licensed from Sony. However, this technology is being challenged by another Japanese manufacturer: Hitachi now sells 19- and 21-inch monitors through various American vendors, including CalComp, Radius, and SuperMac.

What makes the Trinitron tubes so good? They offer three major advantages over conventional shadow-mask tubes (which contain very thin, perforated sheet-metal masks to filter electron beams). First, the Trinitron tube’s single-gun, single-lens technology keeps the three electron beams perfectly aligned within the display tube. Second, a Trinitron tube uses an aperture grille (a flat array of fine, vertically aligned metal wires) that lets more of the electrons strike the screen’s interior phosphor coating than does a shadow mask—creating a brighter picture. An aperture grille is also more resistant to doming—distortion caused by heat that results in a blotchy discoloration of the screen image—than is a thicker shadow mask. Third, a Trinitron tube’s cylindrical screen reflects less ambient light than does the
Dvorak, The Doors Or A Database.

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

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ColorPoint is 100% Adobe PostScript language compatible, thanks to the PhoenixPage interpreter. From graphics to fonts, what you get out of the printer is faithful to what you sent it. What's more, PhoenixPage's advanced screening techniques produce smoother shading and less grainy images. ColorPoint also supports industry standard downloadable typefaces such as Adobe Type 1 fonts—including hints.

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ColorPoint includes an Intel 80960 embedded RISC-based processor that speeds up image-processing time. So you not only get superior 300 dpi quality, you get it as much as 60% faster.

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Seiko Instruments
Color Display Systems

On the Horizon

As color becomes more popular, you can expect to see price reductions on 24-bit-video boards, color monitors, QuickDraw accelerators, and multipurpose boards (combining acceleration and video goodies). Market leaders such as E-Machines, Radius, RasterOps, and SuperMac share Apple's new let's-make-a-deal disposition.

At press time, RasterOps was introducing its new 24-bit board, combining built-in QuickDraw acceleration, NeBus block transfer, and bus-master operation, plus NTSC/PAL gecklock timing for video production. The board has a low power requirement, which conforms to the Mac IIci. The new 24-bit RasterOps 24STV board incorporates full-motion video, overlay, and capture of NTSC/PAL/SECAM input in a resizeable window; optional daughterboards provide acceleration and video compression/decompression. RasterOps, 2500 Walsh Avenue, Santa Clara, CA 95051; (408) 562-4200.

E-Machines is releasing two 24-bit Trinitron systems: the 16-inch TXSi and 19-inch T19Si, both with boards adapted for the low-power Mac IIci. But the hot news from E-Machines will be the ColorPage T16/ XL24 system (less than $4,000) with built-in 24-bit acceleration and hardware-based pan and zoom. E-Machines earned a perfect five mice for the ColorPage T16 system in this report — the accelerated T16/XL24 may be an improvement on perfection. E-Machines, Inc., 8305 S.W. Gemini Drive, Beaverton, OR 97005; (800) 344-7274 or (503) 646-6699.

SuperMac has started shipping its 19" Dual-Mode Trinitron Display, which allows you to switch between 1,352 x 870 pixels (two full pages) and a WYSTV1 1,024 x 768. SuperMac is standardizing on European-standard EBL phosphors (6,500 degrees Kelvin color temperature) on its 19-inch and 21-inch Hitachi monitors. These phosphors produce richer reds and — if accepted as American standards — will advance the cause of international monitor-color accuracy. SuperMac Technology, 485 Potrero Avenue, Sunnyvale, CA 94086; (408) 245-2202.

Radius will offer its DirectColor 24 board with a new Color Display 21, a 21-inch Hitachi monitor also using phosphors with a color temperature of 6,500 degrees Kelvin. Radius, Inc., 1710 Fortune Drive, San Jose, CA 95131; (800) 227-2795 or (408) 434-1010. In addition, CalComp will add acceleration to its Hitachi 21-inch display system. CalComp, Inc., 2411 W. La Palma Avenue, Anaheim, CA 92803; (800) 458-5888 or (714) 921-2000.

— Andrew Eisner and Bruce Mawhinity

usual spherical display.

Hitachi’s shadow-mask tubes now rival Trinitron quality in sharpness, brightness, and color saturation. Hitachi has developed a special shadow mask made of the metal alloy Invar (nickel, iron, and manganese), which is highly resistant to doming. The two SuperMac Hitachi monitors were high on our jury’s list of favorites and offer sharp pictures with good color.

How We Tested

MacUser Labs has tested hundreds of display systems. Not only do we employ sophisticated instruments to rate them objectively but we also have a unique advantage over average consumers: Our experts get to look at all the systems in one room, with the same lighting and the same experienced eyeballs. This time around, all the tested systems looked good; even the “worst” performer, the Relax Ikegami DM2060, earned a four-mouse rating, because of image quality and low price.

Before we tested each display, we degaussed it to eliminate magnetic interference. We then oriented each monitor along the east/west axis when tuning display tubes before shipment, monitor manufacturers do the same to protect against screen-image distortion caused by the earth’s magnetic field. However, none of the tested monitors seemed particularly sensitive to this subtle force.

After each display had warmed up, we measured its active area — the portion of the screen that contains the actual image. Although manufacturers define screen size as the diagonal measurement of the tube’s entire visible front surface, as framed by the plastic-case bezel, the active area is usually smaller and rarely includes the screen’s troublesome perimeter — where accurate focus and color convergence are difficult to achieve.

Brightness Versus Focus

An eternal conflict in monitor design is between screen brightness and focus. The more you turn up the brightness, the more intense the electron beams that scan across the screen’s phosphor. The more intense the beams, the less precise they focus.

We used a Minolta TV Analyzer to measure maximum usable screen brightness (see Figure 1). To their credit, all the displays we tested were still in good focus at an acceptable brightness. Some vendors let you crank the brightness way up so that when the screen’s phosphors age and become less responsive, you can energize them to maintain normal luminance. But whatever their age, phosphors deteriorate much more rapidly if brightness is kept too high or if a screen-saver utility doesn’t always blank out the screen when the monitor is left idle.

External controls are often provided for monitor brightness and contrast, vertical and horizontal convergence, screen-image position and size, and degaussing. Buying a monitor with all or most of these controls lets you fine-tune the screen image safely, even after the monitor has accumulated some mileage. The interior electrical components of computer monitors (even after power has been shut off) retain lethal electrical charges. Leave internal tinkering to the experts!

Sharpness and Glare

MacUser Labs quantifies MTF (modulation-transfer function) — an objective measure of monitor sharpness — by using a custom-built CCD (charge-coupled device) array to compare the brightness of a series of wide white bands with that of a series of thin (one-pixel-wide) white lines. A sharp monitor delivers the same overall brightness in the area with wide bands as in the area with narrow lines.
There's a big difference between our high performance compression/decompression solution and C-Cube's — ours is available now.

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The Micron Xceed™ ICDP-II with Storm Technology's PicturePress™ software offers a variety of features you can't get with C-Cube's CL550™-based products. Like fully adjustable compression settings, thumbnail views, software easily upgraded to future JPEG versions, lossless compression and JPEG ++™ — an exclusive feature that allows you to compress different user-selected parts of the same image at different quality levels.

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So call us at 1-800-642-7661 for more information and the name of your nearest authorized dealer. And find out how, at $995, the Xceed ICDP-II for the Mac® II family is obviously different, and obviously better.

<table>
<thead>
<tr>
<th>Features</th>
<th>Micron ICDP-II</th>
<th>C-Cube CL550-Based Card</th>
</tr>
</thead>
<tbody>
<tr>
<td>True JPEG Implementation</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Upgradable to Future JPEG</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Versions via Software Updates</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>JPEG ++ Support</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Thumbnail Views</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Lossless Support</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Application Plug-ins (Photoshop™)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Free Software-Based Decompression Module</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>60 MIPS Programmable Processor</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
screen that's not so sharp lets the pattern of narrow white and black lines merge slightly, almost becoming a soft-gray area. The higher the MTF numbers, the better the display's ability to distinguish fine detail. Maintaining sharpness is much easier for a low-resolution monitor than for a tube that's forced to squeeze pixels into a limited active screen area. All the display systems we tested delivered good MTF results, with the razor-sharp standouts being the E-Machines ColorPage T16, the Mirror ProView/24, and the SuperMac (Son) 19".

Another trade-off in monitor design is between glare protection and sharpness. Anything you put onto the face of the tube to reduce glare allows less light to be transmitted and may lower sharpness. If you turn the brightness up to compensate, the image will lose its sharp focus. The best — and most expensive — antiglare treatment comes from OCLI (Optical Coating Laboratories, Inc.), with some close competition provided by Asahi Glass' antireflection treatment. The distinctive appearance of OCLI's treatment, apart from a nearly complete absence of screen reflections, includes dramatically enhanced fingerprints (a soft, clean, lint-free cloth and distilled water eliminates these).

The silica-coating antiglare treatment used on two of the E-Machines monitors is surprisingly good. Silica is less costly than OCLI's coating. It works by simply diffusing reflected light.
light and usually reduces a screen’s apparent sharpness—which becomes a problem for high-resolution monitors. To minimize glare from any monitor screen, orient the display so that it doesn’t face fluorescent lights or bright windows.

**Convergence and Color Tracking**

The hues generated by any color monitor come from rows of fine dots (or thin lines) of internal phosphor coating—actually three different phosphor blends that separately create red, green, and blue. These dots are repeatedly excited by three identical colorless beams of electrons. If these beams stray from their intended paths across the phosphor coating, you get **misconvergence**—a rainbow outline around on-screen objects.

If a monitor has external convergence controls or if you have access to a skilled technician, then misconvergence won’t be a problem—one reason why it pays to buy from a reputable dealer. Nearly all the monitors we tested had acceptable misconception levels, but the Relax Ikegami DM2060 and the PCPCII 19” Color could stand improvement.

**Color tracking** is a measure of how well all three electron beams deliver exactly the same intensity on-screen (see the “Color Tracking and Gray Linearity” sidebar). Furthermore, if a monitor always displays gray objects in the correct shade between black and white, the monitor has perfect gray...
Color Display Systems

linearity as well as perfect color tracking. We measured color tracking and gray linearity with our Minolta TV Analyzer, looking for any differences between measured red, green, and blue intensity on-screen versus what the Mac intended. All the monitors showed good color tracking.

Nuisance Notes

Video cards may look similar, but different engineering approaches can result in differences in bandwidth, stability, and versatility. We evaluated monitors for nuisances associated with card design — such as flicker, jitter, and noise. We’re happy to report that none of the systems displayed any nuisance worth noting.

Flicker, which is most perceptible in peripheral vision and is thus a problem with large-screen monitors, was almost nonexistent on the displays we tested. All the cards, except the card provided with the PCPC II 19” Color, had a vertical-scan (refresh) rate greater than 65 hertz, and most have settled on the 75-hertz standard — where flicker is nearly imperceptible.

Software

Radius created some of the first screen-utility software and continues to sell what many users consider the most-versatile software on the market. However, other vendors now offer software with similar goodies: tear-off or expanded menus, enlarged cursors, screen savers, and panning (the entire screen acts like a sliding window over an oversize “virtual screen”) and zooming (enlargement/reduction). The extra memory available on video cards means that some systems let you create amazingly large virtual screens — if you’re not in 24-bit-color mode. To provide similar functionality, PCPC bundles Berkeley Systems’ Stepping Out II software with its systems, but this software approach is not as fast or

Feature-Table Criteria

List price (system) — The vendor’s suggested price for a complete system (monitor, NuBus board, cables, software), for the monitor only, and for the board only.

Street price (system) — The complete system price at dealers surveyed across the U.S. in early February 1991 or through mail order.

Tube type, phosphor — The monitor tube’s type and phosphor coating selected for the screen.

Overall/active screen size — The distance from one corner to the opposite corner on the exposed glass face of the monitor (overall) and the same distance for the actual screen image (active).

Active screen area — The width and height of the actual screen image.

Screen dimensions — The number of dots (pixels) displayed on the screen, counting horizontally and vertically.

Screen resolution — The number of pixels per inch. measured horizontally.

Color modes — The number of potential different screen colors available at different bit depths.

Vert-scan rate — Also called the refresh rate. How fast, in cycles per second (hertz), the screen is redrawn from top to bottom. 65 hertz is considered sufficient to eliminate flicker.

Horiz-scan rate — How many lines of pixels can be written on the screen per second, in thousands.

Bandwidth — A factor governing the speed with which monitors can switch electron beams on and off. Monitors with high pixel density need high bandwidth to maintain sharpness.

Power consumption — The separate electrical-power requirements (in watts) of the monitor and the video board.

Antiglare treatment — A coating or transparent panel on the monitor screen designed to eliminate or diffuse reflected light.

Controls — Monitors can have external dials or buttons to adjust screen brightness, contrast, vertical and horizontal position and size of the image, de-gaussing, and vertical and horizontal convergence.

Case (W x H x D, in.) — In inches, the outside width, height, and depth of the monitor’s plastic shell.

Software — 24-bit systems often come with special hardware capabilities or bundled software.

NuBus block transfer — To speed up monitor screen updates, some video and accelerator boards can transfer QuickDraw information in large blocks.
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THE ART & SCIENCE OF COLOR™
The Bottom Line

Professional, affordable 24-bit color is available from these winners (clockwise from upper left): the Seiko Instruments 14" Color, the E-Machines ColorPage T16, the SuperMac (Sony) 19", and the Macintosh Display Card 8•24 ac and 8•24.

A true-color, 24-bit-color display system should provide a crisp, accurate rendering of scanned photos or Mac-generated artwork. This basic requirement is certainly met by the 20 systems we tested: Among the 17 Trinitron- and 2 Hitachi-tube monitors as well as the 1 with the Ikegami shadow-mask tube (from Relax), there isn't a bad display package in the bunch.

We're the most impressed by all the systems from E-Machines, especially the E-Machines ColorPage T16 ($5,190)—our overall pick. It provides professional 24-bit quality at an attractive price. The E-Machines TX/24 ($5,190) was also of superior quality, despite its non-WYSIWYG high dot density. Other good 16-inch Trinitrons come from PCPC and MegaGraphics.

For the budget-minded, the Seiko Instruments 14" Color system ($1,644) offers great performance at very affordable street prices; we only wish that its video board supported 16-bit color and NuBus block transfer. Either the Macintosh Display Card 8•24 or the Macintosh Display Card 8•24 ac (accelerated) board is a great buy with Apple's small but razor-sharp 13-inch AppleColor Hi-Res RGB Display (system list $1,789 and $2,998, respectively). The 8•24 ac board is by far the fastest video board we tested.

We thought the Mirror ProView/24 ($3,997), a 19-inch Ikegami Trinitron with excellent software, was a real bargain. Another system with matching quality and street price was the sharp SuperMac (Sony) 19" ($7,199). For high-end graphics, you should take a look at the SuperMac (Hitachi) 21" ($8,399). A top-quality monitor, acceleration, and the optional calibration hardware/software make this a very desirable package. SuperMac's just-released 19" Dual-Mode Trinitron Display (see the "On the Horizon" sidebar) should also appeal to graphics pros.

Who's the Fairest of Them All?

As much as we like to pick out only the best and leave the rest, we liked all the display systems. Our general impression is that buyers can't go wrong with any of these products—although several are especially good for specific tasks. Dividing them roughly into groups, first are the small 13- and 14-inch Trinitron monitors, which cost less than $2,000, including a 24-bit card. Next come the 16-inch Trinitrons, which cost you another grand or two; these offer a little more usable screen area (and if you can live with a compressed dot density, a lot more information on-screen). Then come the excellent 19- and 20-inch Trinitrons from Sony or Ikegami. The attractively priced Relax Ikegami DM2060 20" monitor scored lowest, but that's in a field of winners. Relax also sells an Ikegami/Sony 19" Trinitron.

If you still demand the original 19" Sony Trinitron, you'll find good ones (see the "Bottom Line" sidebar). However, for serious graphic artists, we also suggest a look at the new 19- and 21-inch Hitachi monitors sold by SuperMac (and soon by Radius and others). If your budget allows, consider either the Radius PrecisionColor or the SuperMac SuperMatch calibration systems and be prepared to spend the extra bucks for an accelerated video card. A fast state-of-the-art color display system may cost several thousand dollars, but you'll end up with something that's easy on your eyes, accurate, and highly productive.

Andrew Eisner, director of MacUser Labs, occasionally suffers from misconvergence but has never been known to flicker.
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# Color Display Systems

## Table 1: Features of Color Display Systems

<table>
<thead>
<tr>
<th></th>
<th>Apple Display 8×24</th>
<th>Apple Display 8×24 as:</th>
<th>E-Machines ColorPage T16</th>
<th>E-Machines T19</th>
<th>E-Machines TX24</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>List price (system)</strong></td>
<td>$1,798</td>
<td>$2,998</td>
<td>$5,190</td>
<td>$7,990</td>
<td>$5,190</td>
</tr>
<tr>
<td>Monitor only</td>
<td>$998 (AppleColor)</td>
<td>$2,998 (AppleColor)</td>
<td>$5,190</td>
<td>$7,990</td>
<td>$5,190</td>
</tr>
<tr>
<td>Board only (NuBus)</td>
<td>$799</td>
<td>$1,999</td>
<td>$3,195</td>
<td>$3,195</td>
<td>$3,195</td>
</tr>
<tr>
<td><strong>Street price (system)</strong></td>
<td>$1,448</td>
<td>$2,098</td>
<td>$4,150</td>
<td>$5,400</td>
<td>$4,150</td>
</tr>
<tr>
<td><strong>Cons</strong></td>
<td>Small screen. No glare protection.</td>
<td>Small screen. No glare protection.</td>
<td>No OCLI glare protection.</td>
<td>Slight streaking at bottom of active area.</td>
<td>Not WYSIWYG.</td>
</tr>
</tbody>
</table>

### Monitor Specifications

<table>
<thead>
<tr>
<th>Tube type, phosphor</th>
<th>Sony Trinitron, P22</th>
<th>Sony Trinitron, P22</th>
<th>Sony Trinitron, P22</th>
<th>Sony Trinitron, P22</th>
<th>Sony Trinitron, P22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall/active screen</td>
<td>13×11.5-in. diag.</td>
<td>13×11.5-in. diag.</td>
<td>16×14.5-in. diag.</td>
<td>19×17.25-in. diag.</td>
<td>16×15-in. diag.</td>
</tr>
<tr>
<td>Active screen area</td>
<td>9.5×7 in.</td>
<td>9.5×7 in.</td>
<td>11.75×8.75 in.</td>
<td>13.5×10.75 in.</td>
<td>11.75×9.25 in.</td>
</tr>
<tr>
<td>Screen dimensions</td>
<td>640×480 pixels</td>
<td>640×480 pixels</td>
<td>832×624 pixels</td>
<td>1,024×808 pixels</td>
<td>1,024×808 pixels</td>
</tr>
<tr>
<td>Screen resolution</td>
<td>69 dpi</td>
<td>69 dpi</td>
<td>72 dpi</td>
<td>76 dpi</td>
<td>87 dpi</td>
</tr>
<tr>
<td>Vert.-scan rate</td>
<td>66.7 Hz</td>
<td>66.7 Hz</td>
<td>66.9 Hz</td>
<td>71.3 Hz</td>
<td>72 Hz</td>
</tr>
<tr>
<td>Horiz.-scan rate</td>
<td>35 kHz</td>
<td>35 kHz</td>
<td>44.9 kHz</td>
<td>60.2 kHz</td>
<td>60 kHz</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>23 MHz</td>
<td>23 MHz</td>
<td>100 MHz</td>
<td>100 MHz</td>
<td>100 MHz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>160 W, board, 7 W</td>
<td>160 W, board, 20 W</td>
<td>253 W, board, 9.5 W</td>
<td>286 W, board, 9.5 W</td>
<td>286 W, board, 9.5 W</td>
</tr>
<tr>
<td>Antiglare treatment</td>
<td>none</td>
<td>none</td>
<td>OCLI</td>
<td>OCLI</td>
<td>OCLI</td>
</tr>
</tbody>
</table>

### Controls

| Brightness/contrast   | side/side            | side/side            | internal/front        | internal/front        | internal/front        |
| Vert. position/size   | rear/rear            | rear/rear            | front/internal        | front/internal        | front/internal        |
| Horiz. position/size  | rear/rear            | rear/rear            | internal/internal     | internal/internal     | internal/internal     |
| Degaussing            | rear button           | rear button          | auto at power-up      | auto at power-up      | auto at power-up      |
| Vert/horiz. convergence| rear/rear            | rear/rear            | front/front            | front/front            | front/front            |

### Other

| Case (W×D×H, in.)     | 13.75×11.75×15.75   | 13.75×11.75×15.75   | 16×15×18.75           | 16×15×18.75           | 16×15×18.75           |
| Weight               | 34 lb                | 34 lb                | 58.4 lb               | 86 lb                | 60 lb                |
| Tilt/swivel stand     | optional             | optional             | yes                   | yes                  | yes                  |
| Software              | gamma correction     | gamma correction     | brightness/contrast   | brightness/contrast   | brightness/contrast   |
|                      | QuickDraw acceleration| QuickDraw acceleration| adjust, screen dimmer, big menus | adjust, screen dimmer, big menus | adjust, screen dimmer, big menus |
| NuBus block transfer  | yes                   | yes                   | yes                   | yes                  | yes                  |
| Warranty              | 1 year               | 1 year               | 1 year (extendable)   | 1 year (extendable)   | 1 year (extendable)   |

### Company

- **Apple Computer, Inc.**
  - 20525 Mariani Ave.
  - Cupertino, CA 95014
  - (408) 996-1010
- **Apple Computer, Inc.**
  - 20525 Mariani Ave.
  - Cupertino, CA 95014
  - (408) 996-1010
- **E-Machines, Inc.**
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  - Beaverton, OR 97005
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## Table 1: Features of Color Display Systems, continued

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>List price (system)</strong></td>
<td>$6,299</td>
<td>$6,799</td>
<td>$6,148</td>
<td>$3,967</td>
<td>$7,490</td>
</tr>
<tr>
<td>Monitor only</td>
<td>NA</td>
<td>$1,999</td>
<td>$4,349</td>
<td>NA</td>
<td>$3,995</td>
</tr>
<tr>
<td>Board only (NuBus)</td>
<td>$2,699</td>
<td>$4,799</td>
<td>$4,799</td>
<td>$1,797</td>
<td>$3,995</td>
</tr>
<tr>
<td><strong>Street price (system)</strong></td>
<td>$4,095</td>
<td>$4,999</td>
<td>$5,995</td>
<td>$3,997</td>
<td>$7,490</td>
</tr>
<tr>
<td><strong>Cons</strong></td>
<td>Convergence slightly off.</td>
<td>Not WYSIWYG.</td>
<td>Above-average price.</td>
<td>Geometry slightly off.</td>
<td>High price.</td>
</tr>
<tr>
<td><strong>Monitor specifications</strong></td>
<td>ikegami Trinitron, P22</td>
<td>Sony Trinitron, P22</td>
<td>Sony Trinitron, P22</td>
<td>ikegami Trinitron, P22</td>
<td>ikegami Trinitron, P22</td>
</tr>
<tr>
<td>Overall/active screen</td>
<td>30-17.75-in. diag.</td>
<td>20-17.75-in. diag.</td>
<td>19-17.5-in. diag.</td>
<td>19-17.5-in. diag.</td>
<td>19-17.8-in. diag.</td>
</tr>
<tr>
<td>Active screen area</td>
<td>14.25 x 10.75 in.</td>
<td>11.75 x 9.5 in.</td>
<td>13.75 x 11 in.</td>
<td>14.25 x 10.75 in.</td>
<td>14 x 11 in.</td>
</tr>
<tr>
<td>Screen dimensions</td>
<td>1,024 x 768 pixels</td>
<td>1,024 x 826 pixels</td>
<td>1,024 x 826 pixels</td>
<td>1,024 x 768 pixels</td>
<td>1,024 x 768 pixels</td>
</tr>
<tr>
<td>Screen resolution</td>
<td>72 dpi</td>
<td>88 dpi</td>
<td>72 dpi</td>
<td>72 dpi</td>
<td>72 dpi</td>
</tr>
<tr>
<td>Vert.-scan rate</td>
<td>75 Hz</td>
<td>96 Hz</td>
<td>75 Hz</td>
<td>75 Hz</td>
<td>75 Hz</td>
</tr>
<tr>
<td>Horiz.-scan rate</td>
<td>50 kHz</td>
<td>60 kHz</td>
<td>60 kHz</td>
<td>60 kHz</td>
<td>60 kHz</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>80 MHz</td>
<td>100 MHz</td>
<td>60 kHz</td>
<td>80 MHz</td>
<td>80 kHz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>150 W; board, 20 W</td>
<td>150 W; board, 20 W</td>
<td>150 W; board, 20 W</td>
<td>150 W; board, 20 W</td>
<td>150 W; board, 20 W</td>
</tr>
<tr>
<td>Antiglare treatment</td>
<td>OCLI</td>
<td>OCLI</td>
<td>OCLI</td>
<td>OCLI</td>
<td>OCLI</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td>front/front</td>
<td>internal/internal</td>
<td>internal/internal</td>
<td>front/front</td>
<td>front/front</td>
</tr>
<tr>
<td>Brightness/contrast</td>
<td>side/side</td>
<td>side/side</td>
<td>side/side</td>
<td>side/side</td>
<td>side/side</td>
</tr>
<tr>
<td>Horiz. position/size</td>
<td>side/side</td>
<td>side/side</td>
<td>side/side</td>
<td>side/side</td>
<td>side/side</td>
</tr>
<tr>
<td>Vert. position/size</td>
<td>side/side</td>
<td>side/side</td>
<td>side/side</td>
<td>side/side</td>
<td>side/side</td>
</tr>
<tr>
<td>Deglazing</td>
<td>side button</td>
<td>auto at power-up</td>
<td>auto at power-up</td>
<td>side button</td>
<td>side button</td>
</tr>
<tr>
<td>Vert./horiz. convergence</td>
<td>side/side</td>
<td>front/front</td>
<td>front/front</td>
<td>side/side</td>
<td>side/side</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>Case (W x H x D, in.)</td>
<td>19 x 19.5 x 21</td>
<td>19 x 19.5 x 21</td>
<td>19 x 19.5 x 21</td>
<td>19 x 19.5 x 21</td>
</tr>
<tr>
<td>Weight (pounds)</td>
<td>35 lb</td>
<td>59.4 lb</td>
<td>95 lb</td>
<td>79 lb</td>
<td>90 lb</td>
</tr>
<tr>
<td>Tilt/swivel stand</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Software</td>
<td>pop-up menus, screen saver &amp; capture, big cursor/menu</td>
<td>gamma correction, pan and zoom.</td>
<td>gamma correction, pan and zoom.</td>
<td>Desktop Designer Pro, big menu, screen saver, screen capture</td>
<td>gamma correction, pan and zoom.</td>
</tr>
<tr>
<td>NuBus block transfer</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Warranty</td>
<td>1 year</td>
<td>1 year, 3-year option</td>
<td>1 year, 3-year option</td>
<td>1 year</td>
<td>1 year (extendable)</td>
</tr>
<tr>
<td>Company</td>
<td>Generation Systems 1185-C Bordeaux Dr. Sunnyvale, CA 91407 (800) 325-5511 (408) 734-2103</td>
<td>MegaGraphics, Inc. 343 Cale San Pablo Camarillo, CA 93010 (800) 487-6342 (805) 484-3799</td>
<td>MegaGraphics, Inc. 343 Cale San Pablo Camarillo, CA 93010 (800) 487-6342 (805) 484-3799</td>
<td>Mirror Technologies 2644 Patton Rd. Roseville, MN 55513 (800) 654-3294</td>
<td>Moniter Corp. 5740 Green Circle Dr. Minitexico, MN 55343 (800) 993-5740 info (800) 343-4969, support</td>
</tr>
</tbody>
</table>
In one fell swoop, Radius has brought Mach 10 speed to Mac II computers. At the center of it all is a powerful, easily installed NuBus accelerator board aptly named the Rocket. The Rocket is fast: up to three times faster than a Mac IIx, up to six times faster than a regular Mac II, and when matched with a Radius display system, up to 50 times faster with certain applications. The Rocket is smart; multiprocessing enables your Mac motherboard to handle all input/output operations while the Rocket’s Motorola 68040™ goes to town. And the Rocket is powerful: capable of 25 MIPS and 3.6 MFLOPS, the Rocket blows away the Sparstation 1 and 486 PC’s. And with on-board QuickDraw and display-list processing acceleration for color publishing and CAD/CAM, you’ll just have to see it to believe it.

Which you can do by calling us at (800) 227-2795. Then see what it’s really like to have the power to be your best.

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Now you can let your imagination run wild. At a very conservative price. Because Tektronix introduces the first color printer that is PostScript-compatible for less than $5000.

The Phaser II SX is great for individuals or small groups. It works with Windows 3.0 or Macintosh QuickDraw and is software-based PostScript-compatible. It also delivers brilliant 300 dpi thermal-wax color as only Tektronix printers can.

For bigger businesses, we offer the new Phaser II PX. This printer is hardware-based PostScript-compatible with HP-GL and is licensed by Pantone, Inc. It also works with Macs, PCs, and UNIX workstations. All at once.

Now, say you buy an SX, your business grows, and you end up wishing you'd gotten the PX. No
need to worry because all Tektronix printers are upgradable so you'll never outgrow them.

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Tektronix®
The best and the brightest.

Please circle 47 on reader service card.
### Table 1: Features of Color Display Systems, continued

<table>
<thead>
<tr>
<th>Display System</th>
<th>PCPC II 16&quot; Color</th>
<th>PCPC II 19&quot; Color</th>
<th>Radius DirectColor/24</th>
<th>RasterOps 24L</th>
<th>Relax Ikegami DM2060</th>
</tr>
</thead>
<tbody>
<tr>
<td>List price (system)</td>
<td>$3,495</td>
<td>$4,995</td>
<td>$7,890</td>
<td>$8,190</td>
<td>$5,249</td>
</tr>
<tr>
<td>Monitor only</td>
<td>NA</td>
<td>$3,855</td>
<td>NA</td>
<td>$3,995</td>
<td>NA</td>
</tr>
<tr>
<td>Board only (NuBus)</td>
<td>$1,995</td>
<td>$1,995</td>
<td>$3,535</td>
<td>$3,977</td>
<td></td>
</tr>
<tr>
<td>Street price (system)</td>
<td>$3,495</td>
<td>$4,995</td>
<td>$5,250</td>
<td>$6,389</td>
<td>$3,999</td>
</tr>
<tr>
<td>Pros</td>
<td>Sharp; Good color; Inexpensive; Includes Stepping Out II.</td>
<td>Moderate price; Includes Stepping Out II.</td>
<td>Good color; Versatile software.</td>
<td>Good color; Versatile software.</td>
<td>Low price for 20-inch monitor.</td>
</tr>
<tr>
<td>Monitor specifications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tube type, phosphors</td>
<td>Sony Trinitron, P22</td>
<td>Ikegami Trinitron, P22</td>
<td>Sony Trinitron, P22</td>
<td>Sony Trinitron, P22</td>
<td>Ikegami shadow mask, P22</td>
</tr>
<tr>
<td>Overall active screen</td>
<td>16&quot;/14.5-in. diag.</td>
<td>19&quot;/17.75-in. diag.</td>
<td>19&quot;/17.75-in. diag.</td>
<td>19&quot;/17.75-in. diag.</td>
<td>20&quot;/19.5-in. diag.</td>
</tr>
<tr>
<td>Active screen area</td>
<td>11.75 x 8.75 in.</td>
<td>14.5 x 10.5 in.</td>
<td>14 x 10.75 in.</td>
<td>13.5 x 11.0 in.</td>
<td>14.25 x 10.5 in.</td>
</tr>
<tr>
<td>Screen dimensions</td>
<td>1,024 x 768 pixels</td>
<td>1,024 x 768 pixels</td>
<td>1,152 x 882 pixels</td>
<td>1,024 x 768 pixels</td>
<td>1,024 x 768 pixels</td>
</tr>
<tr>
<td>Screen resolution</td>
<td>82 dpi</td>
<td>72 dpi</td>
<td>82 dpi</td>
<td>72 dpi</td>
<td>72 dpi</td>
</tr>
<tr>
<td>Color modes</td>
<td>2/4/16/256/1x1x1</td>
<td>2/4/16/256/1x1</td>
<td>2/256/1x1x1</td>
<td>2/4/16/256/1x1</td>
<td>2/256/1x1</td>
</tr>
<tr>
<td>Vert.-scan rate</td>
<td>75 Hz</td>
<td>60 Hz (56 Hz, Max. 91)</td>
<td>71 Hz</td>
<td>75 Hz</td>
<td>75 Hz</td>
</tr>
<tr>
<td>Horiz.-scan rate</td>
<td>60 kHz</td>
<td>60 kHz (60 kHz, Max. 61)</td>
<td>66 kHz</td>
<td>60 kHz</td>
<td>60 kHz</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>80 MHz</td>
<td>100 MHz</td>
<td>100 MHz</td>
<td>100 MHz</td>
<td>100 MHz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>240 W; board, 8.75 W</td>
<td>220 W; board, 8.75 W</td>
<td>220 W; board, 20 W</td>
<td>330 W; board, 10.5 W</td>
<td>150 W; board, 20 W</td>
</tr>
<tr>
<td>Antiglare treatment</td>
<td>OCLI</td>
<td>OCLI</td>
<td>OCLI</td>
<td>OCLI</td>
<td>OCLI</td>
</tr>
<tr>
<td>Controls</td>
<td>Brightness/contrast</td>
<td>internal/front</td>
<td>front/front</td>
<td>internal/front</td>
<td>front/front</td>
</tr>
<tr>
<td>Vert. position/size</td>
<td>front/external</td>
<td>side/side</td>
<td>front/external</td>
<td>side/side</td>
<td>side/side</td>
</tr>
<tr>
<td>Horiz. position/size</td>
<td>internal/internal</td>
<td>side/internal</td>
<td>internal/internal</td>
<td>side/internal</td>
<td>side/internal</td>
</tr>
<tr>
<td>Desugging</td>
<td>auto at power-up</td>
<td>side button</td>
<td>auto at power-up</td>
<td>side button</td>
<td>auto at power-up</td>
</tr>
<tr>
<td>Vert./horiz. convergence</td>
<td>front/front</td>
<td>side/side</td>
<td>front/front</td>
<td>side/side</td>
<td>side/side</td>
</tr>
<tr>
<td>Other</td>
<td>Case (W x H x D, in.)</td>
<td>19 x 19 x 21</td>
<td>19 x 19 x 21</td>
<td>19 x 19 x 21</td>
<td>19 x 19 x 21</td>
</tr>
<tr>
<td>Weight</td>
<td>85 lb</td>
<td>85 lb</td>
<td>85 lb</td>
<td>84 lb</td>
<td>85 lb</td>
</tr>
<tr>
<td>Tilt/sweevel stand</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Software</td>
<td>Stepping Out II (software for pan and zoom)</td>
<td>Stepping Out II (software for pan and zoom)</td>
<td>tear-off/big menus, screen saver, capture, auto-center dialog</td>
<td>gamma-correction DA, pop-up menus, pan and zoom adjust</td>
<td>gamma correction, pan and zoom</td>
</tr>
<tr>
<td>NuBus block transfer</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Warranty</td>
<td>1 year</td>
<td>1 year</td>
<td>1 year</td>
<td>1 year</td>
<td>1 year</td>
</tr>
<tr>
<td>Company</td>
<td>PCPC 4710 Eisenhower Blvd. Tampa, FL 33654 (813) 884-3692</td>
<td>PCPC 4710 Eisenhower Blvd. Tampa, FL 33634 (810) 822-2888 (813) 884-3092</td>
<td>Radius, Inc. 1710 Fortune Dr. San Jose, CA 95131 (800) 227-0275 (408) 434-1010</td>
<td>RasterOps 2550 Walsh Ave. Santa Clara, CA 95051 (408) 552-4200</td>
<td>Relax Technology 3101 Whipple Rd., #22 Union City, CA 94587 (800) 848-1313 (415) 471-6112</td>
</tr>
</tbody>
</table>
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As Easy As “Print.”

If you know how to use a laser printer, you know how to use ColorFast. Simply select the ColorFast driver in the Chooser and you’re ready to go. Design your presentation using your favorite software — Microsoft® PowerPoint, Aldus Persuasion, you name it. Then, select “print” and you’ll be amazed.

What you see on the screen will be transformed into beautiful, 32-bit color slides, transparencies, or prints, at a fraction of what service bureaus charge. The average production cost with ColorFast is just 75¢ per 35mm slide. So, you reduce your costs up to 94%, without sacrificing any quality.

Incredible Quality, Fast.

ColorFast uses the newest technology from Polaroid,® the undisputed leader in digital film recording. This results in incredible colors, generated by our 33-bit (11 bits per color) pixel recording. To that we’ve added our imaging software (including outline fonts), so you get true “Professional-quality,” at a full 4K resolution. There is also a faster “High-quality,” 2K resolution and a quick 1K “Draft” mode. You can even use our “Enhanced Color Resolution” software option to get 4K results at 2K speed.

And because the typical business slide takes only two minutes, what you see on your Macintosh can be on the presentation screen almost instantly. Which means you can make those last minute decisions and changes without sacrificing the quality of your presentation. Or a major chunk of your budget.

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800-422-7777.

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### Table 1: Features of Color Display Systems, continued

<table>
<thead>
<tr>
<th>Monitor</th>
<th>Seiko Instruments 14&quot; Color</th>
<th>Sigma Designs ColorMAX 8/24</th>
<th>SuperMac (Hitachi) 19&quot;</th>
<th>SuperMac (Hitachi) 21&quot;</th>
<th>SuperMac (Sony) 19&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>List price (system)</td>
<td>$1,544</td>
<td>$6,995</td>
<td>$6,799</td>
<td>$8,399</td>
<td>$7,199</td>
</tr>
<tr>
<td>Monitor only</td>
<td>$899</td>
<td>$4,299</td>
<td>$2,800</td>
<td>$4,400</td>
<td>$4,290</td>
</tr>
<tr>
<td>Board only (NuBus)</td>
<td>$745 (RasterOps 264)</td>
<td>$1,739</td>
<td>$3,999 (Spectrum24 PDE)</td>
<td>$3,999 (Spectrum24 PDE)</td>
<td>$2,999 (Series III)</td>
</tr>
<tr>
<td>Street price (system)</td>
<td>$390</td>
<td>$4,290</td>
<td>$4,275</td>
<td>$4,844</td>
<td>$4,212</td>
</tr>
<tr>
<td>Pros</td>
<td>Great value, quality, complete controls.</td>
<td>Low price, sharp, good focus, no flicker.</td>
<td>Excellent value, very fast QuickDraw.</td>
<td>Excellent value, very fast QuickDraw.</td>
<td>Great value, very sharp, fast.</td>
</tr>
</tbody>
</table>

#### Monitor Specifications

<table>
<thead>
<tr>
<th>Tube type, phosphor</th>
<th>Seiko Trinitron, P22</th>
<th>Sony Trinitron, P22</th>
<th>Hitachi Invar mask, P22</th>
<th>Hitachi Invar mask, P22</th>
<th>Sony Trinitron, P22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall active screen</td>
<td>14/13.5 in. diag.</td>
<td>19/18 in. diag.</td>
<td>19/17.5 in. diag.</td>
<td>19/17.5 in. diag.</td>
<td>19/17.5 in. diag.</td>
</tr>
<tr>
<td>Active screen area</td>
<td>9.5 x 7.25 in.</td>
<td>14.6 x 10.75 in.</td>
<td>14.6 x 10.75 in.</td>
<td>14.6 x 10.75 in.</td>
<td>14.6 x 10.75 in.</td>
</tr>
<tr>
<td>Screen dimensions</td>
<td>640 x 480 pixels</td>
<td>1,024 x 768 pixels</td>
<td>1,024 x 768 pixels</td>
<td>1,024 x 768 pixels</td>
<td>1,024 x 768 pixels</td>
</tr>
<tr>
<td>Screen resolution</td>
<td>72 dpi</td>
<td>72 dpi</td>
<td>72 dpi</td>
<td>72 dpi</td>
<td>72 dpi</td>
</tr>
<tr>
<td>Color modes</td>
<td>24/16/256/mill</td>
<td>24/16/256/mill</td>
<td>24/16/256/mill</td>
<td>24/16/256/mill</td>
<td>24/16/256/mill</td>
</tr>
<tr>
<td>Vert. scan rate</td>
<td>60.7 Hz</td>
<td>75 Hz</td>
<td>75 Hz</td>
<td>75 Hz</td>
<td>75 Hz</td>
</tr>
<tr>
<td>Horiz. scan rate</td>
<td>35 kHz</td>
<td>64 kHz</td>
<td>60.24 kHz</td>
<td>68.68 kHz</td>
<td>60.24 kHz</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>25 MHz</td>
<td>100 MHz</td>
<td>80 MHz</td>
<td>100 MHz</td>
<td>80 MHz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>150 W, board, 10.5 W</td>
<td>229 W, board, 19 W</td>
<td>135 W, board, 16.8 W</td>
<td>140 W, board, 16.8 W</td>
<td>220 W, board, 18.75 W</td>
</tr>
<tr>
<td>Antiglare treatment</td>
<td>none</td>
<td>OCLI</td>
<td>Asahi anti-reflection</td>
<td>Asahi anti-reflection</td>
<td>Asahi anti-reflection</td>
</tr>
</tbody>
</table>

#### Controls

<table>
<thead>
<tr>
<th>Brightness/contrast</th>
<th>side/side</th>
<th>internal/front</th>
<th>front/front</th>
<th>front/front</th>
<th>internal/front</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vert. position/size</td>
<td>rear/rear</td>
<td>front/internal</td>
<td>internal/internal</td>
<td>internal/internal</td>
<td>front/internal</td>
</tr>
<tr>
<td>Horiz. position/size</td>
<td>rear/rear</td>
<td>internal/internal</td>
<td>internal/internal</td>
<td>internal/internal</td>
<td>internal/internal</td>
</tr>
<tr>
<td>Degreasing</td>
<td>auto at power-up</td>
<td>auto at power-up</td>
<td>auto at power-up</td>
<td>auto at power-up</td>
<td>auto at power-up</td>
</tr>
<tr>
<td>Vert/hori. convergence</td>
<td>front/front</td>
<td>internal/internal</td>
<td>internal/internal</td>
<td>internal/internal</td>
<td>front/front</td>
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</tbody>
</table>

#### Other

<table>
<thead>
<tr>
<th>Case (W x H x D, in.)</th>
<th>14 x 13.25 x 15.75</th>
<th>19 x 18.75 x 22.25</th>
<th>19.25 x 18.25 x 19.5</th>
<th>19 x 19 x 20</th>
<th>19 x 19 x 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>33 lb</td>
<td>85 lb</td>
<td>88 lb</td>
<td>70.4 lb</td>
<td>97 lb</td>
</tr>
<tr>
<td>Tilt/swivel stand</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Software</td>
<td>gamma correction</td>
<td>gamma correction</td>
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#### Company

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<th>SuperMac Technology</th>
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<td>1130 Ringwood Ct.</td>
<td>46501 Landing Frey</td>
<td>485 Potro Ave.</td>
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<td>San Jose, CA 95131</td>
<td>Fremont, CA 94538</td>
<td>Sunnyvale, CA 94086</td>
<td>Sunnyvale, CA 94086</td>
<td></td>
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<tr>
<td>(408) 922-5900</td>
<td>(415) 770-0100</td>
<td>(408) 245-2202</td>
<td>(408) 245-2202</td>
<td></td>
</tr>
</tbody>
</table>
Adapt to Changing Environments With Microtek's Color/Gray Scanner.

At last, a scanner that adapts to your changing needs. The Microtek MSF-300Z Color/Gray scanner reproduces everything from 24 bit color to 8 bit gray-scale to black and white line art. All at 300 dpi. Making it the one image capturing device that's ideal for desktop publishing, multimedia projects, presentations, even pre-press work.

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The Color/Gray Scanner is just one member of a whole family of innovative scanners available from Microtek.

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These five printers make color desktop publishing easy and high-quality presentations affordable.

BY
PAUL YI
AND THE
MACUSER LABS STAFF

EASY HARD COPY:
Color PostScript Printers

The first chapter of the desktop-publishing saga was printed in black-and-white on an Apple LaserWriter. Chapter 2 will be in full color. And although there isn’t a color LaserWriter — yet — there is a solution that works as seamlessly as the original LaserWriter: the thermal-wax color PostScript printer.

Although future color printers will probably use laser technology, today’s reigning king of color printing is the thermal-wax-transfer printer. This kind of printer doesn’t produce prints as gorgeous as the continuous-tone beauties from laser or dye-sublimation printers, but its ease of use, low media costs, and PostScript abilities have made it the workhorse of color printing (see Figure 1).

Thermal-wax-transfer printers occupy the middle ground of color printing. Other technologies can give you better-quality prints, but be prepared to spend much, much more for the honor of being on the cutting edge of color (see the “On the Horizon” sidebar). At the low end are color inkjet printers that sell for less than a third of the cost of thermal-wax printers. Although inkjet printers offer low-cost methods for performing personal color printing and producing simple business presentations, their image quality is not up to the demands of desktop publishing. Sophisticated business presentations — especially those that require bright, crisp transparencies — also demand quality higher than an inkjet printer can produce.
If you're a desktop publisher who uses color, you need a printer that can produce accurate comps — composite images that show, in colorful detail, what your page will include when it returns from the printing press. Of course, no desktop printer can match the color accuracy and high resolution of a professional printing press. Comps are an intermediate — although necessary — step in the color-desktop-publishing process.

None of the printers we tested are suitable for color proofing — the final step in checking a complex color image — because of low resolution and unpredictable colors. A color match-proof can cost $50 to $100, and it can take days to be processed by a service bureau. If perfection is not absolutely necessary, a print from a good PostScript thermal-wax printer can give you a usable preview. It's not proof quality, but at 50 cents a page and a few minutes per print, the thermal-wax advantage is obvious. And as Apple and third-party developers

**Figure 1: Color Printing**

Four-color separation  
Dye sublimation  
Color laser

**Figure 2: Printing Speed**

<table>
<thead>
<tr>
<th>Printer</th>
<th>Overall Speed</th>
<th>PostScript Graphic</th>
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<tr>
<td>NEC Colormate PS Model 80</td>
<td>Worse</td>
<td>Faster</td>
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<tr>
<td>Océ OcéColor</td>
<td>Better</td>
<td>Slower</td>
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<tr>
<td>QMS ColorScript 100 Model 10</td>
<td>Faster</td>
<td>Slow</td>
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<tr>
<td>Tektronix Phaser PX</td>
<td></td>
<td></td>
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<tr>
<td>Seiko ColorPoint PS</td>
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</tbody>
</table>

Overall Speed:
We tested how quickly each printer could handle typical color-printing chores. The NEC Colormate PS Model 80 was the fastest, with the Océ OcéColor a close second. Third was the other Adobe PostScript printer, the QMS ColorScript 100 Model 10. The two PostScript clones finished far behind, with the Tektronix Phaser PX edging the Seiko ColorPoint PS to stay out of last place. Look at the individual tests to see which results pertain to your own printing needs.

PostScript Graphic:
A complex PostScript graphic with colored fills and blends taxed each printer's processor. The illustration was originally created in Swivel 3D and imported and printed from Adobe Illustrator.
refine color calibration (the ability to include accurate color information in files), thermal-wax printers may solve the color half of the proof problem — even though their resolution will never be near that of a matchprint.

MacUser Labs looked at five PostScript thermal-wax-transfer printers for producing letter-sized printouts. One, the QMS ColorScript 100 Model 10, won our color-printer contest last May (see “Color on the Page,” May ’90, Buyer’s Guide page 56) and is the only repeat contender. It now faces much stiffer competition, however. Two other PostScript printers from last year — the Océ Graphics Océ 5232 CPS Color PS and the Tektronix Phaser CPS — have been upgraded to the Océ Graphics OcéColor and Tektronix Phaser PX. They’re joined by the NEC Technologies Colormate PS Model 80 and the Seiko Instruments ColorPoint PS.

As this report goes to press, Tektronix is introducing a new Phaser II line of thermal-wax printers — but
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Ronald E. Eberstein, President/CEO
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desktop Designer™ is a unique set of utilities that lets you custom configure your new display system. Until now, features like Pop-up Menus, Enlarged Cursor and Menubar, Screen Saver and Screen Copy were available only from Radius on systems costing twice the price. These important features are included with every Mirror Technologies display system!

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Make The Right Choice!

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Color Printers

don’t worry about our results and conclusions being obsolete. The new Phaser II line uses a similar engine and ribbon, so you can read our observations about the Phaser PX as an early look at the new Phaser II line.

New developments in the color-printer market include significant price reductions. The QMS ColorScript 100 Model 10 was the first to fall below the $10,000 mark, with a price of $9,995 — and it now lists for $1,000 less. Even with this price reduction, the ColorScript 100 ties with the NEC Colormate PS Model 80 and Océ OcéColor for the highest list prices. The Tektronix Phaser PX lists for $7,995, and the Seiko ColorPoint PS is even less than $7,000. With competition this fierce, expect significant savings in street prices (see Table 1).

Color RIPS

All five printers use PostScript as their PDL (page-description language) — the software that tells the printer’s engine, or printing element, how to make up a page. PostScript is the desktop PDL standard, producing high-quality text, graphics, and images. The combination of the PDL software in the printer’s ROM and the printer’s hardware processor is referred to as the RIP (raster-image processor). A PostScript printer RIPs a file that is sent from a Mac, freeing the Mac to do other tasks. A non-PostScript printer requires the Mac to RIP the page.

The extra responsibility of RIPping the page requires hefty processing muscle. The three Adobe PostScript RIPS and the Tektronix Phaser PX’s PostScript-compatible RIP run on Motorola 68020 microprocessors (the same chip that runs the Mac LC and the venerable Mac II), whereas the Seiko ColorPoint PS uses an Intel 80960 RISC (reduced-instruction-set computing) microprocessor.

Adobe developed PostScript and sells complete hardware/software RIPS to printer manufacturers. Some printer companies have reverse-engineered Adobe PostScript and have come up with their own PostScript-compatible RIPS. The Seiko ColorPoint PS and Tektronix Phaser PX use PostScript-compatible RIPS. These are the two least expensive printers, showing the economic advantage of not paying high royalties for Adobe PostScript.

The Seiko ColorPoint PS uses a third-party PostScript-compatible RIP from Phoenix Technologies called PhoenixPage. Tektronix has developed a proprietary PostScript-compatible RIP for use in the Phaser PX. This is the same RIP we tested in last year’s review of the Phaser CPS, the Phaser PX’s precursor.

The only compatibility problem we had last year with the Tektronix RIP was its incompatibility with Adobe Type 1 fonts, the standard fonts used by most PostScript users. Since then, Adobe has opened up the specification for Type 1 code, so most PostScript clones can now print Type 1 fonts, although some still can’t read hints (information that varies the shape of characters so that they look better at 300-dpi resolution and small sizes). A Linotronic imagesetter has a resolution of 1,270 or 2,540 dpi, so it doesn’t require special hinting to make small characters more legible.

The Tektronix PostScript clone can
To minimize the interference patterns — moirés — that result from overlaying four layers of dots, traditional printing rotates each layer. This approach creates groups of dots — rosettes — that the eye finds easy to blend, and it works well for high-resolution electronic prints such as those from Linotronic film. With 300-dpi printers, however, the rosettes become large and too noticeable and prints show irritating moirés.

A better way to print with low-resolution devices such as thermal-wax-transfer printers is to print the four color layers at the same angle, thus eliminating conspicuous rosettes.

now handle Type 1 fonts, but it still can’t interpret hints. Seiko’s Phoenix-Page, on the other hand, is fully compatible with Type 1 fonts, including hints. The three Adobe PostScript printers are fully compatible with Type 1 fonts, hints and all.

Thermal-Wax Technology
After a file is RIPed, it’s passed to the printer’s thermal-wax engine, where a thermal print head melts dots of colored wax (supplied on ribbons). The wax is then transferred by mechanical pressure onto smooth paper between the print head and a platen roller. The paper is peeled away, the unmelted wax remains on the ribbon, and the melted wax sticks to the paper. A mirror image of the printout always remains on the ribbon after the printout is completed, so if you’re dealing with sensitive data, be sure to dispose of used ribbon in an appropriate manner so a simple mirror won’t become a window to your secrets.

After wax of one color has been transferred to the paper, the print engine grabs the trailing edge of the paper and pulls it back for two or three more color passes. Ribbons come on rolls with alternating sheets of three or four colors: cyan, magenta, yellow, and sometimes black. Black — a combination of cyan, magenta, and yellow — can be used as a fourth primary to add emphasis and image definition. Four of the printers use a four-color ribbon; the Tektronix Phaser PX uses a three-color ribbon.

You need only the three primary colors to create millions of colors (see the “How It Works: Color on the Page” sidebar). All traditional color printing uses this three-color model — for example, every color photo in this magazine is made up of small dots of the three primary colors plus black. The dots are printed in patterns called screens in a process called halftoning. Your eye blends the screens into a full-color image.

The major problem with the use of screens is interference patterns called moirés. To minimize moirés, the four color halftone screens are traditionally printed at angles — usually 45, 75, 90, and 105 degrees — to each other. The rotation creates a pattern of colored dots that works well to create the illusion of a full-color image. Although this works beautifully for high-resolution film, 300-dpi thermal-wax printers have a harder time making the illusion work.

The problem is that for rotated halftone screening to work, each dot must be imperceptible. With 300-dpi thermal-wax printing, however, the dots are relatively large, so moirés remain a problem. At this resolution, a better approach is to print each of four half-tone screens at the same angle to alleviate moirés (see the “How It Works: Color on the Page” sidebar).

The NEC Colormate PS Model 80 uses the default PostScript rotated-halftone-screen angles. The Océ OcéColor and the QMS ColorScript 100 offer either rotated screens or same-angle screens. The Seiko ColorPoint PS has its own proprietary halftoning that uses same-angle screens but also offers an emulation of PostScript rotated halftoning. The Tektronix Phaser PX uses same-angle screens in its proprietary halftoning method.
2. As the photo is scanned, viewed on-screen, and then printed, its color gamut keeps changing and shrinking. A scanner tries to mimic human color vision but doesn't do a great job. A monitor then takes the RGB values of the scanned image from the Mac and attempts to display what it can. When the photo is printed, things get much worse. The dyes and technology just can't produce a large gamut.

1. The CIE color-space graphs show each device's color gamut — all the colors it can reproduce. The original slide photo has a large gamut. The combination of the dyes and the sensitivity of the film make color photos look bright, saturated, and realistic.
3. When the original photo finally appears in print — after enduring further modification in the four-color-separation process — its color gamut has shrunk considerably.

Color on the Mac is not WYSIWYG. What you see on your monitor may or may not be what comes out of your printer, because the millions of colors that 32-bit QuickDraw lets you use have no objective definitions. Scanners, monitors, and printers can digitize, display, and print millions of colors, but the color you get at each stage is different. Mac color is device-dependent, and — unfortunately — different devices produce different colors.

If Mac color is ever to be consistently predictable, color values have to be specified in an objective, device-independent way. At present, Mac colors are specified by the Apple Color Picker, which unfortunately doesn’t tell you what the real colors are. The values it specifies are different from monitor to monitor and from printer to printer.

There is, however, an internationally accepted way, called the CIE color space, to name colors objectively. Instruments calibrated to CIE specifications can accurately and consistently report back the CIE coordinates for any color. And systems based on CIE data are currently available for the Mac. Tektronix’s TekColor Picker, a replacement for Apple’s Color Picker, is based on a CIE-derived objective color space and accurately matches monitor and printer colors. SuperMac has incorporated TekColor into its SuperMatch system, providing consistency for SuperMac monitors and some color printers. Kodak has announced a color format called YCC, which calibrates electronic images by using CIE-based data. Kodak has also announced plans for creating a total color definition, using the CIE color space.

Although this is all good news for color users, the Mac still needs a system-level color-definition method that can integrate these proprietary approaches and link the color process seamlessly and easily. The three companies mentioned have formed a working group on color issues to achieve this goal. The group, called the Association of Color Developers (ACD), will draft a specification that will allow application developers to interface with color systems under a single protocol. Other key companies in the group are Adobe, Aldus, Apple, BarneyScan, Claris, Pantone, OMS, and Radius. There’s also an ISO committee, called the IT.8 committee, working on a color file format that will be an industry standard. It will be based on the CIE color space and will also handle issues of compression.

Adobe has also joined the pursuit of better color by announcing that PostScript Level 2 will specify colors in CIE terms. Adobe’s new color support will undoubtedly have a great impact on the entire printing market as people take advantage of the other features of PostScript Level 2.

The five printers discussed in this report all claim “Pantone certification,” but more than a certification sticker is needed to solve color-accuracy problems with the Mac. Although Pantone inks are used to specify colors in the publishing world, in the world of computers, Pantone is not a real color-definition standard (see “The Pantone Touch” May ’90, page 341).
Remember the first day you got your hands on a Mac?
Remember how excited you felt when you saw all the things it could do?
This may refresh your memory.
Introducing WordPerfect® 2.0.

Every once in a while a new product comes along that sparks the same kind of excitement you may have experienced with your first Macintosh (you stayed up half the night, right?). As we’ve shown new WordPerfect® 2.0 to Macintosh users around the country, we’ve seen a very similar reaction. First eyes open wider. Then heads start to nod. Followed by grins that stretch dimple to dimple.

**Here are some of the more graphic improvements.**

We built a graphics and drawing package right into the program. With WordPerfect 2.0, you don’t have to leave your document to incorporate graphics. You can create, edit, size, scale and crop graphic figures just by clicking “graphics” or “draw” on the pull-down menu. The palette includes all of the standard drawing tools, plus Bezier curves, polygons and a free rotation tool.

WordPerfect 2.0 also lets you create text boxes. Inside your text boxes you can change font size and attributes. Then you can drag your text box wherever you want in your document and the rest of your text will wrap around it automatically.

**The list of new features could fill a page.**

**Or up to 24 columns.**

By clicking and dragging icons on the new WordPerfect ruler, you can create columns (newspaper or parallel) and then adjust the column settings, align text, set tabs, change line spacing, move margins and do a number of other formatting changes to your document.

Want to add a border to text, paragraph, column, or page? Easy. WordPerfect 2.0 gives you 36 different border styles from which to choose.

Like working with Styles? WordPerfect not only lets you use them, you can also share your styles with other people on your network.

We’ve also added new features like a Macro Editor, Tables of Authorities, and Line Numbering.

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Color Printers

All the printers in this review print wax dots at 300 dpi — this measurement is known as a printer’s resolution. When printing colors other than the primaries or black, however, the printers use blocks of dots, each block comprising one primary color, in arrays of either 5 x 5 or 6 x 6. The printer can no longer address the full 300 dpi, because it must use the blocks to build a full-color image. This effectively reduces the “apparent” resolution of color images from 300 dpi to 60 or 50 dpi (in printing terms, 60 or 50 lpi, or lines per inch). For line-art and monochrome text, the printers don’t need to trade resolution for color range, so output quality is close to that of monochrome laser printers. Technologies such as dye-sublimation and color laser use variable-intensity and variable-dot methods to get smoother colors (see Figure 1 and “Color on the Page,” May ’90, Buyer’s Guide page 56).

Setup

Last year’s color-printer roundup was a setup nightmare of NuBus cards, parallel cables, and cumbersome software drives. This year, however, we made our task easier by focusing on PostScript printers. One definition of a Mac PostScript printer is that it must include a standard Mac LocalTalk network connection. All you need is a LaserWriter driver in your System Folder and a LocalTalk connection, and the printer will show up in your Mac’s Chooser.

All five printers include serial and parallel interfaces in addition to a LocalTalk port. Non-Mac computers use serial or parallel connections. The two PostScript clones offer an advantage for mixed networks: All three ports are simultaneously active. You can print to the Seiko ColorPoint PS Model 80, Oce OccColor, or QMS ColorScript 100 Model 10, you have to physically set the active port on the printer’s front panel.

A printer’s ability to switch ports automatically is becoming popular, as we saw in the March report on personal PostScript printers (see “Personal PostScript Printers,” March ’91, page 116). We’re also seeing more and more printers that can switch among different PDLs. Besides using different interfaces, computers often use other PDLs besides PostScript. The QMS ColorScript 100 and Tektronix Phaser PX offer HP-GL (Hewlett-Packard’s vector-based PDL) emulation, but you still need to select the active PDL on the front panel of the printer.

On the Horizon

Color desktop printing is taking off, and manufacturers are rushing to supply a broad range of output devices for every stage in the publishing process. Tektronix, for example, is introducing a new line of thermal-wax-transfer printers, upgrades for the Phaser PX we looked at in this report. The new Phaser II line starts with the basic PostScript Phaser ISX, sporting a low price of $4,495. The line is modular, so the ISX can be upgraded to the Phaser IIX, which lists for $7,995 and is a PostScript printer that can automatically switch among ports. At the high end of the new Phaser II line is the Phaser IPX ($10,995), one of the first Mac printers to offer an Ethernet interface along with LocalTalk, serial, and parallel ports.

To compete with the less-expensive PostScript clones, NEC is now offering a scaled-down version of the ColorMaste PS Model 80 we tested in this report. The ColorMaste PS Model 80 will ship with 4 megabytes of RAM and 17 fonts instead of the 8 megabytes and 35 fonts of the ColorMaste PS Model 80. It will list for $6,995. NEC Technologies, Inc., 1414 Massachusetts Avenue, Boxborough, MA 01719; (800) 345-4418 or (508) 264-6000.

The new thermal-wax-transfer CalComp ColorMaster Plus ($6,995) is the second color printer — after the Seiko ColorPoint PS — to use the PhoenixPage RIP. The ColorMaster Plus also comes in a version for printing tabloid-sized pages ($9,995). CalComp, 2411 W. La Palma Avenue, Anaheim, CA 92801; (800) 222-2667 or (714) 821-2000.

The General Parametrics Spectra Star 400 printer series starts with the Model 410 ($5,995), which doesn’t include PostScript, and moves up to the Model 430, which provides hardware PostScript built in. The entire line is upgradeable and includes the Model 440 ($9,995), which has an internal hard disk, and the Model 450 ($14,995), which lets you output Mac graphics onto slides. General Parametrics, 1250 Ninth Street, Berkeley, CA 94710; (415) 524-3950.

JVC has announced a continuous-tone dye-sublimation thermal-transfer printer with a resolution of 300 dpi. It is scheduled to ship during the fourth quarter of 1991 at a list price of about $25,000. JVC Information Products Company of America, 19900 Beach Blvd., Suite 1, Huntington Beach, CA 92648; (714) 965-2610.

Several companies have announced inkjet printers at both ends of the price spectrum. Iris Graphics offers the SmartJet Series Model 4012, a continuous-tone inkjet printer. Through a patented variable-dot technology, the 300-dpi SmartJet Model 4012 has an apparent resolution of 1,200 to 1,800 dpi. Prices start at $39,000. Iris Graphics, Six Crosby Drive, Bedford, MA 01730; (617) 275-8777.

The Hewlett-Packard PaintWriter Color Graphics printer ($1,995) will feature a new printer driver and color-matching capabilities. HP is also announcing brighter, brighter, inkjet printers and its existing line of inkjet printers. The new jets will address the problem of printing to transparency, a

Wax and Paper

The hardest part of setting up a thermal-wax-transfer printer is installing the ribbons — and even this isn’t too difficult. QMS makes things a little...
The continuoustone Canon Color Laser Copier 500 represents the cutting edge in color output.

noticeable flaw of earlier HP inks. Hewlett-Packard, 19310 Prunieridge Avenue, Cupertino, CA 95014; (800) 752-0900 or (408) 725-8900.

Kodak's Diconix Color 4 ($1,595) is a 192-dpi inkjet printer that prints on plain paper and transparencies. Eastman Kodak Co., 343 State Street, Rochester, NY 14650; (800) 344-0006.

The first of two color laser printers to come onto the Mac market is the Colorocor CP4007 ($29,995) plain-paper color printer, a 300-dpi PostScript-compatible printer that prints at 5 ppm (pages per minute) in full color and 40 ppm in black-and-white. The CP4007 uses a single-pass electrophotographic technology to print on either A- or B-sized paper and on transparencies. Colorocor Corp., 2805 Peterson Place, Norcross, GA 30071; (404) 840-6636.

The second laser printer is the Canon Color Laser Copier 500 ($49,000), which prints gorgeous 400-dpi images on plain paper and also doubles as a color copier, a slide scanner, and a flatbed color scanner. PostScriptability will soon be available from Adobe, CAI (Custom Applications, Inc.), and EFI (Electronics for Imaging). An optional film scanner, film projector, and other output devices are also available. Canon, One Canon Plaza, Lake Success, NY 11042; (516) 488-6700.

Ilford will soon ship a continuous-tone printer, the Digital Photo Imager, which prints in 16.7 million colors on smooth paper, transparencies at 300-dpi resolution, and 35mm slides. Thanks to its liquid-crystal-cell technology, multiple copies can be printed at a rate of up to 150 prints, 120 transparencies, or hundreds of slides per hour. The list price will be around $50,000. Ilford Photo, W. 70 Century Road, Paramus, NJ 07653; (201) 285-8000.

Two of the printers also come in versions that can accommodate tabloid-sized paper — the QMS ColorScript 100 Model 30i ($12,995) and the Seiko ColorPoint B-size ($9,999). Océ will have a tabloid version of the OcéColor for around $16,000, to be named by the time you read this. And speaking of dimensions, the size of the printer itself usually isn’t a major factor — until you try to heft the 73-pound Tektronix Phaser PX. In contrast, the compact ColorPoint and OcéColor weigh around 42 pounds. If you’re in a crowded office, you’ll need to think twice about where you’ll put any of these printers — and if you choose the Phaser PX, you’ll need a sturdy desk.

Speed Testing
After setting up and loading our five printers, we tested the two aspects desktop publishers are the most concerned with: speed and image quality. Two things — the processor and the engine speed — normally influence printer speed. For thermal-wax-transfer printers, the engine speed is only one page per minute, so in this case, it’s the processor that makes the difference.

We passed a range of color documents through the printers to see how well their processors could RIP the images. We started with a relatively simple presentation chart and then printed a complex PostScript graphic, a scanned photo, a page-layout document, and a font-intensive document. Our presentation document was a two-page file with a bar chart, a pie chart, and colored text. The PostScript graphic was a logo first created in Paracom’s Swivel 3D and then imported into Adobe Illustrator. A full-color slide image containing a broad range of skin tones was scanned by a Barney CIS+4520 Slide Scanner; the resulting 1.5-megabyte file was then printed from Adobe Photoshop. The page layout consisted of a three-page...
QuarkXPress document, which included a variety of text, PostScript graphics, PICT files, and scanned TIFF files. The font-intensive test, which involved 17 downloadable Type 1 fonts, let us evaluate the efficiency of the printers' LocalTalk management and how well the RIP is integrated with the Mac interface.

After the final wax had melted, the speed winner was the NEC Colormate PS Model 80 printer (see Figure 2). The other two Adobe PostScript printers were in second and third place, far outdistancing the two PostScript-clone machines. The poor performances of the Seiko ColorPoint PS and the Tektronix Phaser PX were disappointing, because the ColorPoint PS uses a RISC processor — whose reduced instruction set serves only one function, to print PostScript — and the Phaser PX makes only three passes per print whereas the other printers make four. Each printer had its own personality and handled some types of test prints better than others: Take a look at the individual test results to see which printer is fastest for your most common applications.

The only difficulty we had in running the tests was with LocalTalk on the Seiko ColorPoint PS. When we repeated the tests for statistical accuracy, the ColorPoint's print times sometimes varied by minutes, whereas the other printers varied only by seconds. It turned out that the ColorPoint PS has a bad ROM in its LocalTalk implementation. Seiko reports that it is now working on remediying this problem.

**Figure 3: Print Quality**

<table>
<thead>
<tr>
<th>Print Quality</th>
<th>Color Gamut</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tektronix Phaser PX</strong></td>
<td><strong>Worse</strong></td>
</tr>
<tr>
<td><strong>Seiko ColorPoint PS</strong></td>
<td><strong>Better</strong></td>
</tr>
<tr>
<td><strong>NEC Colormate PS Model 80</strong></td>
<td><strong>Worse</strong></td>
</tr>
<tr>
<td><strong>Océ OcéColor</strong></td>
<td><strong>Better</strong></td>
</tr>
<tr>
<td><strong>QMS ColorScript 100 Model 10 (bright)</strong></td>
<td><strong>Worse</strong></td>
</tr>
<tr>
<td><strong>QMS ColorScript 100 Model 10 (Pantone)</strong></td>
<td><strong>Better</strong></td>
</tr>
</tbody>
</table>

**Print Quality:**
Print quality is the result of the synergy of the pattern in which the printer lays down dots (halftoning), the range of colors it prints (color gamut), and how accurately it lays down dots (registration). Our sample documents ranged from presentation charts to 24-bit scanned photos.

**Color Gamut:**
We measured and computed the color potential — the color gamut — of the printers. The color gamut is determined by how "color bright" the printer's ribbons are. The bigger the gamut, the more realistic the prints will be. The Tektronix Phaser PX had the largest gamut and won decisively in our jury tests.
Introducing Color That Out-Neons Neon.

Amazing, isn't it? The monitor image actually out-shines the real thing. Introducing two of the brightest Macintosh-compatible color monitors ever made: the Seiko Instruments 14" CM-1445, and 20" CM-2050.

Our new Trinitron monitors brighten your ideas with a blazing 100 NITs of color. That's a full 30 NITs brighter than an Apple MAC II RGB monitor's maximum of 70 NITs. Which means with us, your colors can be 43% brighter. Your fire engine reds can be 43% hotter, glacier blues 43% icier, and sunshine yellows can almost give you a tan. In fact, with color brighter than neon in 16 million possible shades, anything you can imagine, you can see. And every eye-popping pixel will be razor sharp because of our high resolution Trinitron tubes.

So if you're looking for color, just use your eyes. You'll see that Seiko Instruments is the brightest choice you can make.

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This publication management XTension from Managing Editor Software, Inc. lets you build a publication and keep track of all the page elements. You can create complete page layouts, then generate reports that give you the status and design characteristics of copy, graphics, and advertising as your publication comes together. With the unique “Gatherer” feature, you can have Page Director search for files on your network and place them directly in predesignated locations. Page Director even suggests color configurations based on a library of up to 2,048 configurations. When your publication is ready, flow it directly into QuarkXPress for final changes and output.

Flow information from a data base into QuarkXPress automatically with Autopage.

K. Erf Associates has created an automated page makeup XTension that helps you with the production of books, manuals, textbooks, technical documentation, and technical journal articles. Autopage lets you take advantage of batch processing to flow text directly into QuarkXPress and automatically control page breaks, graphics placement, footnotes, and vertical spacing. Now you can use the precision of QuarkXPress and — by automating the page makeup process — significantly decrease your production time.

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With this XTension from RESEAUX, you can run whole sets of search and replace operations to save time when you are working on large or complex documents. What’s more, you can customize Alias to allow multiple strings to be defined and stored as tables.

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Color Printers

Good Looks

To determine image quality, we used a combination of subjective and objective tests. For the subjective aspect, we assembled a jury of color-publishing experts and selected a range of documents for them to rate. They looked at six images, comprising a spectrum of graphics and business documents, from each printer.

To reinforce our jury’s opinion, we used a 928 Spectrocolorimeter, from X-Rite, to get an objective measurement of the range of colors the printers can produce — the color gamut. We also determined any misregistration of the printers, measured in pixel percentages: We printed one-pixel colored lines to test the accuracy of each color pass.

Compared with the speed results, the winners and losers switched places: The two PostScript-clone printers led the three Adobe PostScript printers, with the Tektronix Phaser PX showing clearly superior halftoning and bright ribbons. Our jurors preferred the Phaser PX’s prints over those of any other printer, and they least liked the QMS ColorScript 100’s output (see Figure 3). The two PostScript-clone printers had better halftoning than the Adobe printers, and although the QMS ColorScript 100 and Océ OceColor improved on the normal PostScript halftoning, their prints didn’t approach the quality of a Tektronix Phaser PX print.

We then forced each printer to print with identical rotated halftone screens to test the engine and ribbons alone and eliminate any advantages or disadvantages of proprietary halftoning. The results were illuminating: The Tektronix Phaser PX prints still looked the best. Besides having the best halftoning method, the Phaser PX also had the brightest ribbons, as evidenced by its having the largest color gamut. But whereas the Seiko ColorPoint PS finished second to the Phaser PX when using default halftone screens, it fell behind when forced to use the same halftoning method. The consistent loser was the QMS ColorScript 100, with both the smallest color gamut and the worst overall halftoning method.

The NEC Colormate PS Model 80 is noteworthy for having the best registration of all the printers, although the Tektronix Phaser PX came in a close second. The worst registration showed in the QMS ColorScript 100’s prints.

Conclusion

Although you can spend less — or a lot more — the best day-to-day way of getting color output from your Macintosh is with a PostScript thermal-wax-transfer color printer. The ease of use, low cost, and availability of these printers are hard to beat. Color laser printing is making inroads, with its plain-paper printing, fast speeds, and variable-dot technology, but at prices of more than $50,000, color laser printers are justifiable only for large networks. Dye-sublimation printers offer photo-realistic prints, but their price-per-print costs are still too high — around $5 a print. Inkjet printers are ideal for personal color printing, but they just aren’t fast or precise enough for graphics use.

If you’re a desktop publisher or a creator of high-quality business presentations, you’ll find thermal-wax-transfer PostScript printers to be more than adequate for your needs — if you don’t set your standards too high. Although these printers can create excellent comps, their ability to produce proof-quality output will have to wait until standards of color accuracy become more widely accepted and color-calibration technology improves.

Paul Vi is a MacUser associate editor who tries to add color to everything in life.
The Mac has always had great potential in graphic arts. But until now, no one has really provided a tool to unleash it. There has always been some form of mechanical trade-off imposed by input devices that inhibited artists from letting their imaginations flow naturally.

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- 60 to 30 square or rectangular
- Surface types: standard, magnetic, electrostatic, or transparent menu panel
- Pointing devices: Stroke-type, or mono-stroke-type cordless stylus, pressure sensitive stylus, 4-button or 12-button cordless cursor
- Driver software: AHI driver, mouse drivers, Windows drivers, Macintosh driver
- Compatibility: PCs, Macintosh, and workstations.

Performance Specifications
- Resolution: 1,270 lines/inch (0.02mm)
- Accuracy: ±0.01 inch (±0.25mm) over entire active area
- Reading speed: Max. 205 points per second
- Data transfer rate: Max. 19,200 baud
- Interface: RS-232C or optional GPIB
- Command set: Wacom II, MM, Pad
- Power supply: built-in (A0 to A5) or external (A0, A1, A3)

Please circle 60 on reader service card.
### Table 1: Features of Thermal-Wax-Transfer Color Printers

<table>
<thead>
<tr>
<th>Feature</th>
<th>NEC Colormate PS Model 80</th>
<th>OcéColor</th>
<th>QMS ColorScript 100 Model 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>List/street price</td>
<td>$8,995/$6,895</td>
<td>$8,990/$7,192</td>
<td>$6,995/$6,995</td>
</tr>
<tr>
<td>Cons</td>
<td>Poor halftoning.</td>
<td>Poor halftoning.</td>
<td>Worst image quality.</td>
</tr>
<tr>
<td><strong>Hardware</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Processor, clock speed</td>
<td>Motorola 68020, 16 MHz</td>
<td>Motorola 68020, 16 MHz</td>
<td>Motorola 68020, 16 MHz</td>
</tr>
<tr>
<td>RAM (standard configuration)</td>
<td>3 MB</td>
<td>5 MB</td>
<td>5 MB</td>
</tr>
<tr>
<td>Additional RAM, price</td>
<td>3 MB, $1,200</td>
<td>1 MB, $395; 4 MB, $995 (8 MB max.)</td>
<td>Mitsubishi</td>
</tr>
<tr>
<td>Print-engine manufacturer</td>
<td>NEC</td>
<td>Shinko</td>
<td></td>
</tr>
<tr>
<td>Hard-disk drive</td>
<td>20 MB, $985</td>
<td>third party</td>
<td>third party</td>
</tr>
<tr>
<td>Interface</td>
<td>RS-232, RS-422/LocalTalk, Centronics</td>
<td>RS-232, RS-422/LocalTalk, Centronics</td>
<td>RS-232, RS-422/LocalTalk, Centronics</td>
</tr>
<tr>
<td>Auto-switching interface</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Resident fonts</td>
<td>35, Adobe</td>
<td>35, Adobe</td>
<td>35, Adobe</td>
</tr>
<tr>
<td>PostScript type, version</td>
<td>Adobe, v. 5.1.9</td>
<td>Adobe, v. 50.3</td>
<td>Adobe, v. 50.3A</td>
</tr>
<tr>
<td>Emulations</td>
<td>none</td>
<td>none</td>
<td>HP-GL</td>
</tr>
<tr>
<td>Dimensions (W x D x H, in.)</td>
<td>17 x 21.5 x 15</td>
<td>9.9 x 16.1 x 17.5</td>
<td>16.9 x 24.9 x 11.3</td>
</tr>
<tr>
<td>Weight</td>
<td>55 lb</td>
<td>42 lb</td>
<td>66 lb</td>
</tr>
<tr>
<td><strong>Media handling</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery</td>
<td>sheets</td>
<td>sheets</td>
<td>sheets</td>
</tr>
<tr>
<td>Paper sizes</td>
<td>letter, A4</td>
<td>letter, letter +</td>
<td>letter, legal, A4, special A4</td>
</tr>
<tr>
<td>Printable area on letter-sized paper</td>
<td>8 x 10.9 in.</td>
<td>8.2 x 9.3 in.</td>
<td>8.1 x 9 in.</td>
</tr>
<tr>
<td>Tray capacity</td>
<td>100 sheets</td>
<td>100 sheets</td>
<td>100 sheets</td>
</tr>
<tr>
<td>Pantone-certified</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Supplies</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Letter-sized paper</td>
<td>500 sheets, $35</td>
<td>600 sheets, $55</td>
<td>2,000 sheets, $125</td>
</tr>
<tr>
<td>Letter-sized transparencies</td>
<td>50 sheets, $25.50</td>
<td>100 sheets, $1.15</td>
<td>100 sheets, $125</td>
</tr>
<tr>
<td>Ribbon</td>
<td>150 sheets, $98</td>
<td>200 sheets, $98</td>
<td>120 sheets, $52.50</td>
</tr>
<tr>
<td>Cost per letter-sized print</td>
<td>$0.67</td>
<td>$0.58</td>
<td>$0.50</td>
</tr>
<tr>
<td>Cost per letter-sized transparency</td>
<td>$1.75</td>
<td>$1.64</td>
<td>$1.70</td>
</tr>
<tr>
<td><strong>Warranty</strong></td>
<td>1 year or 24,000 pages</td>
<td>1 year</td>
<td>1 year</td>
</tr>
<tr>
<td>(first 90 days; on-site)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Company</strong></td>
<td>NEC Technologies, Inc.</td>
<td>Océ Graphics USA, Inc.</td>
<td>One Magnum Pass</td>
</tr>
<tr>
<td></td>
<td>1414 Massachusetts Ave.</td>
<td>386 Ravendale</td>
<td>Mobile, AL 36689</td>
</tr>
<tr>
<td></td>
<td>Boxborough, MA 01719</td>
<td>Mountain View, CA 94039</td>
<td>(800) 631-2602</td>
</tr>
<tr>
<td></td>
<td>(800) 343-4412</td>
<td>(800) 545-5445</td>
<td>(205) 633-4300</td>
</tr>
<tr>
<td></td>
<td>(308) 264-8000</td>
<td>(415) 864-7900</td>
<td></td>
</tr>
</tbody>
</table>
Not in front, on the side, over or under.
But all the way to the back (which is why we named this hard drive Bacster™). And it does have a tendency to go unnoticed.

What doesn't go unnoticed is the Quantum drive inside with effective access times as low as 8ms* and 50, 100 or 200 MB capacities.

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### Color Printers

#### Table 1: Features of Thermal-Wax-Transfer Color Printers

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Seiko ColorPoint PS</th>
<th>Tektronix Phaser PX</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pros</strong></td>
<td>Low price, Compact design, Good image quality, Largest print area.</td>
<td>Highest image quality, Largest color gamut, Low price.</td>
</tr>
<tr>
<td><strong>Cons</strong></td>
<td>Slowest.</td>
<td>Slow: No SCSI port.</td>
</tr>
<tr>
<td><strong>Hardware</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Processor, clock speed</td>
<td>Intel 80960 (RISC), 16 MHz</td>
<td>Motorola 68020, 16 MHz</td>
</tr>
<tr>
<td>RAM (standard configuration)</td>
<td>6 MB</td>
<td>6 MB</td>
</tr>
<tr>
<td>Additional RAM, price</td>
<td>1 MB, $250 (34 MB max.)</td>
<td>4 MB, $995</td>
</tr>
<tr>
<td>Print-engine manufacturer</td>
<td>Seiko</td>
<td>Sharp</td>
</tr>
<tr>
<td>Hard-disk drive</td>
<td>third party</td>
<td>no</td>
</tr>
<tr>
<td>Interface</td>
<td>RS-232, LocalTalk, Centronics, SCSI</td>
<td>RS-232, LocalTalk, Centronics</td>
</tr>
<tr>
<td>Auto-switching interface</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Resident fonts</td>
<td>30, Bitstream</td>
<td>30, Bitstream</td>
</tr>
<tr>
<td>PostScript type, version</td>
<td>PhoenixPage</td>
<td>Tektronix v. 2.66</td>
</tr>
<tr>
<td>Emulsions</td>
<td>none</td>
<td>HP/GL</td>
</tr>
<tr>
<td>Dimensions (W x D x H, in.)</td>
<td>14.1 x 17.5 x 8.1</td>
<td>17.4 x 17.2 x 14.7</td>
</tr>
<tr>
<td>Weight</td>
<td>41.8 lb</td>
<td>73 lb</td>
</tr>
<tr>
<td><strong>Media handling</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery</td>
<td>rolls (paper and transparency)</td>
<td>sheets</td>
</tr>
<tr>
<td>Paper sizes</td>
<td>letter, A4, A Super</td>
<td>letter, legal, A4 special folio</td>
</tr>
<tr>
<td>Printable area on letter-sized paper</td>
<td>8.2 x 10.7 in.</td>
<td>6.1 x 8.8 in.</td>
</tr>
<tr>
<td>Tray capacity</td>
<td>145 prints per roll</td>
<td>100 sheets</td>
</tr>
<tr>
<td>Pantonene-certified</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Supplies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Letter-sized paper</td>
<td>145 sheets, $10.15</td>
<td>1,000 sheets, $53</td>
</tr>
<tr>
<td>Letter-sized transparencies</td>
<td>120 sheets, $8.76</td>
<td>50 sheets, $57</td>
</tr>
<tr>
<td>Ribbon</td>
<td>172 sheets, $68.80</td>
<td>345 sheets, $135</td>
</tr>
<tr>
<td>Cost per letter-sized print</td>
<td>$0.47</td>
<td>$0.45</td>
</tr>
<tr>
<td>Cost per letter-sized transparency</td>
<td>$1.13</td>
<td>$1.54</td>
</tr>
<tr>
<td>Warranty</td>
<td>90 days</td>
<td>1 year</td>
</tr>
<tr>
<td><strong>Company</strong></td>
<td>Seiko Instruments USA, Inc. Graphics Devices &amp; Systems Division 1130 Ringwood Ct. San Jose, CA 95131 (800) 875-4561 (408) 922-5800</td>
<td>Tektronix, Inc. Graphics Printing Imaging Division P.O. Box 1000, M-5 63-630 Wilsonville, OR 97070 (800) 836-5100 (503) 685-3585</td>
</tr>
</tbody>
</table>

#### List/street price — The list price is the manufacturer's suggested retail price. The street price is an average actual price charged by dealers around the United States in January 1991.

Processor, clock speed — The manufacturer and speed of the chip that processes the PostScript data sent from your Mac.

RAM (standard configuration) — The amount of on-board memory standard with the printer.

Additional RAM, price — Any optional memory upgrades and their price.

Print-engine manufacturer — This is often not the same company that sells the printer.

Hard-disk drive — If the printer has a SCSI port, you can attach a hard-disk drive, either from a third party or from the printer vendor.

Interface — Interfaces other than LocalTalk connect the printer to IBM PCs.

Auto-switching interface — Some printers can automatically auto-switch among interfaces without users having to configure them.

Resident fonts — The number and type of fonts in the printer's ROM.

PostScript type, version — The type and version number of the PostScript or PostScript-clone code in the printer's ROM.

Emulations — Some of the manufacturers provide popular printer languages.

Delivery — Either stacks of sheets or rolls of paper.

Paper sizes — Most printers handle the popular sizes, with some offering special letter sizes to increase the printable area.

Printable area on letter-sized paper — Thermal-wax printers usually have much smaller printable areas than do laser printers.

Tray capacity — These printers have limited paper-tray capacities, because of the thickness of the special smooth paper.

Pantone-certified — All of the printers carry the Pantone seal of approval.

Letter-sized paper — The number of sheets and the cost of the special smooth paper.

Letter-sized transparencies — The number of sheets and the cost of transparent media.

Ribbon — The number of copies and the cost of a ribbon.
You asked for higher capacity
You asked for greater reliability
And you always ask for more speed
Now, you can have it all...
Step up to the PLI Infinity 88 Turbo
From the most trusted name in removable hard drive technology.
800-288-8754 or 415-657-2211
Perfect printing.
Your work deserves it and ColorMaster® Plus was specifically designed to deliver it.
ColorMaster Plus has the right resolution: 300 dpi.
You get PostScript power: it's 100% Adobe compatible.
It's color correct: PANTONE certifies it.
Size selection? Letter or tabloid with full bleed—giving you the largest live image for any desktop printer.
Plenty of ports, too. SCSI, Appletalk, RS-232 and Centronics parallel so you can mix and match different computers on one ColorMaster Plus printer.
And all ColorMaster Plus models come with something you simply can't get anywhere else: CalComp product quality and long term commitment to service, support and supplies. Our 1-year on-site warranty is just one example.

New ColorMaster Plus

We draw on your imagination.
Will color matching be the next technology to acquire a standard? Each product—TekColor, SuperMatch, Radius Toolkit, Photo YCC, and so on—currently has a different interface, but the color vendors have joined forces to create a protocol that will let you (or rather, your application) access every color-matching product in the same way. The (as yet unnamed) standard will force products to compete strictly on functionality and color WYSIWYGness. ETA: summer 1991.

By Aileen Abernathy

Teaching an old font new tricks: FontMonger, from Ares Software ([415] 578-9090), rolls the best of Metamorphosis, ParaFont, and Art Importer into one must-have utility. Developed by the same team that created Letraset's FontStudio, FontMonger converts type formats in any direction among Type 1, Type 3, and TrueType. You can turn type into Illustrator or EPS files or take the reverse tack and turn EPS images into font characters. But wait, there's more: You can combine characters from different typefaces into a single font, or you can make a font with customized characters such as obliques, fractions, and small caps. All this for $99.95. Hot, hot, hot.

Xpanding horizons: Page Director fills a void in Mac-based publication-management tools. This $895 program from Managing Editor Software ([215] 635-5074) focuses on production, not design, and can track, assemble, and configure all the elements of a newspaper (or magazine) page. One catch: It's a QuarkXTension, so tough luck if you use PageMaker. Speaking of QuarkXTensions, more than 30 of these third-party modules are now available, adding specialized features such as database publishing, indexing, and pagination. To get a free QuarkXTensions catalog, send Quark a postcard (trust me, it's faster than calling). Quark has also released two free QuarkXTensions: NetworkConnection, which adds groupware capabilities, and FeaturesPlus, a collection of utilities for setting preferences, making fractions and prices, and more. Both are available from on-line services or from Quark ($25 shipping). Finally, Quark is offering Passport, a multilingual version of QuarkXPress 3.0 that lets you choose among 12 languages for both text and menus within a single document (spelling and hyphenation dictionaries included). A mere $2,495.

Product news: Eddy Award nominee FrameMaker 2.1 is still less than a year old on the Mac, but Frame ([408] 433-3311) is about to push version 3.0 out the door. The most significant new feature is the comprehensive tables package, but the upgrade also adds conditional-text capabilities; more import/export filters; and improved color features, including support for the DCS and OPI standards. The rev is due out by June, with an upgrade price of less than $200. Effects Specialist from PostCraft ([805] 257-1797) offers 120 canned styles that work on any font, including non-PostScript and bit-mapped varieties. You can't hand-tweak the letter shapes, à la TypeStyler, and you have only eight color choices, but it's a no-brainer way to create instant display type. $199.95. Timeworks ([800] 535-9497) is now offering special site licenses for schools: ten copies of Publish It! Easy 2.0 for $300. Heck of a deal.

MacUser May 1991
Your data is your data. And to keep it that way Kensington introduces PassProof™ — the first complete data protection system for the Macintosh.

**First, the hardware.**
A rugged cylindrical lock keeps your disk drive safe from intruders. Two sturdy metal plates with tamper-proof screws block both rear-floppy and SCSI ports.

**Next, the software.**
As the master user you assign yourself a master password. From then on, you use the password as your key to unlock the system. You can add or delete additional users whenever you want. And PassProof's User Log keeps track of every attempt to use your Mac.

Want to “lock up” in a hurry? Quick Cover™ is PassProof’s screen-locking program that lets you secure your Mac on command.

Best of all PassProof is user friendly. Unless, of course, the user is unauthorized.

Ask your dealer about other Kensington accessories including cable and lock systems for all Apple and Macintosh computers, including the Mac Portable and the LaserWriter® II. Or call for a free brochure at 800-535-4242. Outside the U.S., call 415-572-2700.
Designing for Fax

Faxes are becoming as important to business communications as a printed letterhead—and they should be designed just as thoughtfully.

By Kathleen Tinkel

Time-saving, attention-getting facsimile transmissions—a.k.a. faxes—have become an essential tool for huge corporations and tiny businesses alike. In spite of their usefulness, however, most faxes are homely things to look at. The slippery and sleazy paper doesn't help, nor do the broken lines and occasional blobs that result from phone-line noise. But the faxed ugliness goes beyond that, as if the senders are thinking, "Aw, they're just for quick communications. No one expects them to look good."

Think again. Faxes represent you, just as your business card and letterhead do. If you're concerned about making a good impression, be sure your faxes look as professional as the rest of your stationery. Unfortunately, the mechanics of fax transmission create a special set of design problems—you can't fax just anything and expect good results. To help you put your best fax forward, here are some tips and techniques I've uncovered as copublisher of a weekly faxed newsletter and as the recipient of hundreds of faxes from around the world.

Just the Fax

The capabilities of the sending fax machine (or fax modem) can greatly affect how you design a fax document. If your fax machine gives you control over 64 levels of gray, for example, you can send a realistic-looking photograph to any fax machine, even one that doesn't have gray-scale capabilities itself. Or perhaps your fax machine accepts large originals (roughly 10 x 14 inches); you can certainly send oversized pages, but unless the receiving fax machine supports wide paper (which is rare), your documents will be reduced to fit a smaller sheet. Also keep in mind that whereas most fax units offer two resolution settings—Standard and Fine—faxes are usually sent at the lower-quality standard resolution, which is faster and cheaper. For these reasons (and more), you should design your faxes conservatively and be sure they are readable and attractive at standard resolution, even if you expect to send most of them at fine resolution.

Fax modems usually produce better-looking faxes than do stand-alone machines, because they send original documents directly from the computer without an intermediate scanning step that degrades image quality (see "Fast, Full-Featured Fax Modems," in this issue). The best image quality comes from a fax modem set to fine resolution, whereas a fax machine at standard resolution produces the worst (see Figure 1). For all fax units, fine resolution is 203 x 196 dpi and standard resolution is 203 x 98 dpi. Although fax resolution sounds as if it should be roughly two-thirds as good as a laser printer's 300 dpi, the arithmetic doesn't work out that way. The actual effect on type and graphics depends on the number of dots each device can fit into a square inch. A laser printer provides 300 x 300 dpi, or 90,000 dots per square inch, whereas a fax unit provides only about 40,000 (actually 39,788) dots per
Figure 1: Typeface Selection

Adobe Garamond, a faxed example of the type
Frutiger 55 Roman, a faxed example
Hiroshige Medium, a faxed example
Italia Medium, a faxed example of the type
Lucida Roman, a faxed example of the type
Stone Sans, a faxed example of the type

Fax modem, fine resolution
Fax machine, standard resolution

Figure 1: When designing a fax, choose the typeface based on your fax equipment and resolution. A fax modem coupled with ATM provides the best text output, giving you the widest choices in typefaces and point sizes. Conventional fax machines at standard resolution fare the worst with type; stick to simple faces (preferably sans serif) in large point sizes (at least 12 points).

square inch at fine resolution — less than half the resolution of a laser printer.

Fax machines and fax modems have inherent disadvantages related to their features and ease of use that can affect the way you design documents. Conventional fax machines are often more convenient, particularly if most of your documents are not computer-generated. However, their low-precision scanners can introduce physical problems such as skipped scan lines, stretched characters, and vertical white lines. The originals may feed crookedly, causing straight lines (including those within type) to wind up broken and jagged (see Figure 2a). Specks of dust, fingerprints, and paper creases can all be transmitted as part of a document.

If your original document comes from a printer that produces a dot pattern (a category that includes laser, inkjet, and dot-matrix printers), the resolution mismatch between it and the fax machine can further degrade image quality, creating thicker lines, darker type, and blotchy artwork. This can be particularly troublesome if your fax includes small type sizes or intricate artwork.

Finally, few stand-alone machines make it easy and economical to send faxes at fine resolution. Only expensive machines offer features such as scheduling (so that faxes can be sent at a time when phone rates are lower), programmability (for sending multiple documents), and the ability to change the resolution to fine for all transmissions. Without these features, you’re more likely to use the money-saving standard resolution than the image-enhancing fine resolution.

Peculiarities of Fax Modems

Fax modems offer more scheduling features than do stand-alone machines, and they avoid the image problems associated with scanning printed originals. However, fax modems transmit images as electronic bit maps, which places a different set of limitations on the handling of type and graphics. These problems — such as scaling distortions caused by the differing resolutions of the Mac’s screen (usually 72 dpi) and the fax protocol (203 dpi horizontally) — are nonexistent with paper-fed fax machines.

The best way to image type for a fax modem is through Adobe Type Manager 2.0. ATM uses the power of PostScript to create crisp text on-screen at any size, and the fax modem transmits that scaled type directly. If you don’t use ATM, the only way to avoid jagged-looking type is to install bit-mapped screen fonts that are three times the size of those in your document. The fax-modem software uses the oversized fonts to scale the type correctly for transmission, but this option can be limiting. Only a few fax-modem vendors supply the necessary triple-sized fonts, and those that do usually provide only a limited selection of sizes and faces (often just Times, Helvetica, and Courier). If you want to use 11- or 13-point type for legibility (easy to do with ATM), you’ll first have to find or make 33- or 39-point bit maps. With ATM, you avoid all these problems. (Keep in mind, however, that ATM works only with Type 1 PostScript fonts. Chicago, New York, and other bit-mapped faces will still suffer from the jaggies if you don’t have triple-sized fonts installed.)

Sending graphics via fax modem poses some resolution-related problems that are easier to solve on a conventional fax machine. On the positive side, images composed of vertical, horizontal, and 45-degree lines work just fine — perhaps better — with a fax modem, because there’s no opportunity to insert a piece of paper crookedly. Curves and lines at other angles fare less well, with a tendency toward the jaggies. Intricate bit-mapped artwork (in MacPaint, PICT, or TIFF formats) is often very effective, yielding an etched look.

However, unless your fax modem has gray-scale capabilities (which only the Prometheus Products Maxfax offers at
Since we know you're pressed for time, we'll skip the standard introduction and get straight to the point.

- Double Helix is the fastest multiuser relational database for
  - Indexed Search:
    - Double Helix
    - FoxBASE
    - Omniform 5
    - 4D
  - Matching Records
  - Time in seconds

  When speed-testing the top Mac databases, Double Helix in multiuser mode won hands-down.

- Here is— and we quote— what MacWorld said in May 1990: “If you need a working database by Friday morning, and it’s now Wednesday afternoon… your best bet is Double Helix.”

- Talk about fast. With Double Helix in hand and no prior knowledge at all, you can, in a matter of hours, mold Double Helix to conform to your individual needs. And as your needs change, so can, with minimal effort, your applications.

- WELCOME TO THE WORLD’S VERY FIRST MAC-BASED CLIENT/SERVER DATABASE.
  - What makes Double Helix so fast?

  Technically, it’s because of our advanced client/server format. Unlike file servers, which slow your system down by shuffling copies around the network, client/server lets all users work directly off a master. This keeps network traffic down. And productivity up.

  In addition to speed, client/server provides another crucial benefit: total referential integrity. In other words, when one user makes a change to the master, the whole network gets updated—in real-time. On your screen. Right then and there.

  So everyone has the same data. And everyone’s in sync. The end result: a group that’s always working in one direction—forward.

  - By the way, and for the record, we were the first ever to introduce a Mac-based client/server. And while it was revolutionary at its debut in 1986, it is, remarkably enough, still revolutionary today.

- IMMEDIATE GRATIFICATION, RIGHT FROM THE START.

- DOUBLE HELIX IS THE MOST AFFORDABLE MULTIUSER SYSTEM AVAILABLE. HONEST.
  - How do we figure? For one, the multiuser application is already included in every Double Helix box. And unlike other databases, it doesn’t require any special fileserver software or hardware, saving you additional and quite substantial start-up costs. So with Double Helix, there’s nothing more to buy. Nothing more to install. And nothing more affordable.

- THE FASTER YOU GET GOING, THE FASTER YOU GET GOING.
  - We’ve just spent the last 456 words talking about how fast and affordable Double Helix is. Now you can spend the next 14 numbers confirming it all for yourself. Call 1-800-323-5423, ext. 234 and we’ll send you out a test flight demo and Quick Start instruction guide of your choice right away. After all, if you stayed with us this long, you’ve got no time to waste.

Please circle 148 on reader service card.
Figure 2: Design Considerations

Fax machine

Fax modem

URSO
1234 ANYWHERE BOULEVARD
EVERTOWN, ANYSTATE 90765
PHONE 123 456-7890
Fax modem

URSO
1234 ANYWHERE BOULEVARD
EVERTOWN, ANYSTATE 90765
PHONE 123 456-7890
Fax machine

Figure 2a: Hairline rules come across fairly well at fine resolution, although they suffer some distortion when sent through a fax machine (bottom). The scanning process thickens the lines, partially obliterating the type (particularly the smaller face); also notice the "stair-stepping" of lines, caused by feeding the document crookedly.

Figure 2b: Large bold type works well for faxing (Helvetica Insert is shown here). Even small bold type is readable when sent via fax modem (left), which tends to lighten type, but it should be avoided on a conventional machine (right), which causes the lines to thicken and the openings to fill in.

Figure 2c: With a fax modem, you can safely print type over a 20- or 30-percent screen (top left). The faxed output from a laser printer is too coarse and makes the text hard to read (top right). Bold type reversed out of a black background works well for all faxes (center). However, outlined type (bottom) poses a problem either way: A conventional machine makes the outline too heavy, whereas a fax modem produces lines that are too light. You're better off avoiding outlines and sticking with solid-black letters.

this writing), photographs and screened artwork are lost causes. Gray tones in the original image are converted to stark black-and-white blocks for transmission, often obscuring the contents (see Figure 3). A conventional fax machine with gray-scale and contrast controls does a much better job of handling such images. Likewise, PostScript graphics usually look better if they are printed on a laser printer and then scanned into a fax machine. None of the Mac fax modems currently include a PostScript interpreter, which would bring the language's device- and resolution-independence to faxing. Because fax-modem software isn't able to interpret PostScript code, it sends a low-resolution (PICT) screen image instead. (If an EPS file doesn't include an embedded PICT, the image will be replaced by a rectangular placeholder.)

Finally, interactions among fax-modem software, the Mac's operating system, and other resident applications may affect the appearance of your faxes, creating problems such as erratic type spacing or truncated lines. BackFAX, for example, has compatibility problems with hard drives formatted with La Cie's Silverlining software: It can run on such a drive, but it produces data errors, some of which show up as oddly formatted faxes. Most fax modems don't support fractional font
Before developing our new billing system, we talked to our customers.

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During the last two years, we combined your input with state-of-the-art technology in optical imaging, laser printing, EDI and EFT to create a new billing system that delivers the features you want most:

- Less paper plus faster checking and matching capability by printing copies of each time card right on the invoice.
- Easy-to-read, high-quality laser printing.
- Easy-to-handle, standard-size bond paper and no staples.

And we've included options that can save you additional time and money:

- Customized reporting to provide data on usage.
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The new Kelly® optical imaging laser billing system. Another industry first—only from Kelly.
Mouse Systems PageBrush/Color: Your computing world has never been so brilliant.

Figure 3: If your fax machine has gray-scale features, you can transmit a realistic-looking photograph (the top image was faxed at fine resolution). If it doesn't have this capability, the image will be converted to black-and-white and much content may be lost.
Choosing a Typeface

Before you begin worrying about the image they project, you should first make sure your faxes are readable. Faxed text has a dot pattern that’s visible to the naked eye. Typeface and styles that work well for laser-printed correspondence may be too small and light for faxing—you may find that increasing the type size from 10 points to 12 or 13 points helps readability. And some faces are clearly better at surviving the vicissitudes of faxing than others (see Figure 1).

A couple of years ago, Adobe tested the faxability of several typefaces and found that Lucida Roman, Lucida Sans, and Stone Sans worked best. (The results were published in Adobe’s type catalog, *Font & Function*.) I ran some tests of my own, not limited to Adobe fonts, and found that these faces do indeed work well, along with Bitstream Charter; Adobe Utopia; and sans serif faces such as Frutiger, Helvetica, and Univers. These typefaces (and probably others that work well) share three characteristics:

- The letters have relatively unvarying, moderately heavy line weights.
- Openings within the characters (in the e and a, for example) are large.
- The letters are relatively plain. In general, sans serif typefaces work better than serif ones.

I conducted all these tests with conventional fax machines. If you’re using a fax modem and have ATM, however, you can use a much wider range of fonts—in fact, almost any PostScript font works well. Although conventional fax machines tend to thicken lines, obliterating small text, fax modems tend to lighten them (see Figure 2b), which means that you can often use smaller font sizes and typefaces that have smaller letter openings.

Design Fundamentals

Once you’ve mastered the peculiarities of the fax format, creating a fax document is just another design project. I’ve already covered some considerations specific to fax machines, fax modems, and typeface selection. Here are the highlights plus a few more points to ponder:

- Don’t use your printed letterhead for fax documents. Many things that are effective in print—embossing, foil or other metallic type, screened or pale type, very small type—can’t be communicated effectively by fax. Instead, use a special fax letterhead with a related design.
- Keep type and images away from the margins so that they aren’t truncated by the faxing process. Margins of three-quarters of an inch all around seem safe.
- Phone lines can introduce visible errors, so choose typefaces and graphics that can survive missing or doubled-up lines. Sans serif faces are generally safer than serif faces, particularly if you use a fax machine. Graphics fare best if they have strong angles or bit-mapped textures.
- If you’re using a conventional fax machine, avoid layouts with long straight lines, small type sizes, and intricate artwork. Misfeeds and phone-line noise cause unsightly broken lines, and the scanning process can thicken lines and darken type, causing text to become unreadable and turning artwork into a blotchy mess.
- For superior text output from a fax modem, use ATM with Type 1 fonts or be sure that your installed fonts include sizes that are three times as large as those in your documents.
- Avoid overlapping type on an illustration or screened area, especially if you use a fax machine (see Figure 2c). At best, the edges of letters will look fuzzy; at worst, characters will virtually disappear.
- For special emphasis, try reversing white type out of a black background. A sans serif typeface set in 18-point bold works well.
- Don’t fax photographs or other grayscale artwork if your equipment lacks gray-scale and contrast controls (or you don’t use them). Either create a posterized (black-and-white contrast) version of the artwork, or skip it altogether.
- If you have to send PostScript illustrations from a fax modem, create them at roughly three times the desired finished size and then export and reduce them in a layout program before faxing. This process enhances the apparent resolution of the embedded PICT image, minimizing the jaggies you normally get when faxing the PICT portion of a PostScript object.
- Most fax machines let you duplicate a document by passing it through the scanning mechanism in Copy mode. Although this is useful for seeing how the layout works on the fax page, it doesn’t show you the alterations produced by the phone lines and shouldn’t be used as a faxability test.
- Cover pages waste paper and are redundant if you also address the pages that follow. On the other hand, fax machines are often shared and a well-designed cover page helps direct the document to the right person. Unless you’re concerned with confidentiality while the fax is awaiting pickup, your cover page can simply be the top part of the first document page.
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The new Epson EPL-7500 for Macintosh.

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Introducing the Epson® EPL-7500 laser printer.

One of the first true Adobe® PostScript® laser printers designed around a lightning-fast RISC processor.

The result is significantly faster output.

It is also significantly better.

Thanks to true Adobe PostScript—not a clone—the EPL-7500 is able to produce razor-sharp text in 35 scalable fonts, plus equally impeccable graphics. Blacks are blacker and lines are finer, courtesy of the printer’s unique MicroArt Printing technology.

All of which makes the EPL-7500 extremely well-suited for the most demanding desktop publishing applications.

The EPL-7500 handles paper as well as it handles text and graphics. A 250-sheet tray comes standard, a second is optional. Also standard are AppleTalk®, parallel and serial interfaces, allowing the printer to work easily in both Macintosh® and PC environments.

With the EPL-7500, the engineers of Epson have succeeded in raising the standards of laser printing for Macintosh, without raising the price.

But rather than take our word for it, compare for yourself. Chances are, you will come to the same conclusion.

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For the hot new Macs, Dayna introduces hot new Ethernet adapters. Using the latest Ethernet technology, our DaynaPORT™ cards for the Macintosh LC and IIci are red hot performers. And for Macs like the Classic®, our DaynaPORT E/Z hooks to Ethernet in a flash.

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So call us today at (801) 531-0203. And get them while they're hot.
Ethernet is gaining popularity, but it's still expensive. Maybe that's why people keep looking for ways to speed up LocalTalk. The latest effort, LocalSwitch from Tribe Computer Works, is an accelerated 16-port LocalTalk hub. Each port gets 230.4 kilobits per second worth of network bandwidth to itself, for a total network capacity of 3.6 megabits per second. $3,495. Keep your eye on this one.

By Henry Bortman

Midget modem for Macs on the run: Outbound, maker of the Outbound Laptop System, now offers the Pocket Port, a 2,400-bps Hayes-compatible modem. Weighing only 2.4 ounces and literally small enough to fit into your shirt pocket, the Pocket Port requires no battery, because it gets its power from a telephone line. $279.

NetWare news: NetWare 3.11 (formerly dubbed NetWare 386) and NetWare for Macintosh 3.0 are finally shipping. NetWare for Macintosh 3.0 integrates AppleShare-like file service and AppleTalk print spooling as part of its core technology. Novell says the new version should provide twice the performance of the current version, 2.15c. NetWare 3.11 costs $3,495 for 20 users, $6,995 for 100 users, and $12,495 for 250 users. If you also want NetWare for Macintosh 3.0, add $895 for 20 users and $1,995 for 100 users.

DataViz is now shipping MacLinkPlus version 5.0, which offers new translators for Word for Windows, WordPerfect 2.0/Mac, MultiMate 4.0, FrameMaker, and Windows graphics. Version 5.0 also includes the new version of Dayna's DOS Mounter for one-stop DOS-to-Macintosh file swaps. $199; upgrade for registered owners, $50. Want to toss your NeXT machine into the file-exchange picture? DIT's FloppyWorks enables a NeXT computer with a floppy drive to read from and write to Mac disks directly. It also contains filters for file translation between popular Macintosh and DOS applications. $250.

Macs without Apple? It may soon -- at long last -- become reality. RDI Computer is selling Companion, Mac-emulation software that runs on SPARCstations. According to RDI, any application that runs on an SE or Classic can run under Companion. At press time, Companion required an S-bus card with Mac Classic ROMs installed to function properly and cost $1,695 (S-bus card included, but you supply your own ROMs). RDI expects some legal complications to have been resolved by the time you read this, so it can sell Companion as a software-only product for $895. Meanwhile, Nutek Computers is readying Macintosh-clone technology it says is Apple-lawyerproof. This technology is a combination of custom ROMs and system software that can run Mac applications but gives them a slightly different look: that of the Open Software Foundation's Motif interface, which is common on UNIX machines. All Nutek needs to do now is find a hardware manufacturer to develop its product into a usable computer -- and keep Nutek company in the courtroom.
"Color control in QuarkXPress gives me endless design possibilities."

Josephine Rigg, Art Director
Image, the Magazine of the San Francisco Examiner

"Working under deadline pressures at a newspaper, you generally don't have as much time as you'd like to 'play' with a design. But with QuarkXPress, I can scan in a color transparency, then crop it, screen it, rotate it — and see the results instantly on my monitor. And with all the color models QuarkXPress supports, I can create automatic drop caps and rules, or shade a background and try different colors until I find the one that works. This kind of color support gives me the freedom to experiment with design, and QuarkXPress does the rest."

The San Francisco Examiner has been serving the Bay Area since 1887. Image, a weekly magazine that includes news and lifestyle features of interest to Examiner readers, appears on Sundays.

If you want endless design possibilities from your page layout program, visit your local dealer for more information.

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The Mac-to-Mini Connection

Connecting the Mac to IBM's midrange computers gives you minicomputer power with Mac ease of use.

By Teresa Elms

W
gen the Mac meets the minicomputer in the business world, the result is often confrontational. But things are smoothing out in a rather improbable quarter: the IBM midrange-computer market. Users of these business minicomputers are "speaking Mac" in a growing number of companies, thanks to a flurry of new connectivity products.

Midrange computers are business-oriented minicomputers. Minicomputers comprise the middle tier of computer power and price. They're more powerful and more expensive than desktop computers but are less powerful and less expensive than mainframes. IBM's current midrange computer is the AS/400. It supersedes the System/34, System/36, and System/3X (collectively known as System/3X machines), although these machines are still used widely. According to IBM, approximately 400,000 System 3/X and AS/400 minicomputers are installed worldwide. Attached to those systems are an estimated 5 million terminals—a quarter of which access the data on the midrange host. This is a large market by any standard, and it's growing faster than the computer industry as a whole.

This growth is significant for Mac users. By connecting Macs to a midrange system, users gain access to large-system processing power, easy data exchange with PCs or Macintoshes anywhere on a network, and the security of a centrally managed database. The Mac also brings advantages to midrange-computer shops, including user-friendly applications and its famous graphical user interface.

One of the earliest, most successful combinations of the Mac and IBM midrange computers was at Apple, which uses AS/400s for corporate information processing. Instead of the "dumb," character-oriented terminals traditionally connected to such systems, Apple uses a network of Macs. The Macs work independently of the AS/400s for tasks such as word processing and graphics, which the AS/400s don't do well. But the AS/400s provide computing horsepower for the high-volume number crunching needed to manage corporate order processing, accounts payable, and sales reporting. They also provide shared access to corporate databases. With a click of the mouse, users can access the best of both worlds.

Making Connections

To integrate the Mac into an IBM-midrange-computer network, you need a fast, reliable connection to the midrange host. There are a few choices here. Most System/3X and AS/400 computers support these options:

- Medium-speed (up to 19.2 kbps), asynchronous communications via an RS-232C serial port and a modem.
• High-speed (up to 56 kbps), synchronous communications via an RS-232C or a variety of other serial interfaces to a modem or to digital phone lines. This is the standard IBM midrange-communications mode.

• Very-high-speed (1.2 megabytes per second) attachment via twin-axial cable, which is the wiring that connects dumb terminals and printers to an IBM midrange system.

• Connection via Ethernet LAN (local-area network), which is available on the AS/400 only.

• Connection via token-ring LAN, which delivers 4 to 16 megabytes per second — the best communications performance available on IBM midrange systems.

To connect the Mac to a midrange system with any of these communications options, you must install a communications controller (such as a token-ring-LAN adapter or a 5250-emulation board) in one of the Mac's expansion slots or connect an outboard box (such as a protocol converter) to the Mac's modem port. The controller card or protocol converter then connects the cabling system — such as the twin-axial cable in the building's walls — that carries data between your Mac and the midrange system. Current Mac-to-midrange connectivity products support either twin-axial or token-ring connections. Of these, the twin-axial connection is the more popular, because it's fast, reliable, relatively inexpensive, and available on all IBM midrange systems.

Translating Mac to Midrange

Establishing a connection between the Mac and a midrange system is like placing a phone call to France. If you dial the right number with the right equipment, you can hear your French counterpart speak, but if you don't speak French, you can't communicate. Terminal-emulation software provides the Mac equivalent of a French interpreter. This software runs on your Mac and supports three key connectivity services: terminal emulation, printer emulation, and file transfer.

Terminal emulation. Terminal emulation lets the Mac communicate like the dumb, text-based terminals the midrange system understands. During this process, the Mac window the emulator runs in temporarily gives up its independent computing power and becomes a "slave" of the midrange system.

The midrange system sends character data — but not graphics — to a Mac window just as it does to an IBM 5250-series terminal. The midrange system codes this data in EBCDIC (extended binary-coded decimal interchange code) rather than ASCII, so you require terminal-emulation software to translate the incoming data to ASCII equivalents the Mac can display. Conversely, the midrange system expects to receive keystrokes from the Mac that map to the standard 5250-series keyboard, and it needs special function keys (such as Attention and Error Reset) that don't exist on the Mac. The terminal-emulation software on your Mac performs this keyboard-mapping function.

A note about selecting the right terminal-emulation software: Emulation software that works with IBM midrange systems does not work with IBM mainframes. Your Mac must emulate a 5250-series terminal to be understood by midrange computers, and only midrange computers accept 5250 emulation. IBM mainframes require the much different 3270 terminal-emulation protocol. To confuse matters further, emulation software that works with IBM mainframes might work with an AS/400, but only if special hardware and software are installed on the AS/400 to support 3270 terminals and printers. (For more information on Mac-to-mainframe connectivity, see "Face to Face with Your Mainframe," February

![Figure 1: Connecting your Mac to an IBM midrange system lets you access the minicomputer's power without losing your Mac's intelligent features. You can run multiple midrange jobs in separate windows, view them concurrently on one or more monitors, and run a native Mac application (such as a word processor) at the same time.](image1)

![Figure 2: Protocol-Converter Connection to the Host](image2)

Protocol converters work with any Mac model, and they can connect multiple Macs to a midrange system — but they're slow compared with other connectivity options.
Printer emulation. Printer emulation is an extension of terminal emulation: It translates the printer-data stream from the midrange computer into QuickDraw or PostScript commands that your printer understands.

You need to follow a few rules to get terminal or printer emulation to work. Most importantly, you need to specify a correct device address each time you configure a terminal or printer session on your Mac. (You can configure as many as seven sessions at a time.) The device address is a number the midrange system uses to route message traffic among hundreds of 5250 terminals. The midrange system permits only seven device addresses per midrange port, and because you can have more than one Mac connected to a port, you may prevent other users from signing on to the midrange system if you configure too many emulation sessions on your Mac.

File transfer. The final piece of the Mac-to-midrange puzzle — file transfer — is a two-step process. First the midrange system’s EBCDIC codes must be translated to ASCII for downloading to the Mac and vice versa. Then the file-transfer software must reformat data to and from standard formats, such as tab-delimited ASCII.

File-transfer software usually comes in two parts: one for the midrange system and one for the Mac. You don’t have to buy both halves from the same software developer. For example, a widely used file-transfer product for midrange systems is ETU (Emulator Transfer Utility), from Andrew, formerly called Emerald Technology. Because it runs on a wide variety of IBM midrange computers, many manufacturers write file-transfer software for desktop computers that works with ETU on midrange computers. But this isn’t always the case: IDEAssociates’ IDEAComm Mac $250-emulator board includes file-transfer software for both the Macintosh and the midrange system in one package.

The Best of Both Worlds

Terminal emulation, printer emulation, and file transfer may seem like primitive connectivity functions, but the result is a beautiful synergy of Mac and midrange strengths. For example, DOS terminal emulation requires that you give up your Macintosh’s intelligent features—at least temporarily. At this point, the desktop computer becomes a character-oriented terminal, dedicated to a single job and controlled by the host. But when a Mac is running under MULTI-Finder, a session with the host is just one job running in its own window. You can run multiple midrange jobs in separate windows, view them concurrently on one or more monitors, and run a native Mac application, such as a word processor, at the same time (see Figure 1). Midrange programmers, for example, can debug midrange source code in one window, watch the revised program execute in another window, and cut and paste between the midrange screens and a Mac document in a third window to create the program documentation.

The midrange system offers advantages such as advanced file-server capabilities and data safety to Mac users. The midrange system’s security system, for example, automatically checks each user’s authorization to access files or perform restricted operations. The midrange file-management system provides file- and record-locking services to prevent conflicts among multiple users as well as ensure that files aren’t overwritten or destroyed. No matter how many users have access to a record, only one copy exists, so there aren’t several versions of the same file. And finally, the midrange system can work as a data repository— because it’s usually backed up to tape daily. This also lets Mac users archive data on the midrange system, which frees space on their hard disk.

Some Mac-to-midrange connectivity products bundle the communications link— usually an add-in board or converter box — with terminal-emulation and file-transfer software. In some cases, however, you must buy the software separately. The Mac-to-midrange connectivity products currently available are protocol converters and 5250-emulation boards (see Tables 1 and 2). Token-ring-LAN adapters are also emerging as an option.

Protocol Converters

Protocol converters are stand-alone boxes that act as translators between different computer systems. They connect to the Mac’s modem port and translate ASCII communications (which the Mac understands) to EBCDIC, 5250-style, twin-axial communications, which the midrange system understands (see Figure 2). Because they require no internal hardware in the Mac, protocol converters are a practical way to connect Macs that don’t have expansion slots (such as the Plus and the Classic) to an IBM midrange system. However, because they’re limited
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**Figure 3: 5250-Emulation-Board Connection to the Host**

Twin-axial cable

Midrange system

Twin-axial cable

by the Mac's modem port to a top data-transfer rate of 19.2 kbps, they're slower than other Mac-to-midrange connectivity options.

The three protocol converters currently available are the Andrew MacMidrange TwinAccess Series II and MacMidrange TwinAccess Series III and the Perle Model 3i ASCII Workstation Controller from Perle Systems.

Andrew's MacMidrange TwinAccess Series II has as many as seven serial ports, which lets you attach seven Macs to the same protocol converter and reduce costs per user significantly. It's also upgradable: You can start with a single port and add more as needed. The one-port model costs $1,695; the seven-port model costs $3,595. The Series III is a nonupgradable single-port model that costs $1,295.

For terminal and printer emulation and file transfer on the Series II and Series III, you need to install Andrew's Boxer software ($150) on the Mac, and ETU must be installed on the midrange for file transfer. Boxer provides a HyperCard interface to ETU that simplifies file transfers. Boxer lets your Mac emulate up to seven 5250 terminals, each in its own window, one of which can contain a printer-emulation session.

Boxer is much better than other terminal-emulation software, because it maps 5250 terminal functions to the Mac's extended keyboard. Macintosh users who are unfamiliar with a 5250 keyboard will find that the extended keyboard's Help key, for example, now also functions as the midrange Help key. Formidrange users who are unfamiliar with the Mac, Boxer offers a pull-down, tear-off menu with icons for special 5250 command keys such as System Request and Error Reset. You can select the desired key function from this menu or request an on-screen display of the current keyboard mapping.

Boxer also lets you customize keyboard mapping and tear-off menus as well as create keystroke macros to automate such tasks as sign-on sequences.

The Perle Model 3i ASCII Workstation Controller, announced as this article went to press, connects one, three, five, or seven Macs to a midrange system. Depending on the number of ports you need, the cost ranges from $1,995 to $3,495. Perle's terminal-emulation software, PerleTalk, sells for $225; you also need to have ETU installed on the midrange system for file transfers. PerleTalk allows up to seven communications sessions between the Mac and the midrange computer (one can be a printer session), and it lets you cut and paste between the Mac and midrange sessions.

Protocol converters can work with any Mac, and they can connect multiple Macs to a midrange system, but they're slow. If you need faster data transfer, 3250-emulation boards are the answer.
5250-Emulation Boards

Internal 5250-emulation boards plug in to a Mac expansion slot and provide a direct twin-axial connection to the midrange system (see Figure 3). Like protocol converters, 5250-emulation boards translate ASCII communications to EBCDIC 5250-style communications. But unlike protocol converters, 5250-emulation boards can operate at the full rated speed of the midrange connection — 1.2 megabytes per second. Andrew and IDEAssociates make 5250-emulation boards for the Mac.

The MacMidrange MacTwin 5250-emulation board is part of Andrew’s Mac-to-midrange product series. It is bundled with InterAccess software for terminal and printer emulation and file transfer (again, you need ETU on the midrange for file transfers). InterAccess is identical to the Boxer software for Andrew’s protocol converters, except that its hardware driver is different. The MacTwin board costs $995 for the SE and LC and $1,095 for the SE/30 and Macintosh II series. It costs $3,995.

IDEAssociates’ IDEComm Mac differs from the Andrew MacMidrange products in an important way: Its bundled file-transfer software, IDEAlign, supplies both the Mac and the midrange pieces of the file-transfer puzzle, so you don’t have to buy ETU for the midrange. The Mac-to-midrange interface to IDEAlign is an easy-to-use HyperCard stack — either your own or the one that comes with the software.

IDEAlign supports only four communications sessions, not seven, but this limitation has the benefit of limiting the number of midrange device addresses consumed by greedy users. A real constraint, however, is IDEAlign’s keyboard mapping, which isn’t nearly as good as that of Boxer or InterAccess. IDEAlign maps the keys as they appear on a 5250 terminal’s keyboard, so if you’ve never seen such a keyboard, the program may be awkward for you to use. Another limitation is that IDEComm Mac provides printer emulation for Apple Image Writers and LaserWriters only. If you use any other printer with your Mac, you’re out of luck.

Figure 4: For speedy Mac-to-midrange connectivity, token-ring LAN adapters may be the best choice. The adapter occupies an expansion slot in your Mac and connects to multiple desktop computers networked in a ring. There’s one hitch — you need an IBM PC to act as a gateway between the midrange system and the Macs on the LAN.

Twin-axial cable

Midrange system

PC Token-ring LAN

Figure 4: Token-Ring-LAN Connection to the Mac

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For some users, the productivity gained by the Mac-to-midrange connection transcends the cost.

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Token-Ring LANs

An emerging alternative for Mac-to-midrange connectivity is the token-ring LAN. Token-ring LANs use a communications protocol that prevents network tie-ups by passing a token, or special authorization signal, among computers connected in a ring. Only the computer with the token is allowed to broadcast over the network. This means that all the computers on the network are peers and you don’t have the master/slave relationship of other IBM-midrange communications methods, such as twin-axial. Token-ring LANs have another big advantage: With data-transmission rates of 4 to 16 megabytes per second, they're the fastest communications medium available.

The AS/400 and some System/3X models can attach directly to a token-ring LAN when the correct adapter card is installed. The Mac also needs a card to connect to the same LAN. Unfortunately, to connect to a token-ring LAN, the midrange must be connected to a PC rather than a Mac (see Figure 4). The midrange can connect to the PC via a token-ring-LAN adapter, twin-axial-workstation controller, or serial communications port. Although you can’t directly connect a midrange computer to Macs in a LAN, it appears that software being developed by Apple will soon enable a direct connection and should make it easier for Macs and midrange computers to share the advantages of token-ring LANs.

The Bottom Line

Protocol converters, 5250-emulation boards, and token-ring-LAN adapters provide a variety of Mac-to-midrange connectivity choices. But power has its price: These options can cost $500 to $1,300 per user. Until these prices go down, evaluate your connectivity requirements carefully. For some users — such as software developers and documentation specialists — the productivity gained may transcend the costs.
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Table 1: Features of Protocol Converters

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<th>Feature</th>
<th>Andrew</th>
<th>Andrew</th>
<th>Perle Systems</th>
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<tbody>
<tr>
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<td>MacMidrange TwinAccess</td>
<td>Series II</td>
<td>Series III</td>
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<tr>
<td>List Price</td>
<td>1 port, $1,695; 2 ports, $1,995; 4 ports, $2,695; 7 ports, $3,595</td>
<td>$1,295</td>
<td>1 port, $1,995; 3 ports, $2,495; 5 ports, $2,995; 7 ports, $3,495</td>
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<tr>
<td>Comments</td>
<td>Upgradable from one to seven ports. Requires emulation software on the Mac and file-transfer software on the midrange computer.</td>
<td>Single-port model. Requires emulation software on the Mac and file-transfer software on the midrange computer.</td>
<td>Upgradable in two-port increments. Requires emulation software on the Mac and file-transfer software on the midrange computer.</td>
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<tr>
<td>Emulation software/price</td>
<td>Boxer/$150</td>
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<td>PerleTalk/$225</td>
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<td>Host file-transfer software</td>
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<td>ETU (Andrew)</td>
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<td>Keyboards supported</td>
<td>Standard and extended</td>
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<td>Any printer with standard printer driver</td>
<td>Any printer with standard printer driver</td>
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<td>Macs supported</td>
<td>Plus and later</td>
<td>Plus and later</td>
<td>Plus and later</td>
</tr>
<tr>
<td>Company</td>
<td>Andrew Corp. 6034 W. Courtyard Dr., Suite 100 Austin, TX 78730 (512) 338-3000</td>
<td>Andrew Corp. 6034 W. Courtyard Dr., Suite 100 Austin, TX 78730 (512) 338-3000</td>
<td>Perle Systems 630 Oakmont Lane Westmont, IL 60559 (708) 789-3171</td>
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Table 2: Features of 5250 Emulation Boards

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<tr>
<th>Company</th>
<th>Andrew MacMidrange MacTwin</th>
<th>Andrew MacMidrange NetAccess</th>
<th>IDEAssociates IDEComm Mac</th>
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<td>List Price</td>
<td>SE and LC, $995; SE/30 and II, $1,095</td>
<td>$3,995</td>
<td>SE, $965; II, $1,095</td>
</tr>
<tr>
<td>Comments</td>
<td>Excellent printer support. Includes terminal-emulation software, requires ETU on the midrange system for file transfer.</td>
<td>Provides AppleTalk access to midrange systems. Includes terminal-emulation software, requires ETU on the midrange system for file transfer.</td>
<td>Includes file-transfer software for both the Mac and the midrange computer.</td>
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<td>Host sessions per Mac</td>
<td>7</td>
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<td>Printer sessions per Mac</td>
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<td>1</td>
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<td>InterAccess</td>
<td>IDElink</td>
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<td>Host file-transfer software</td>
<td>ETU (Andrew)</td>
<td>ETU (Andrew)</td>
<td>IDElink</td>
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<tr>
<td>Keyboards supported</td>
<td>Standard and extended</td>
<td>Standard and extended</td>
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<td>Apple ImageWriters and LaserWriters</td>
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<td>SE, SE/30, II</td>
<td>SE, II</td>
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<tr>
<td>Company</td>
<td>Andrew Corp. 6034 W. Courtyard Dr., Suite 100 Austin, TX 78730 (512) 338-3000</td>
<td>Andrew Corp. 6034 W. Courtyard Dr., Suite 100 Austin, TX 78730 (512) 338-3000</td>
<td>IDEAssociates 29 Dunham Rd. Billerica, MA 01821 (508) 663-8878</td>
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Give your network a complete physical while it’s healthy. The information you gather will help you recognize and treat network ailments.

By Kurt VanderSluis

One reason network troubleshooting is so difficult is that it doesn’t involve any of your senses. When a network is “sick,” it looks, smells, feels, and sounds exactly the same as when it’s healthy. By contrast, if your car’s engine breaks down, you can usually diagnose the problem by sight, smell, feel, or sound.

Your familiarity with the way the car normally behaves makes pinpointing problems much easier. For example, you’ve heard your car’s engine hundreds of times before, so you know what it should sound like. This reference point can be invaluable when trouble strikes.

Because a computer network doesn’t display signs of its physical fitness, you must rely on data-gathering tools instead. To troubleshoot your network quickly and accurately, you should reach the point where the information you gather is as familiar to you as the sound of your car’s engine. To gain this familiarity, use your troubleshooting tools before your network develops a problem. By running tests when the network is healthy, you’ll have “normal” data to compare against the results you get when the network’s in trouble.

For example, last month we talked about the PET (progressive echo test), which sends a signal to points progressively farther away on the internet. By seeing how long the signal takes to bounce back to your location from each node, you can locate the source of a network malfunction. The echo test produces numerical data that indicates the reliability and the speed for the round-trip echo. If an echo test tells you that a round trip to another node takes an average of .04 seconds, you need to know whether that’s normal or not. If you test the network only after it breaks down, you won’t have a set of normal data against which to compare the results. Therefore, you should first run the echo test while the network is healthy. By keeping records (such as the graphs in last month’s article), you’ll have reference points to use when things go wrong.

You should perform other preventive tests to develop a sense of what normal data looks like and think about what the information means and what it tells you about the network. In addition to the PET, there are three other sets of benchmarks you should perform, using the following troubleshooting tools:

**Traffic-monitoring tools** can show you how busy the network is during typical transactions. Using programs such as Farallon’s TrafficWatch or the tools that come with Farallon’s StarController or NuvoTech’s TurboStar, watch how the network responds when you send a file to the printer, download a file from the server, or retrieve some data from a database. If your traffic-monitoring tool can produce a “skyline chart” of traffic density over time, look at it carefully and determine what caused the peaks and valleys. Get a feeling for which network events correspond to various traffic patterns, and you’ll be better prepared to interpret the patterns in case of trouble.

**Packet-monitoring tools** — the AG Group’s EtherPeek or LocalPeek, for example, or Neon’s Netminder Ethernet or Netminder LocalTalk — tell you what kinds of data packets are on the network at any given time.
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Packets come in many forms, containing different types of data. They convey messages ranging from "Where are the printers?" to "Are you there?" to "Here's some data." Run EtherPeek or Netminder, and watch the variations that occur when someone boots a Mac, has an AppleShare session with no activity, or receives a mail message from the server.

The Addison-Wesley book Inside AppleTalk describes all the packet formats, and if you're persistent, you can eventually understand what all that hexadecimal gobbledygook means. If you carefully study the packet patterns, you can determine when packets are missing and if there are too many of one kind or not enough of another. For example, the Mac emits a special packet when it first boots, and it should emit it only once. If a Mac is sending out this boot packet repeatedly, something is definitely wrong. If you don't use packet-monitoring tools on a healthy network, you don't stand a chance of interpreting the results when the network breaks down. Don't be discouraged by the difficulty of deciphering packets—it really does get easier with experience. There's also no better way to familiarize yourself with how a network works than by reading the packets.

Information-gathering tools such as Technology Works' GraceLAN and CSG Technologies' Network Supervisor can provide a variety of information about each machine on a network. For example, these tools can tell you what type of Mac is on a particular node and what version of the System it is using, how much memory it has available, and what INITs and applications are running. Gather this information when the network is healthy, and keep it so you'll have reference points whenever the network runs into problems.

NetAtlas, a network-mapping product soon to be released from Farallon, has a data-comparison feature that can automatically compare current network information against previously gathered data and report the differences. It notifies you if new network-ID numbers have appeared, if old ones have disappeared, if node numbers have changed, and so forth. By studying the differences, you can see which changes are normal and which aren't.

Remember, network troubleshooting involves comparing what is happening to what should be happening. Learn what data to expect under normal conditions, and you can spot problems more quickly and restore an ailing network to health in record time.
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Do-It-Yourself Mac Repairs

When manufactured goods were scarce, every repair involved fixing, mending, and making the best of what you had. Today, manufactured goods are so modular that once you've isolated the problem, most repairs merely involve removing the suspect module and replacing it with one that works.

The Mac is no exception. As long as you use some common sense and don't try to do anything risky or beyond your capabilities, you can probably do simple repairs. Even if you don't fix it yourself, you'll save time and money by being able to identify the faulty component, remove it, and send it to be serviced.

Most of the repairs I describe concern the Mac II, IIX, IICX, and IIIfx, which are easy to open and whose components are logically laid out and fairly simple to remove and replace. These Macs all have a disk drive, a hard drive, a motherboard, and a power supply. The II, IIX, IICX, and IIIfx also contain a video card (the IICX has built-in video circuitry). Figures 1 and 2 show how the layout of the Mac II, IIX, and IIIfx differs from that of the IIe and IICX.

Before we begin, there are a few caveats. First, if your Mac is still under warranty, leave repairs to your dealer. Because the new Macs (the IIsi, LC, or Classic) are still under warranty, I don't include them in this article.

Second, several of these tips require that you send Mac components to be serviced once you've diagnosed the problem. A third-party service center may cost less than your Apple dealer (I've included typical third-party charges for some repairs), but make sure you find a reputable company. Get recommendations from other Mac users, and ask for testimonials.

And finally, although some of these repairs are easy to do, others require some technical knowledge and specialized equipment. A few rules: Don't attempt anything you aren't comfortable with; shut down before opening the case; and handle all components with the greatest care. Now, let's get started.

Floppy-Disk-Drive Problems

1. Good SOOK floppy disks suddenly become unreadable, and you can't initialize blank floppy disks. Check to see that the ribbon cable connecting the floppy drive to the motherboard is firmly seated. There's also a chance that the drive has dirty heads. You can buy cleaning diskettes from your local computer store—they look like regular diskettes except that they have a felt disk instead of a plastic one. Insert the premoistened cleaning diskette into the drive, and wait the prescribed time. [The jury's still out on the merits of cleaning diskettes. For a full discussion of their pros and cons—plus how to use them—see Help Folder, March '91, page 266.—Ed.]

2. You have the problem described in No. 1, cleaning hasn't solve the problem, and other floppy-disk drives connected to the same computer work. You (or someone else) may have damaged the heads by forcibly removing a stuck disk. You can't fix this yourself, but you can remove the drive to have it repaired.

The floppy-disk drives on the II, IIX, and IIIfx are fastened to a horizontal mounting plate by a single Phillips-head screw. Unplug the data cable, remove the screw, and take out the drive. On the IIe and IICX, this operation is not as straightforward: Unscrew the Phillips-head screw on the corner of the floppy-disk/hard-drive assembly, and remove the power supply and cables, and the two drives will pop out. Rebuilding an 800K drive (with new heads) costs about $100.

Hard-Drive Problems

3. You can't get past the Welcome to Macintosh message when you start up. This symptom can indicate that you have a corrupted Finder. Start up from a floppy containing the same versions of the System and Finder that are on your hard drive, drag a fresh copy of the Finder from the floppy to the System Folder on the hard drive, and choose Restart from the Special menu. If the hard drive boots normally, the problem is fixed. (You can also try installing a new System, using the System-installer disks that came with your Mac.)

4. You can't get past the blinking question-mark icon, and you're sure that the hard drive is spinning. Check for any SCSI problems such as an ID conflict, a termination problem, or a loose cable. To check the SCSI-ID number, look on the switch on the back of each device or use a utility such as SCSI Probe (a freeware utility available from Zmac and other on-line services and user groups). Each device should have a unique number from 0 to 6, inclusive.

When checking termination, be aware that only the first and last SCSI devices on a chain should be terminated. Some products are shipped with internal termination, however, and if you have one of these devices in the middle of a chain, you'll have problems. Check with the manufacturer to find out if a device is internally terminated. If it isn't,
check to see if there is a 50-pin flow-through terminator plug on the SCSI connector. Remove the plug if the device is in the middle of the chain; add a plug if it's the first or last device on the chain.

5. You can't get past the blinking question-mark icon, and you've ruled out SCSI problems. You may have corrupted boot blocks. First, try using a hard-disk-recovery utility such as Norton Utilities for the Macintosh to examine the disk. (For a complete guide to hard-disk recovery, see "Surviving the Crash: Hard-Disk Recovery," April '91, Buyer's Guide page 42.)

If you still have problems, your next step is to try SCSI-formattng software, such as Silverying from LaCie or Format/Partition from NuvoLabs (don't use Apple's HD SC Setup — it doesn't have the tools you need for this job). Start up from a floppy disk containing the SCSt-formating software. If it recognizes the drive, there's a good chance you can fix it. Look for a menu item that verifies blocks and runs a drive test. If a dialog box at the end of the test reveals that bad blocks were found, try to mount the drive (your software may let you do this from within the program). If you're successful, you'll have solved the problem and saved most of your data. If you can't mount the drive, your formatting software gives you a couple of options: reinitializing (which overwrites the directory) or reformating (which overwrites the entire drive and tests the blocks). You'll lose all your data if you do either of these operations, so make sure you back up your files regularly.

6. You can't get past the blinking question-mark icon, and you can't hear the internal hard drive spinning. If this happens, the bearing lubricant may have thickened or the heads may have stuck to the medium. Either way, there's a good chance you can fix it. On the IIx, the hard drive is fastened to a metal mounting bracket by two Phillips-head screws. (On the IIx and IICx, the hard drive isn't screwed in, so you can simply pop it out.) Unplug the data and power cables, remove the mounting screws if necessary, and briefly place the drive in direct sunlight. More often than not, a few hours of the sun's heat will thin the lubricant or free the heads, at which point the drive should work fine. A variant on this procedure is to carefully turn the computer upside down or on its side and leave it somewhere warm (about 70 degrees) overnight.

7. You can't get past the blinking question-mark icon; the drive makes strange scraping noises, the stepper motor ticks, or the drive isn't spinning, and you have reason to believe it's not a power-supply or motherboard problem. Send the whole drive module to be
Figure 2: Inside the Mac llcx and IICi

Figure 2: The inner workings of the Macintosh llcx and IICi are similar but not identical — the IICi also includes video circuitry on the motherboard as well as room for a ROM upgrade and cache card. The numbers refer to repair tips that you can use.

Video-Card Problems
8. You see colored blotsches, static, or buzz lines on the monitor display. Find out if the monitor is in trouble. Connect it to another Mac, and see if the problem persists. If the monitor’s OK, then the problem is in the video card, which is plugged into a NuBus slot. (With a IICi with no external video card, the problem may be the video circuitry on the motherboard.) To remove the card, turn the power off, wait at least 20 seconds, and then pull straight up on the card. Component-level repair of a video card costs about $115.

Power-On Problems
9. Pressing the power-on switch intermittently fails to start your Macintosh II, IIX, or IIfx. The usual problem is a weak battery on the motherboard. On the II, IIX, and IIfx, there are two AA lithium cells located under the drive bay. One battery powers the power-on key, and the other powers the clock and PRAM. The IICx and IICi’s power-on keys are powered by a 5-volt “trickle” line on pin 10 of the power supply.

To test the cells, press the power-on key and read the batteries’ voltage with a digital multimeter (available from Radio Shack or other electronics-supply stores for about $40). Good cells generally read from 3.2 to 3.7 volts and weak cells read from 2.3 to 3.2 volts. Any cells that fall to less than 2.15 volts are considered dead. Newer Macintoshs have a battery box that lets you simply pop the batteries out to replace them. On older Macintoshs the original batteries are soldered in, but you may be able to find a dealer who can retrofit your board with a removable battery holder.

SIMM Problems
10. You see a blinking question-mark icon or hear an error tone on startup. Immediately after their power button is pressed, all Macs run an internal diagnostic program. The more RAM you have, the longer it takes. If the Mac passes the test and there’s a startup disk on-line, the computer boots to the desktop. Otherwise the blinking question-mark icon is displayed. If you hear an error tone when you start up a Mac II, it can mean SIMM problems. Test the SIMMs by replacing them with another set. Your SIMMs may be defective, in which case you need to replace them, or they may be too thick or too thin for the socket. It is possible to tighten the contacts on the sockets, but this is a sensitive operation and you need to use extreme care. To tighten the contacts, use a small, delicate tool such as a jeweler’s screwdriver to move the contact wires closer together.

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Networking

M.Y.O.B.
M.Y.O.B. 2.0 
Streamlines your accounting, and delivers essential information on the status of your business. Create a sales invoice and M.Y.O.B. adds the amount to Receivables, decreases the inventory, and generates the monthly customer statement. Integrating G/L, AP, AR, Inventory, and card files. $145. FIN 0087

Microphone II 3.0
The ideal communication software for international telecommunications. Packed with ease of use and advanced scripting language, Microphone II gives you the latest ZModem protocol options and can operate under virtually any speed from 300 to 57,600 baud. $215. COM 0043

Get a free subscription to GEnie and a free copy of Okyo with each Microphone II, $85.

COM 0060

DeskTop Publishing

Aldus
Aldus Design Team ............... 889
DTP 0104 PageMaker 4.0 .... 495
DTP 0106 PrePrint ............... 329

M.Y.O.B. 2.0
(1-800-ALL-MACS) Now works in Canada.

Inquiries: 908-367-0440 Fax # 908-905-9279 (NOTE NEW N.J. AREA CODE)

My Mac (MicrOsoft)

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 you have a Power Keypad with 16 keys instantly available to you. With its two million touch points, the UnMouse also performs as a small graphics tablet. $189. INP0084

White Knight V.11
Supports the new 23Modem protocol, as well as the new versions of XModem and Kermit. It works with MultiFinder and Quickdraw and large monitors. Get a free subscription to GEnie and a free copy of Okyo with each copy of White Knight. $85.

COM 0060

Bridge 6.0
Play a rubber of Bridge 6.0 with the Mac’s three players, Bid with either the Stayman or Blackwood conventions. Handles all the bookkeeping and tactfully informs you of any mistakes in bidding or play. It saves hands for later replaying and analysis. $38. BNT 0303

THE NEXT GENERATION OF DESKTOP PUBLISHING
Empower I & Empower Ii

Empower I is a "front line" security software system that controls and monitors use of the Mac. Empower II provides resource access controls at the folder level and multi-user privileges for increased security. Each features access logging, controls for disabling floppy drives and hard disk protection. Empower I-$155. UTI 0146
Empower II-$155. UTI 0147

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HYPO32 HyperBible International Version 2.0 ... $129
HYPO35 HyperBible King James Version 2.0 ... $129

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Electronic Arts

Adobe Systems, Inc.

Altsys

DoveFax Desktop

MacBible - New International Version

Overnight Delivery

ONLY $3.00

WordPerfect 2.0 for the Macintosh

Index Maker (Avery)

Altsys

MacBible - Professional v. 2.0

DoveFax Desktop

Turn your Mac into a multi-featured personal fax equipped to send and receive letters and documents anywhere in the world. DoveFax works quietly behind the scenes, automatically answers and receives faxes without interruption and redials until your fax has been sent. Combines a 9600 baud fax modem and 2400 baud data modem. $299. MOD 0038

Index Maker (Avery)

Create professional-quality customized index dividers with your Laser Printer. Enables the individual to create indexes tab titles and graphics. Includes 5 sets of blank-tab indexes and 3 sheets of clear laser printer taffers. From $12-518.

Ready Index

Produce efficient indexes for better organization on heavy-duty, reinforced pages with colored and numbered tabs corresponding to a colored and numbered table of contents. Type or write on the transfer and use a copier machine to duplicate additional.

From $15-030.

Electronic Clip Art (Metro ImageBase)

Communicate more effectively with fabulous art and graphics from the world's largest publisher of clip art. Each of the 18 ImageBase packages contains at least 300 topic-related images drawn by professional artists. (digitized at 300dpi or in EPS format). $85 ea.

New! Metamorphosis Professional v. 2.0

The ultimate font conversion utility. Feature enhancements include conversion to PICT outlines, automatically hinged TrueType (Mac and PC), and PC PostScript Type 1. Also, generation of EPS and conversion of Type 3 to hinged Type 1 for use with ATM. $89. FON 0284

WordPerfect 2.0

Taking full advantage of the Macintosh interface, WordPerfect 2.0 is easy to use and completely compatible with industry standards. Features include improved graphics handling, drawing and editing capabilities, styles, newspaper and parallel columns, macro editor, sort, merge, 115,000 word spell/thesaurus, search and replace and table of authorities. Other features include a Ruler with pop-up menus, Language Support and a fill conversion utility that lets you transfer documents. $299. WRD 0041

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From $15-030.
MacPrint 1.2

Easy-to-use software utility that lets you use most Mac applications with any HP LaserJet, DeskJet or compatible printer. MacPrint 1.2 is included. $95. UTI 0098

Easy-to-use software utility that turns text and graphics at the printer's maximum resolution, but does not support Postscript. Cable is included. $85. UTI 0058

MacDraw II 1.1 (Claris)

Create a variety of graphics in addition to regular drawings. Use it for simple desktop publishing projects (letters, invitations, business forms). Make desktop presentations. Create illustrations, logos, and maps. Or design floor plans, landscapes, and products.

MacDraw II prints everything from 8" x 11" size documents to color 35mm slides, and generates four-color separations. Comes with FREE MacPaint 2.0 and custom dip art. FREE upgrade to MacDraw PRO: A $349 value. GRA 0258 $298.

MacDraw II

Multi-Ad Search

Multi-Ad Search is a graphic utility program that allows multi-users to create, catalog, manage, and manipulate Macintosh-based graphics for placement into desktop publishing programs. $129. UTI 0199

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Multi-Ad Search
### MODEMS & FAX

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<th>Description</th>
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<tr>
<td>PowerCard - 50 MHz (40)</td>
<td>$169.00</td>
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<td>PowerCard 400</td>
<td>starting at $145.00</td>
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<td>Connectix DMT030</td>
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<td>DRI 1030</td>
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<td>$699.00</td>
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<td>Micron Technology</td>
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<td>DRI 2011</td>
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<td>DRI 2030</td>
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<td>DRI 2031</td>
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### UTILITIES & PROGRAMMING

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<tr>
<th>Description</th>
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<tbody>
<tr>
<td>TelePort plugs into your mouse (ADB port) and provides a pass-through connector for other devices. It uses no external power supply, and leaves your serial port free for other uses!</td>
<td>$195.00</td>
</tr>
<tr>
<td>TelePort FAX includes Send/FAX software. Hold OPTION as you drag FILE-PRINT to easily send FAXes worldwide MOD0058</td>
<td>$119.00</td>
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<td>Best Data Products MOD0061</td>
<td>$139.00</td>
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<td>Dave MOD0068</td>
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<td>Global Village MOD0069</td>
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<td>PowerUser MOD0071</td>
<td>$349.00</td>
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<td>Gemini Full Live Available MOD0072</td>
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<td>Gemini 26 MHz Card MOD0073</td>
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<td>Gemini Plus Kit MOD0074</td>
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### MUSIC & SOUND

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<th>Description</th>
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<td>MUS0001 Ultra 96 2/Smartcom II</td>
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<td>Microcom MOD0065</td>
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<td>PowerMac MOD0066</td>
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<td>SuperSync MOD0070</td>
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<td>Supergo MOD0071</td>
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### SECURITY & VIRUS PROTECTION

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<th>Description</th>
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<tr>
<td>ASD Software, Inc. U1000</td>
<td>$180.00</td>
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<tr>
<td>Echelon Corporation U1001</td>
<td>$150.00</td>
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<tr>
<td>Good News Software U1002</td>
<td>$120.00</td>
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<tr>
<td>Microcom U1003</td>
<td>$100.00</td>
</tr>
<tr>
<td>Microsoft Excel U1004</td>
<td>$100.00</td>
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<tr>
<td>PowerCard U1005</td>
<td>$100.00</td>
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</tbody>
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### GUARANTEE

Many of our products come with a thirty day money back guarantee. If you are not completely satisfied, ask for details when you place your order.
CompuServe Membership Kit

The latest on-line data service, with over 500,000 users. Services include electronic mail, bulletin boards, special interest groups (Forums), and a discount department store. You can read complete text from major newspapers and encyclopedias, plus stock data, weather forecasts and book and movie reviews. Mac users have three special interest Forums: entertainment (MACFUN), personal productivity (MACPRO) and business (MACBIZ).

CompuServe’s Mac bulletin boards provide a lively forum for exchanging ideas. The Membership Kit contains everything you need to get started, including credit against your first two hours on-line.

$23. COM 0006

International Graphics Library

Put professional visual impact into all of your page layouts, presentations, and multimedia productions with the International Graphics Library CD-ROM. Features over 200 business-oriented images, flags and currencies of the world, globes, maps of countries and states and patriotic and political themes all created in high-resolution 24-bit color PICT and TIFF’s, 8-bit color TIFF’s and grayscale TIFF’s.

$229.

CD-ROM

Magna
UTI0166 Empower I .......................... 89.
UTI0167 Empower II .......................... 155.
Mainstay
UTI0073 Capture 3.0 .......................... 45.
UTI0074 MacFlow 3.1 .......................... 125.
Microsoft
UTI0199 Multi Ad Services .. ............... 129.
Now Software
UTI0094 Now Write II .......................... 79.
UTI0095 Screen Locker .......................... 45.
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Applications Are Talking Too

Interapplication communication is on its way — and when it gets here, it'll change not only what applications do but also how you use them.

By Michael Swaine

When System 7.0 arrives this summer — oops, no room for another foot in my mouth. Let's start again.

Whenever System 7.0 arrives, its most important feature — interapplication communication — won't be visible immediately. IAC (interapplication communication) lets applications talk among themselves, and it's a juggernaut rolling toward your desktop. You won't be able to avoid it forever, because eventually your applications are going to be chattering among themselves like squirrels in the trees. The question is, when? IAC won't mean much to most users until a critical number of applications that make use of it have come on the scene.

There has been plenty of time for developers to create applications that exploit IAC, so some of them will arrive at the same time as the System 7.0 release or shortly thereafter. That doesn't mean that Mac users will immediately have them — unless we run right out and plunk plastic on computer-store counters or the applications we're currently using are among the first to upgrade. But it should mean that IAC will already have some momentum when it starts rolling our way.

In recent months, however, things have become a little more complicated for the developers who are going to create these applications: There are now more flavors of IAC to choose from as well as competing claims to weigh. Fortunately for Mac users, these are problems that application developers have to deal with — the rest of us don't have to worry about which IAC method is best. But the fact that we don't have to make the choices doesn't mean we won't have to deal with the consequences. The choices developers are making will matter to us because different IAC approaches are not all compatible, and incompatible communications methods generally mean no communication at all. So maybe it wouldn't hurt if we knew a little more about IAC.

Exactly what, the pragmatic Mac user is justified in asking, is interapplication communication going to do for me? Speaking as an occasionally pragmatic Mac columnist, I see IAC as a prerequisite for two developments we can expect to see in computer software over the next few years: collaborative computing and more-focused applications. Both developments address real and growing problems of managing the increasingly complex tasks that can be done by computers and dealing with the proliferating tools we use in performing these tasks.

The Power to Point

Collaborative computing means people working together, via computers, to achieve a common goal. It's nothing new, really, but what is relatively new are some of the ideas for making collaboration easier. For example, we need a more robust way to share information than what we currently have. What we have is the Clipboard, which allows us to pass around copies of information chunks. What we need is to be able to share the actual chunk, not copies...
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A decade of experience with ‘integrated’ applications should convince anyone familiar with software that a jack of all trades rarely masters any.

of it. This is crucial, because not all “copies” are identical — one copy may have been edited, for example — so when collaborators talk about a chunk of information, they may not be talking about the same chunk. Collaboration is always performed on something, and the collaborators need to be able to point to that thing itself.

System 7.0 satisfies this collaborative-computing prerequisite by allowing documents to incorporate links to shared chunks of information. There are different ways to implement such links, but Apple’s model is Publish and Subscribe. In the Publish and Subscribe model, a chunk of information in one document can be marked as a “publication” and many documents can “subscribe” to it. The publication can be incorporated smoothly into each subscribing document as though it had been generated there, and when the publication is changed, it changes in each subscribing document. These changes occur because the subscriber has a link to the original, not the original itself.

Death of the Creeping Feature

The second important benefit that IAC will provide is a trend toward more-focused applications. This comes down to the issue of the specialist versus the generalist. Every Mac application is — or ought to be — an expert in some domain. A decade of experience with “integrated” applications should convince anyone who’s familiar with personal-computer software that a jack of all trades rarely masters any. But most Mac applications don’t stick to their individual areas of expertise. Communications packages have full-featured editors, spreadsheet programs draw graphs, and word processors evaluate numeric expressions. Why is this creeping-feature syndrome happening? Because we, as users, demand it. We need to access our address books while we’re using communications programs, insert the results of computations into letters, see data in a different way — and these real-world problems often slop over the nice boundaries of an application’s area of expertise.

Integration of software functionality is the problem, but creeping features aren’t the solution. For most people, integrated software isn’t the solution either. This is because, again, the tool we now have is the Clipboard, and again, it’s not what we need. The Clipboard lets you move data to the application where the desired function resides. But often what you really want to do is move the function to where the data is. You want to stay where you are and have number crunching or graphing come to you. You want to work “in place.”

With AppleEvents and low-level IAC, two of System 7.0’s IAC capabilities, you can do that. (Or you will be able to do that when applications that use these system capabilities are released.) One application can draw on the expertise of another, so that each focuses on its area of expertise, calling on other applications for capabilities outside its specialty. You can adopt a surgical approach, requesting just the precise instrument you need to operate on the patient in front of you, rather than making do with hairpins for clamps or continually wheeiling the patient from operating room to operating room.

Apple’s IAC Instruments

Publish and Subscribe, AppleEvents, and low-level IAC are System 7.0’s IAC tools. Publish and Subscribe is intended to be nearly as ubiquitous as Copy and Paste. It’s universal IAC. AppleEvents is the protocol that manages how applications send messages to each other. It’s intended to be the generic IAC for the Macintosh, and any applications that want to get in on the conversations are supposed to talk AppleEvents.

Low-level IAC is a set of tools for developing more-specialized IAC abilities. Unlike AppleEvents, its protocols are not standardized by Apple, so its most obvious use is to give a third-party company’s product line an edge by making its applications communicate better among themselves than they do with other vendors’ applications. This is called proprietary IAC.

None of these IAC capabilities are here on a grand scale yet, because System 7.0 is not here yet. The delays have lessened the potential impact of this significant upgrade of the Mac’s operating system. The notions that everyone will shortly be using System 7.0 and that the problems presented by the 2-megabyte minimum-memory requirement for System 7.0 would somehow
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The big news from January's Macworld Expo was Excel 3.0, and the big news about Excel 3.0 was OLE (object linking and embedding) — part of Microsoft's approach to IAC.

magically go away have proved to be wishful thinking. When System 7.0 arrives, System 6.x will not immediately slide off the stage.

While System 7.0 has been slouching birthward, two higher-level approaches to IAC on the Mac have sprung up.

Strange Embedfellows

The big news from Microsoft at January's Macworld Expo was Excel 3.0, and the big news about Excel 3.0 was OLE (object linking and embedding). OLE is part of Microsoft's approach to IAC, developed for PCs running Windows and now ported to the Mac.

Microsoft has implemented its IAC identically on the PC and the Mac so that IAC links among documents work across platforms. You can, in principle, link an Excel spreadsheet and a Word document on the Mac and move the documents to a PC, and not only will Excel and Word on the PC be able to read the documents but the link will work too.

I say in principle because at the moment only Excel supports OLE. However, other Microsoft applications on the Mac and PC will use OLE. Not only that, so will applications from other developers, because Microsoft is making its protocols public.

Microsoft's IAC is not Apple's IAC — but it is also not a proprietary IAC. Microsoft has implemented document linking in a way that differs from Apple's Publish and Subscribe approach not only technically but also at a level that will affect users. Developers have the option of using either the Microsoft or the Apple version of IAC. The Microsoft option has some attractions, particularly if you have Mac and Windows versions of a given application. It does muddy the waters, however, and the programmer interface won't be available until later this year.

There is, however, another high-level approach to IAC on the Macintosh that is currently available, is AppleEvents-compatible, and promises a Windows version in the not-too-distant future.

IAC Here and Now

The IAC Toolkit from Palo Alto-based UserLand (well-known Mac developer Dave Winer's latest venture) widens the field of choices, and Winer has beaten Apple and Microsoft to the punch. Although IAC Toolkit is currently a Mac-only product, the head developer, a Windows-programming veteran, has been charged with porting it to Windows.

The UserLand IAC Toolkit works with System 7.0 or the current System 6.x. To use it with System 6.x, all you have to do is put an INIT into the System Folder. The IAC Toolkit is a collection of routines programmers can add to their applications. These routines let applications send messages and respond to messages from other applications. Because it offers a higher-level approach than working directly with Apple's tools, it should speed development of applications that will exploit IAC.

One of the unanswered questions about IAC is just what it will look like to users. The UserLand product doesn't really answer that question, but it gives us a few hints. In principle, the user interface for all of IAC (except for Publish and Subscribe) is up to third-party developers. In practice, Apple will no doubt provide examples in the form of applications from its software subsidiary, Claris.

Eventually there will probably be a user scripting language that lets you control applications precisely. What that language may look like is unsettled; it may have HyperTalk-ish syntax, or it may look more like batch-command files in DOS. There will probably be more than one such language. UserLand is working on one, which it hopes to bring to market this year. The IAC Toolkit has been designed throughout with scripting in mind.

But It Was Here All Along

One Macintosh tool that has supported IAC since 1987 is HyperCard. Individual HyperCard stacks have always been able to send messages to other HyperCard stacks. This was of limited usefulness before HyperCard 2.0, because only one stack could be open on a machine at a time and a stack couldn't easily communicate across networks.

Version 2.0 breaks the first barrier, and HyperCom, from Gava, of Seattle, breaks the second. With HyperCard 2.0, you can easily have two or more HyperCard stacks...
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With HyperCard 2.0, you can easily have two or more HyperCard stacks on numerous machines on a network messaging one another and accessing each other's functionality.

HyperCom is a set of external commands and functions for communicating between stacks across an AppleTalk network. It was available for HyperCard 1.x, but HyperCard 2.0 makes it really useful. HyperCard 2.0 lets you have more than one stack open in separate windows and runs in the background under MultiFinder. It has performance enhancements that make interstack communication more powerful.

Chiefl y, HyperCom adds a Tell command to HyperTalk. You use this command by typing tell xx yy, where xx is the name of a stack or list of stacks and yy is a HyperTalk command or message. HyperCom sends the command or message to the stack(s). HyperCom also includes functions for getting values back from stacks. You can, for example, send an advanced mathematical expression to a stack that does symbolic differentiation and get the answer back.

A data-entry or -editing screen on one machine can trigger a database stack (possibly on another machine) to update itself. With a little care, you can set up data-entry or -editing stacks on several machines that all access the same database. (Note that there are some thorny problems in multi-user databases that may not be adequately addressed by HyperCom. Gava says nothing about multiuser databases, and I present the example only to show that it is possible for moderately sophisticated users to explore some of the uses of IAC right now.)

HyperCard 2.0’s multiple windows and background processing let you open a window on another machine off-screen while leaving the current window open. Your access to another user’s machine, in other words, can be transparent (except for the performance degradation). That sounds as if it might lead to problems, but you can lock out other users from your stack or turn off HyperCom entirely. Then access to your stacks is possible only if you grant permission.

HyperCom and HyperCard 2.0 certainly make it feasible to do some tricky things. But is this really IAC? You bet. HyperCard stacks are applications, and different stacks communicating with one another does constitute IAC in the limited world of HyperCard-generated applications. And after all, Microsoft-style IAC will work only in the limited domain of Microsoft-compatible applications.

Transition

This is my last Beating the System column. Next month I’ll be migrating toward the front of the magazine and into a different format. Bob LeVitus will be moving into this space. Having written a book on System 7.0, Bob has a lot to say about Mac system software. As for what I’ll have to say, we’ll see. Through Beating the System and my Card Tricks column, which preceded it, the back of MacUser has been very good to me. So have you. Thanks. See you up front.

Puzzle Answers

In honor of my last appearance in this space, here are the answers to some recent puzzles. The smallest number of steps in which the disk of September’s puzzle can be optimized is 12, and yes, this is the worst case. The MITS documentation writer I alluded to in October is David Bunnell, whose best-known connection to the Macintosh is that he founded the first Macintosh magazine, which I’m pretty sure is still being published (it’s known around these parts as “Brand W”). The solution to February’s puzzle hinges on knowing that the chord that the Macintosh plays when it starts up is diagnostic: If certain notes are missing or are played in a certain sequence, this provides clues to hardware problems, such as bad RAM.

The lucky winners of “I Beat the System” T-shirts are Hiroshi Yonamine, Tokyo, Japan, and Kevin Mark Eberhart, Atlanta, Georgia (September); James P. Connell, Hamel, Minnesota (October); Ben Hallert, Eugene, Oregon, and Nikki Johnson, Yarmouth, Maine (November); and Bill Vernon, Odessa, Texas (February).

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Living with Murphy

Disk drives can be finicky beasts, and Murphy’s Law is always ready to prove it — at the most awkward moments, of course.

By Thom Hogan

The world isn’t very kind to someone in a hurry, and when computer equipment is involved, you can bet that good old Murphy is sneaking up behind you, ready to pounce.

Case in point: I had a lot of work to do when the holidays rolled around and made a mess of my schedule. Although I hate mixing travel and work, I didn’t have much choice this time. I had columns to write, books to complete, a software manual to edit, and other work to finish before the end of the year. No problem, I thought. I’ll just rent a Mac Portable to carry on my travels. (Although the thought of lugging 15 pounds around for two weeks didn’t make me happy, I consoled myself by remembering that my first portable computer, an Osborne 1, weighed 28 pounds — at the time I thought that was a godsend. Of course I was younger and stupider then.)

My first mistake — which gave Murphy plenty of time to sneak up behind me — was to rent the Portable the day before I left. My second mistake was to wait until that evening to transfer work from my hard-disk drive to the Portable’s internal hard-disk drive. Murphy was now leering over my shoulder. My third (and fatal) mistake was to assume that this would be a breeze. Pop! — Murphy’s Law just took effect.

Sure enough, I connected my hard-disk drive to the Portable and pressed the Escape key to wake the computer up, and a few seconds later it crashed. A quick attempt to restart the Portable and boot from my hard-disk drive also failed. With three hours left before my flight, I began to panic. I unplugged my hard-disk drive from the Portable and reconnected it to my Mac II, which didn’t recognize it either.

Time Out for a Lecture

About now you’re probably thinking that all I had to do was pull out my backup disk and restore the hard disk. OK, that’s sort of what I did, as you’ll soon find out. But time-out for a lecture first. Something was doing a pretty good job of destroying the integrity of my hard disk. It might have been the Portable, or it might have been the hard-disk drive. But let’s not allow Murphy to get a full nelson on us. Think about what might happen if your backup files were trashed by the same kind of phantom. That would leave you in a fine mess, wouldn’t it? So here’s the lecture.

I have two rules regarding backups, and these should be followed as closely as a monk follows his vows:

1. One backup is not enough. Backup disks can — and do — get zapped from time to time. I’ve had floppies die in storage or be zapped by the computer I was trying to restore. And, of course, there are fires, floods, theft, and other fabulous facts of life to worry about. (By the way, if you haven’t figured out that last month’s column was a hoax, I should tell you that Lemon Pledge isn’t going to resurrect your data either.)

One thing isn’t a hoax: Data is expensive to recover. I know because I’ve had to re-create two books, several fonts, and several other data
I've solved problems before by junking the equipment in question, but my bank balance told me I wouldn't be able to buy my way out of this one.

files from the remnants of my backup disks. Always keep a second set of backup disks of your valuable data, and keep it in a different location than the first set. If your first attempt to restore your system destroys your backup, you still have a chance to retrieve your data. (Hint: Do the second restore on a machine you know is good.)

2. Never use your backup disks until you know what's wrong with — and have fixed — the system. In the case of my trashed hard-disk drive, this meant not trying to restore the drive until I knew what had caused the original crash or until I'd reformatted the drive and tested it enough to know that it was functioning properly. If you jump in with your backup disks before you've isolated the problem or stabilized your system, there's a good chance of losing the data on your backup disks.

Meanwhile, Back at the Mac

Three hours is not a lot of time in which to fiddle with a 200-megabyte hard drive, but I pulled out my usual set of fiddling utilities anyway. My hard-disk drive is set up with several utilities that supposedly make it easier to restore it in case files are accidentally erased. Symantec's SUM II has an INIT that provides duplicate information to help you restore a drive with bad sectors, missing file links, and so on. Central Point Software's MacTools Deluxe has a similar utility, which I had been using on my drive. Unfortunately, these utilities didn't do me any good in this situation, although I'll continue to use them in the future. The problem was that the System wasn't recognizing the drive, so I couldn't even get to the MacTools utility. (Catch 22 lives — as Mac users frequently observe.) But here's the strange part, which makes me wonder how much I can trust any of the current hard-disk utilities on the market:

When I tested the drive with three disk-recovery utilities (the two mentioned above and Microcom's 911 Utilities), I got three different diagnoses. MacTools couldn't find the drive at all. SUM II diagnosed the problem as a corrupted directory and suggested formatting the drive and forgetting about the data on it. 1stAid (which used to be called Disk 1stAid and is now part of 911 Utilities) told me that it had found one file whose sectors weren't linked correctly but that the drive and all the files except one could be recovered to floppy disks. I didn't have Norton Utilities for the Mac, but I have no doubt that it would have reported yet a different problem.

Which utility was right? Despite 911 Utilities' mediocre performance in April's lab report (see "Surviving the Crash: Hard-Disk Recovery," Buyer's Guide page 42), it is my most trusted Mac file-recovery utility. Sure, it has a terrible user interface and is difficult to understand, but in five years of use, it has never let me down on any hard-disk problem I've encountered.

Because 1stAid told me it could recover files to floppy disks, I decided to take the time to restore any file I had changed during the previous week. I was pretty sure I had backed up all these files in their current form, but it couldn't hurt to be sure. With that done, there were only two hours left before my flight, and I was getting grouchy and a bit panicky. I didn't want to risk plugging my removable-cartridge drive (which I use for backups) into the Portable, nor did I want to reformat my hard disk until I had more time to diagnose what was wrong. So I took the painful — but safe — route. I copied the files from the external cartridge onto floppy disks in my Mac II and then copied the floppy disks onto the Portable. Besides the slow read/write speed of the floppy drives, another hindrance was that my Mac II is an original with 800K drives.

This painstaking method is almost guaranteed to work, and when you're staring a deadline in the face, it's not a good time to start gambling. Moreover, by taking the floppies with me, I now had a backup of the files for the Portable. By the time I had to leave for the airport, I had the Portable's hard-disk drive set up with most of my work as well as a set of floppies to use if I still had problems.

The Diagnosis

Ironically, I no sooner got to my destination than I got sick. So I did very little work during the vacation, but I did catch up on my sleep. Being sick at the same time as my Mac didn't put me in a particularly good mood. Besides being even further behind in my work, I still hadn't
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Easy Copy Mac v1.04..........................27708 $119
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Mail Verification...............................27676 $83
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dg Startup 6.0.................................27726 $27
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Drawing & Apps
AlgolWriter Plus..............................28042 $37
Math Writer Mystery.........................27970 $29
Math Writer v1.0..............................27948 $29
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Mario Bross Teaches Typing.................28016 $12
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Mac Box, 1st edition........................28028 $24
Mac Bross (Super)...........................28038 $35
Great Wave
Knitskill v1.0.................................27992 $26
Knitskill Plus v1.0.........................27986 $26
NumberMaze v1.1.............................27992 $26
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MECC
Exploring Microsoft Works....................28012 $18
Number Munchers............................28014 $19
Word Munchers.........................28013 $19
Sensible Software
Sensible Cranmer v1.8......................28010 $11
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Synchroncity v3.5............................28040 $48

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Carmen San Diego USA.....................28672 $29
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Racer Tri-plane v2.02......................28682 $25
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Mogenic Starlight..........................28712 $29
Sky Shadow...................................28724 $29
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Casin Master Deluxe.........................28700 $58
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Daivers Design...............................27840 $30
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Ring Quest 3...................................28728 $29
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Spectre
Secrets of Holykdey..........................28676 $26
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Wheels........................................28706 $25
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dg Startup 6.0.................................27726 $27
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THINK C v1.0, 27286 $165
THINK Pascal v1.0.........................27384 $165

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PowerCache 40 MHz IICl with co-processor (DayStar). 23651..............31167
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Mac 101 Keyboard ADB......................25183 $134
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PING collaborators...............25289 $108
Kensington Turbo Mouse ADB..............25281 $107
Turbo Mouse Plus............................25280 $107
Mackeyboard 101 Extended Keyboard ADB...25186 $99
Microspeed Mac (SR AB)...................25285 $75
Mouse Systems Little Mouse..................25283 $73
Trackball ADB...............................25284 $69
Seiko DI 5600 Digitizing Tablet............25734 $295

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American Power UPS 1100....................26292 $207
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Applied Engineering

QuadraLink 26817 $205
Rambouillet

Rambouillet BSC-4448 Tape Cartridge.......25704 $95
ColorCode......................................26918 $157
ColorJet

discette Writer 10pk (alligator)...........26792 $7.50
discette Writer 10pk (blue).................26790 $7.50
discette Writer Spin (alligator)............26701 $5.50
discette Writer Spin (blue).................26701 $5.50
Mac Plus 500m (B1 Key)....................25745 $1.95
Mac Plus 642m (new in Purchase).........25253 $1.64
Mac SE/101 KB Skin..........................25782 $1.95
Mac SE/101 KB Dust Cover................26884 $8
Followers

Compact Personal Shredder PS 50........25655 $119
Inland

3 Mode Surge Protector.....................40505 $14.50
Innovative Technology

The Library (gray)............................26905 $14
The Library (black).........................26905 $14
Internet

9 pin male to 9 pin male....................26298 $7.95
Keyboard Replacement Cable, 3 ft........26900 $7
Mac 128/30/64 to Hayes DPIP to 25pin, 6 ft. 26281 $8
Mac 128/30/64 to IBM DPIP to 25pin........26282 $8
Mac to SCSI 25 pin M to 50 pin M........26200 $13
Mac to SCSI System Cable, 6 ft...........26201 $17
MacPlus Peripheral Adapter cable, 1 ft...26283 $8
Mac Plus, SE to Apple modem.............26202 $9
Mac Plus, SE to Hayes DATAIN............26285 $8
Mac Plus, SE to IBM DPIP to 25pin........26286 $8
MacPlus, SE to Imprunet EN/IM to DNE...26287 $5
Mini DIN-6 to Mini DIN-6 Null..............26297 $7.95
SCSI Terminator, 50pin M to 68pin...26293 $18
SCSI Terminator, 50pin male.............26296 $18
Inwin Magnetics

External Tape Back-up 500V 00.............21832 $529
External Tape Back-up 500V 10.............21833 $719
Kensington

Apple RGB Anti-Clash Filter...............26891 $64
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Intuit

Quicken v1.5................................28458 $39
Mec

Managing Your Money v4.0..................28467 $142
Reality Software

WealthBuilder v1.0..........................25690 $145
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Accountancy INT. Professional v2.0.......28480 $345
SoftView

FAX Personal Tax Analyst....................28498 $47
MacTen 1010 Fedora's 1993................28350 $59
Software Toolworks

Deluxe & Simple v.5.0....................28645 $46
Timetrips

Timetrips III v 2.0..........................28364 $196
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Citadella

DataDesk v 1.0...............................27818 $418
DATABASE

Datalab

4th Dimension v 2.1.......................27780 $418
File Force......................................27780 $247
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Clone FixMaker Pro.........................27789 $216
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Microsoft Fax v2.0A.........................27795 $123
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MyAdvanced Macintosh v2..................27817 $29
Preferred Pals

Database v1.5..............................27834 $67
Smilie Software

Bookends v 1.2..............................27832 $51
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Microsoft Mail v2.0..........................30498 $83
Power Up

Letter Writer Plus v 1.0.....................30440 $54
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Telnet Fax 9800 22314 $155
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2419 External w/o SW 49357 $119

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PageView 15" w/ SE adapter 22010 $1095
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- **Virex** ........................................................................................................ 30413
- **Alter Dark v2.0** .............................................................................................. 30425

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- **Copy II Mac v7.2** .............................................................................................. 30362
- **APBExpress v1.0** .............................................................................................. 30344
- **SAMv2.0** ........................................................................................................... 30342
- **OnLocation v1.0** ............................................................................................. 30434
- **Protector Shark** .............................................................................................. 30448
- **Disk Doublerv1.0** ............................................................................................. 30460
- **Mac Tools Deluxe v1.0** ................................................................................... 30368
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- **Abbott Systems** ............................................................................................... 30348
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diagnosed the hard-disk drive’s problem. I’ve worked around such problems before by simply junking the equipment in question and purchasing new stuff. This is a great way to keep up with the latest and greatest hardware, but it isn’t easy on the bank account. A look at my bank balance told me I wouldn’t be able to buy my way out of this problem, so I started looking closely at the Portable and the hard-disk drive in question.

The Portable seemed to be fine—it recognized everything else I hooked up to it. When I returned it to the rental store and told the people there my problems, they did a complete hardware checkup too. No smoking gun at that end.

So it had to be my hard-disk drive, right? Thinking back to the last few months of hard-drive use, I remembered two symptoms I had previously overlooked. About a month before the crash, the hard-disk drive had consistently failed to load Adobe Type Manager and had displayed some unusual (and never repeated) alert messages. On two occasions, my Mac II had crashed just after saving a file, which was also quite unusual, because most application-caused crashes are triggered by things such as launching DAs or printing. I began to wonder if something on my hard-disk drive had slowly become a problem and had eventually pushed the unit over the edge.

I’ll never know for sure, but because ATM was the one file 1st Aid couldn’t recover, I suspect that it was the unlucky file that ended up in the drive’s problem sector. My best guess is that the sector containing the ATM directory information was failing (which explains why ATM wouldn’t load) and that it eventually failed completely. This may be why SUM II found directory damage. Moreover, an error in the directory section of the hard drive would likely upset the System, which explains why the disk wouldn’t boot and the Portable couldn’t recognize it.

Now comes the tougher part—figuring out how that problem had begun and why it eventually reared its ugly head. I’d used this hard-disk drive for almost 18 months without having to reformat it, which may have been part of the problem. Hard-disk drives drift over time. Think about the close tolerances necessary in order to stuff all those megabytes onto small platters that may be only 3.5 inches in diameter. We’re talking fractions of millimeters separating tracks. As with any mechanical device, constant use can eventually loosen a hard drive’s mechanism sufficiently so that there is a measurable difference in where tracks are being written on a disk. Temperature changes can also play a part by causing the mechanism to expand and contract (my office temperature ranges from 60 degrees in the winter to 95 degrees in the summer). The net effect is that the drive’s heads may try to place and read tracks at slightly different positions on the platter as the drive ages. This can be a major problem, as I suspect it was for me—or it can be no problem.
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CABD design
One thing IBM PC users have that Mac users don’t is sophisticated disk-drive utilities. A utility called SpinRite II automatically looks for track drift and marginal sectors. It can reformat the entire track in question on the fly, without affecting the underlying data. Others, such as Disk Technician Pro, test exhaustively for marginal sectors—the ones that are causing retries but are not yet bad enough to make the write process fail completely. Why utilities such as these haven’t appeared for the Mac is a puzzle to me. Maybe we Mac users aren’t as technically oriented as the average PC user (hah!). Whatever the reason, as our drives age, we are going to experience the unfortunate results of not having nearly enough early-detection software available.

Some Preventive Maintenance

Fortunately, you can do a few things to prevent such problems—reading last month’s hard-disk-recovery lab report is a good place to start. Here’s another heavy-duty prescription, which you aren’t going to like but should go a long way toward preventing disk troubles. Once every six months, back up your entire hard disk, reformat it with the low-level formatting utility that came with the unit, and restore it file by file. This isn’t a fast operation—it takes longer to format my 210-megabyte drive with this method than it does to back up the files on it. But afterward, the hard disk drive’s sense of where the tracks are supposed to be is totally in sync with where they actually are. An hour of pain can give you a month of problem-free operation.

Here are Dr. Thom’s recommendations:

1. Make a complete backup of your files.
2. Get out the hard-disk drive utility, and reformat the drive.
3. Run a test of the drive if you have the appropriate software (SUM II, Norton Utilities, 911 Utilities, MacTools Deluxe, or the drive’s own utility).
4. Install a fresh System on the hard-disk drive from the disks supplied by Apple.
5. Add your System enhancements, font files, DAs, and other goodies.
6. Restore your applications.
7. Restore your data files.

These seven steps can help your hard-disk drive operate at its best level, plus they optimize the files for faster performance. And following these steps may mean that—if you’re lucky—you can give Murphy the slip.
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How to Hire a Programmer

Got a great product idea but can't program your VCR, let alone a Mac application? Here's how to find the technical help you need.

By Kurt W. G. Matthies and Thom Hogan

Programming is a specialized art form, requiring the practitioner to have analytic as well as synthetic skills. Only those people who can think logically and have an eye for detail (as well as a constitution that thrives on all-night sessions) can achieve any measure of success.

Programming is not a career for everyone, yet we all get ideas for products we're sure would make us millionaires if we could somehow bring them into being. Many of today's large software houses were built on a single product. It's a continuing trend — just thumb through this magazine, and you'll see plenty of new companies marketing only one product. These entrepreneurs could well be the Farallons, MacroMinds, or Passport Designs of tomorrow.

Even if you aren't a technical wizard, you need only two things to get started in this business: a great idea and the means to bring it about. If you've been blessed with a bulging bank account, you can live out your entrepreneurial fantasy by hiring a programmer. But before you do so, here are a few things to keep in mind.

Creating the Specs

First, you must ask yourself what problem your program solves. Whether an application formats a paragraph of text, calculates a formula, or sorts a list of names, it solves some basic problem. By defining the problem — and therefore the program's focus — you define its actions.

Your first design step, then, is to write a program description, which is a consolidation of all your ideas. It should describe what the program does, how it benefits users, and who will use the product, and it should provide a general idea of how they'll use it. The program description serves two main purposes. First, you can use it to orient your programmer to the program's technical goals. Second, you can use it as the basis of a business plan. For this reason, it should be free of implementation details and technical jargon.

The next step is to define what the program will look like. This is the functional-specification phase, in which you design the program's user interface. You're the expert in this phase — no one knows your product better than you do — so there's no point in hiring a high-priced programmer yet. Bear in mind, however, that your programmer will use the functional specification to implement the design, so it must contain detailed information about every aspect of the user interface.

Designing the interface is perhaps the most enjoyable part of software creation, but a word to the wise: Keep it simple. Your first task is to come up with a basic feature set that will support your concept, but don't build in too many bells and whistles the first time around. This approach gives you a better chance of actually getting your program done, which is no small feat.

If this is your first program design, there are a couple of books you should read. The Macintosh Human Interface Guidelines...
POWER PROGRAMMING

(Reading, Massachusetts: Addison-Wesley, 1987) explains the proper use of the Macintosh's various user-interface tools. Another good and informative book is Apple's Programmer's Introduction to the Macintosh Family (Reading, Massachusetts: Addison-Wesley, 1988), which outlines the implementation details involved in programming the Mac and is a good way to learn how to speak a programmer's language.

At this stage, you'll need a painting or drawing program to create dialog boxes, menus, and windows. Or you can use a specialized program such as Bowers Development's AppMaker or Smethers-Barnes' Prototypier, which has these standard user-interface items built in. When designing Tycho Tablemaker, we used a combination of MacDraw, MacPaint, and Prototypier.

A good place to start your design is with the windows. Anything the user sees should be defined here. Does the application require multiple views? If so, all the application's windows should be defined in this specification. If there is printed output, then reports should be part of the functional spec.

The next step is to develop a detailed description of the application's feature set. Taking a menu-by-menu approach helps you cover all the bases. Define each of the application's menus, the items for each menu, and any dialog boxes or other actions that occur as the result of a menu selection. Describe each action.

Where to Look

With the functional design finished, you're ready to find a programmer. Where do you start looking? Your best bet is to ask colleagues for recommendations. If you're the kind of person who wouldn't go to a doctor or hire a plumber without a recommendation, then it seems foolish to trust your future business success to an unknown quantity.

Another good option is to try your local Mac user group (which is where we met each other). Most user groups have a programming SIG (special-interest group). Go to a meeting, stand up and announce your needs (at an appropriate point!), and don't be surprised if you're the center of attention during the break. You can find your local user group by calling Apple's customer-service line at (800) 538-9696, ext. 500.

If the personal approach doesn't work, there are a number of professional membership organizations to try. The MCN (Macintosh Consultants Network) is an organization of programmers who specialize in Mac software development, databases, networking, and systems integration. This group is based in the Seattle area, but it has more than 100 members around the country. You can reach MCN at (206) 453-2729. Another group, the APX (Apple Professional Exchange), should have a consultants directory available by the time you read this. Contact APX at (408) 980-1957.
You can also find technical help through the classified section of your local computer tabloid. Many cities — such as St. Louis, Chicago; and Washington, D.C. — have local computer newspapers. The San Francisco Bay Area has two: Computer Currents — which also publishes in Southern California, Boston, Atlanta, and Texas — and MicroTimes. Many consultants advertise in these magazines; they’re usually listed by specialty at the back.

Cut Out the Middleman

In some cities, you can use headhunters to find a programmer. Often called contract brokers, they specialize in knowing the local technical talent and their specialties. The better brokers understand the technical side of this market and can usually match you with a good programmer.

Finding your programmer in this way has major disadvantages, however. The three-way business arrangement among entrepreneur, contract broker, and programmer can create some unique problems — the size of the contract alone might scare you away. Most entrepreneurs hold contracts with the broker, who employs the programmer. The legal arrangements regarding who owns what technology can become horribly complicated. It also costs you more to hire a programmer through a broker: Instead of a one-time fee for finding the programmer, the broker may ask anything from 20 to 50 percent of the programmer’s hourly rate. Because brokers receive a commission for the entire period the programmer works for you, their serv-
ices can quickly become very costly. But perhaps the greatest disadvantage to using a broker is that having a middleman involved can get in the way of establishing a close, long-term relationship with your programmer.

OK, so you still haven’t found a programmer. It’s now time to place a classified ad in the help-wanted section of the Sunday paper. List your ad under Programmer (not Data Processor or Engineer), and run it for two or three consecutive weeks.

Where you place your ad is often more important than what you say. In our experience, programmers are creatures of habit and read only certain papers. For example, in the metro Denver area, where Kurt lives, most programmers check out the Denver Post or the Boulder Daily Camera, but they usually skip the Rocky Mountain News. Likewise, in the San Francisco Bay Area, Thom’s home turf, your best bet is the San Jose Mercury News, which covers Silicon Valley. If you’re located in another area, look through the classified section of your Sunday papers and see where others are advertising for programmers.

Just remember: There are plenty of unemployed programmers out there. However you find the right one for you, always ask for references from former clients. And the best of luck with that great idea of yours.

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You can also contribute tips electronically via Zmac, the on-line service for MacUser. Send them to Gregory Wasson at 72511,36. Be sure to include your full name and mailing address along with the text of the tip.

Compiled by Gregory Wasson

Control Panel
If you use a Mac with more than one monitor, here is a way to select which monitor you want to use as the main one for the Welcome to Macintosh dialog box or a Startup screen. Choose Monitors from the Control Panel, and hold down the Option key. When the Happy Mac appears, drag it to your main monitor and reboot.

Chris Rendall
Appleton, WI

Adobe Type Reunion
I like Suitcase II's ability to display fonts on the Font menu as they really appear. But after installing Adobe Type Reunion, I was disappointed to find that the feature apparently no longer worked.

To temporarily regain the feature within the application you're using, hold down the Shift and Option keys while selecting the Font menu. This key combination disables Adobe Type Reunion long enough for you to see what the fonts look like.

Larry Mendenhall
Urbandale, IA

Adobe Illustrator 3.0
Certain characters in the Adobe Symbol font, such as π and α, are accessible within other Adobe fonts such as Helvetica but are not displayed on the keys (you can see what keys to use via the Key Caps DA). Although you can see these characters on-screen in Illustrator 3.0, some of them don't print, even if you import text containing these symbols. If you need these characters and can't—or don't want to—switch to the Adobe Symbol font (within which they will print), here's a simple workaround. First make sure you have Adobe Type Manager 2.0 installed. Then with the new

What you type in:
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What prints:
Helvetica

What you see with Create Outlines:
HelvetriciumDA2

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Figure 1: Illustrator 3.0's Create Outlines command lets you print characters that don't normally print.

Create Outlines command on Illustrator 3.0's Type menu, select the text and choose Create Outlines. By selecting Preview Selection from the View menu, you can see how the text will look when it is printed. The only drawback is that the characters may look slightly bolder when they're printed (see Figure 1).

P. Michael Hartman
Franklin, PA

QuarkXPress 3.0
Here's a quick tip on importing Word 4.0 documents with style sheets into QuarkXPress. When you import text by using the Include Style Sheets option and the Word document's styles have the same names as those in the QuarkXPress document (for example, Body Text), the QuarkXPress styles should override the Word styles. However, this won't work consistently if you've saved your Word text with the default Fast Save option—only some formatting will take effect. To make sure the QuarkXPress styles do override all the Word

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Tip of the Month

General
If you're using a single-floppy-drive-only system, the hassle of switching disks while a program launches or executes can drive you crazy. You can avoid this if the application you need to use is smaller than about 500K.

Because you don't need the Finder file for the Mac to run properly—it simply lets you launch other applications much more easily—you don't really need it on your startup disk. You do, however, need an application for the Mac to launch on startup, which you can provide by replacing the Finder file with the application you want to use. Here's how to do it:

1. Place a copy of the System file on an empty floppy disk (you need to use only the Minimum System version).

2. Using Font/DA Mover, remove any unwanted or unnecessary fonts and DA's from the System file. (Don't remove the Control Panel DA, however.)

3. Back in the Finder, copy the application you'll be using onto the floppy with the System file (make a System-file disk for each application you intend to use). Select the copied application by clicking on it once.

4. From the Special menu, select Set Startup. The dialog box should already display the application you've selected. Click on OK. You're set! You can now restart your system from the floppy you've created, and your application will launch. Be sure to quit your application when you've finished. A dialog box will appear, telling you that the Finder is busy or damaged. Click on Restart in this dialog box; the disk will eject and your Mac will restart.

Kyle J. Smith
St. Cloud, MN
Suitcase II lets you store printer and screen fonts in the same folder, a great time saver, and a convenient way to share fonts on a network. You get unlimited access to DAs from your Apple menu or Suitcase II list. And you can even display the fonts in your font menu in their own typefaces.

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styles, use the Save As command when saving your documents in Word. You can also use the Command option from the Edit menu to add the Fast Save Enabled command to a menu. This lets you toggle Fast Save on or off as you need it.

Elisabeth Nelson
Greenville, SC

If you’re outputting files at a service bureau that charges per page, you can consolidate space and reduce costs by combining several small jobs such as business cards onto a larger page. However, because you are putting several separate documents onto one page, you can’t use QuarkXPress’ automatic-crop-marks feature. Here is the best way I’ve found to quickly create accurate crop marks for each document on a page:

1. Draw a text box within a letter- or tabloid-sized page, and give it a white fill with no runaround.

2. Select the box, and make it the size of the document you want (for example, a 2- x-3 business card), using the Modify command from the Item menu or the Measurements palette.

3. Draw two lines with a 0.25-point line weight. One should be horizontal, butting the top of the box, and the other should be vertical, butting the left side of the box. Both lines should extend about ¼ to ½ inch beyond the box at both ends.

4. Duplicate each line, and drag it to the opposite side.

5. Now drag the zero ruler guide to the top left corner of the text box, and drag the corner to resize the box so that it is ¼ inch larger than it was at the top and left. Drag the ruler guide to the bottom right corner, and extend the box likewise to the right and bottom. With the box still selected, bring it to the front, using the Item menu.

6. Create a descriptive title if necessary (for example, “My business card — shoot @ 100%”), and place it appropriately. Select all items, and group them. If you want to save this as a template for future use, drag a copy of it to a library.

7. Now drag the grouped item to an appropriate place on the page, and add any ruler guides as necessary. Continue adding other items to the page as desired (see Figure 2).

Elisabeth Nelson
Greenville, SC

DeBNDLer

If you keep a lot of font-outline files — also known as printer fonts — on your Mac to use with Adobe Type Manager, you may find that rebuilding your desktop or opening folders containing the printer fonts takes a very long time.

This is because the Finder keeps information about applications, their documents, and their icons in the Desktop file. Each application has a Bundle resource that lets the Finder know that it contains icon information (documents don’t have Bundles because their icons are stored in the application). For example, Microsoft Word has a Bundle that tells the Finder about the application’s icons as well as about the icons for all Word documents. To guarantee that every printer font has an Icon, Adobe ships each one with a Bundle. So if you have 20 outline files on your disk and you rebuild your desktop, the Finder will find 20 instances of the same information. If you have a lot of printer fonts and you use Apple’s Desktop Manager INIT (part of the AppleShare Server software) or System 7.6 (which has the Desktop Manager built in), it can take a long time to open folders containing printer fonts or rebuild the desktop.

To solve this problem, I’ve written a small application named DeBNDLer. DeBNDLer scans either the active System Folder or the volume where DeBNDLer resides, depending on which radio button you choose — Process Current System Folder or Process This Drive. DeBNDLer then removes the Bundle information from the files and changes the creator to DeBNDLer. Because all printer fonts are now treated by the Finder as DeBNDLer documents, rebuilding the desktop is much faster. DeBNDLer does not affect either ATM or Adobe’s Font Downloader.

Stephan Somogyi
MacUser Project Leader

DeBNDLer is freeware. You can download it from Zmac’s Applications Library (Lib 1) in the Download Forum (GO ZMC:DOWNLOAD), filename DeBNDL.SIT. Zmac is available on the CompuServe network. If you’re not a member of CompuServe, look elsewhere in this issue or for information on joining. — Ed.
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QuarkXPress 3.0 can provide you with useful information about your system configuration in its Environment dialog box. You access it by holding down the Option key when you choose About QuarkXPress from the Apple menu. But if you use QuickKeys 2 or Suitcase II, you can run into problems, because those programs use the Option key to modify menus. Quark suggests that you change this menu-modifier key, but if you have an Apple Extended Keyboard, you don’t have to. Hold down the Option and Help keys, and the QuarkXPress Environment dialog box is all yours.

Jay Jemison
Birmingham, AL

Adobe Photoshop

Here are some handy Adobe Photoshop tricks from the magicians at Adobe:

Beyond Masking: Photoshop’s painting tools affect only the selected portion of a graphic, and it can be difficult to protect (or mask) an awkwardly shaped object or one that’s in the middle of an image you want to work on. A special kind of mask called a frisket lets you select the area you want to protect rather than the area you want to alter; it also keeps your document size smaller than it would be if you created masks in the usual way. To create a frisket, select the part of the graphic you want to shield and then choose the Inverse command from the Select menu. The area you’ve selected is now protected (see Figure A).

Magic-Wand Magic: The magic-wand tool sometimes fails to make the desired selection when it’s faced with an intricately shaped object, but you can get around this. If the object rests on a simple background, use one of the selection tools to choose the object and some of the background. Then remove the background from the selection by clicking on it with the magic wand while pressing the Command key.

Two Windows Are Better Than One: As with Illustrator 3.0, you’ll probably find it productive and helpful to open two Photoshop windows or views on the current graphic. Set one to display your file at its actual size and the other with a zoomed view. This can make working with small graphics or small details of larger graphics easier, and you can still see the graphic as it will appear in its finished size.

Figure A: A frisket, or inverse selection, protected the yellow flower from the effects of Photoshop’s painting tools.
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Hiding Files

Q. Are there any programs for the Mac that can "hide" the existence of a file so that it doesn’t appear in the directory window but also can’t be overwritten?

Frederick Wein
Plainsboro, NJ

Bob: Any program that allows you to edit a file’s attributes (such as CE Software’s DiskTop, Apple Computer’s ResEdit, or Symantec’s SUM II) can do what you ask. All you have to do is turn on the Locked and Invisible attributes (see Figure 1). To use the file, just reverse the process — use the same program to turn the Locked and Invisible attributes off.

68040 Upgrades?

Q. I am a dedicated Mac user and own an SE/30 that I use for everything, including a lot of processor-intensive applications. I want to upgrade, but I also want to wait and get a really first-rate upgrade. Are there any companies that are planning to offer a 68040 (25-megahertz) upgrade for an SE/30?

By the way, I am a high-school student working on extremely complicated designs for a mechanical/robotic arm. I need some expensive hardware, but I don’t have any money. Any ideas for getting either the money or the hardware?

Nate Sammons
Via CompuServe

Bob: I haven’t heard of any 68040 upgrades for the SE/30. But remember, I’m writing in January. I’m willing to bet that more than one third-party 68040 upgrade for the SE/30 will be introduced in 1991. As long as I’m gazing into my crystal ball, I also predict that Apple will introduce one or more new 68040 models sometime this year. An Apple-branded 68040 upgrade for the SE/30 is also a possibility.

As far as inexpensive “expensive” hardware goes, there are a couple of ways a savvy Mac user can save a few bucks on high-powered hardware. First, non-Apple peripherals and upgrades are almost always less expensive than their Apple-labeled counterparts. So if you’re looking for a big hard disk or monitor, consider vendors other than Apple.

Another thing to consider is buying used equipment. Used computers and peripherals...
In the beginning, there was nothing. Absolutely nothing, not a sausage. Then God said, "Let there be Light." And there was still nothing. But at least now you could see it.

**Eye and Body Saver?**

Q. I’ve seen many screen savers but I’ve never heard of an eye saver. Is there an INIT that could turn my monitor off every hour for five minutes or so and let me focus on something away from my computer? Louis Veillette
Via Zmac

Bob: Good question, Louis. But it’s more than just your eyes — your whole body is at risk. The National Academy of Sciences reports that more than half of all video-display and microcomputer users polled complained of eyestrain, headaches, and muscle pain, and BusinessWeek reports that RSI (repetitive-strain injury) is the fastest-growing occupational disease of the 1990s.

The best way to protect yourself is to take a break every so often and do something else. I know I should do this, but I forget more often than not, which is why I’m so impressed with a software product called LifeGuard.

LifeGuard is an INIT and DA from Visionary Software that interrupts your work at customizable intervals — with audible or visual notification — and reminds you to do something else (see Figure 2). It also keeps track of the number of keystrokes you’ve made in the past hour (according to the manual, experts recommend you keep your keystrokes to fewer than 12,000 per hour). The DA includes illustrated exercises for the eyes, neck, shoulders, back, arms, wrists, hands, and legs, plus ergonomic reference diagrams to help you create a workstation that won’t cause you pain.

Andy: Another solution is to keep a TV set on in the next room or better yet a small child. I guarantee you won’t get more than ten minutes’ work done at any one stretch.

**Daisywheel and Deal**

Q. I recently switched from an Apple II Plus to a Mac II. I love the more powerful word processors but hate the Mac’s dot-matrix printers. Is there a way I can hook up my old daisywheel printer to my Mac II and still get that letter-quality output?

Martin Asdorian, Jr.
Bedford, TX

Andy: Piece of cake, Martin — you just have two humongous problems to deal with before you can get started. Problem 1 is that only a printer with a serial interface can be connected to the Mac. (Interface here just means the way the printer’s hardware talks to the computer’s hardware, and there are two kinds: parallel, which is incredibly, amazingly fast, and serial, which is only amazingly fast.) If your old printer is serial, then you need a Mac II-to-ImageWriter I printer cable. If it’s parallel, you’ll have to find a way to convert the signal. There are a bunch of parallel-to-serial converters on the market, selling for anything from $50 to $150. Depending on how you set it up, the converter will either translate serial to parallel or (if you’re using a dot-matrix printer) it’ll translate the ImageWriter-type printer codes into your printer’s codes.

Problem 2 is persuading the Mac that it’s not hooked up to an ImageWriter or LaserWriter. See, one of the Mac’s high-scoring concepts is that each Mac program doesn’t have to know how to deal with several different printers. As long as the program plays by the rules, it can print on any printer whatsoever, assuming there’s a driver for that printer in the System Folder (the driver describes the printer, its features, and how it operates). That’s the good news. The bad news is that the only drivers Apple gives away (or even officially supports) are the drivers for its own printers, which are ImageWriters and LaserWriters.

Fortunately, drivers for non-Apple printers are available from lots of non-Apple companies, notably GDT Softworks. Its MacDaisy Link (about $50) is a set of drivers designed for use with more or less generic daisywheel printers, and should serve your needs just fine.

I have to tell you, however, that you can get by pretty well if you use the plain old ImageWriter driver — if you don’t mind some inconsistencies in spacing. When set to Draft mode, the ImageWriter driver sends raw ASCII text through the serial port, spacing the letters to approximate spacing.
what's on-screen (see Figure 3). The letters are printed in a monospaced font (such as Monaco or Courier) at the same size as your printer's typewheel (typically 10 or 12 points), and keep the fancy formatting to a minimum. It's a bit of a trade-off; an additional space may be added here and there (although on my printer it's hardly noticeable), but you're saving yourself $80.

The last cheapo solution is to do your word processing with a program that — like your old Apple II — deals only with plain ASCII text to begin with, such as the shareware DAs MiniWriter and McSink.

Managing User Access

Q. In one of our labs, we have ten Mac IIEs. We need a software package that allows the students to access installed applications, DAs, and fonts; copies their files to and from the hard disk via the floppy-disk drive; and prints their files. But we want to prevent them from accessing the Control Panel; initializing the hard-disk drive; accessing Set Startup; or copying applications, DAs, or fonts to and from the hard disk via the floppy-disk drive.

The perfect software package would let teachers access the Control Panel and regain full access to all aspects of the Mac by using a password. Does such software exist?

Guy Dalbec
Ottawa, Ontario Canada

Bob: A.M.E. from Casady & Greene is the only product I know of that can do everything you ask. Unfortunately, my experience with A.M.E. was mixed. Although it is easily the most powerful security product I've seen, the version I used, 1.1.3, rendered one of my hard-disk drives temporarily inaccessible, requiring me to send the drive to Casady & Greene for repair. (For what it's worth, Casady & Greene's tech support was excellent and the hard disk was returned within 48 hours with all its data intact.) In A.M.E.'s defense, there have been several bug-fix releases since then, and apparently the problem I experienced has been isolated and fixed in later versions (the current shipping version is 1.1.7, and Casady & Greene say version 2.0 may be out by press time.)

My advice: Give A.M.E. a try, but be sure you're religious about maintaining backups in case anything should go wrong.

Andy: I like ASD Software's FileGuard myself. It doesn't restrict access to the Control Panel, but it does allow you to set different access levels to folders, does, and applications.

The Dreaded Error Tones

Q. Drear! My Mac SE/30 gives me an error tone when I boot up first thing in the morning — not every day but often enough to cause concern. When I boot up the computer, the error tone sounds like "ba-baa bum" and the screen turns into a series of alternating horizontal black and white lines. My local dealer said it might be due to the moisture in my garage office; another technician said that it's probably damage to the motherboard or RAM and asked if I had done a memory upgrade recently. He said that the damage was probably static-related. I was pretty surprised by this, because I wore an antistatic wrist strap when I did the upgrade. The people from whom I bought the chips told me that static damage was rare and that they don't wear wrist straps even when they're working on their own machines. Is it possible that I did serious static damage to my Mac even while wearing a strap? If so, shouldn't you and mail-order RAM suppliers be more careful in warning people who install RAM themselves about the dangers? Also, why don't I get the error tones consistently? Help!

Dick J. Godbey
Columbia Falls, MT

Andy: Your letter brings up a whole basket of different topics, requiring me to separate them into different acts, just like an episode of "The Streets of San Francisco."

Act 1: The Error Tone. The Mac has a cryptic system of error ID codes, which is supplemented by a system of cryptic error tones. If there's a hardware problem, on startup you'll hear the specific tone that tells you it's time to send Apple some more money. Your "ba-baa bum" sounds like the beloved "Stage 2 RAM error." This means that your RAM is acting somewhat — but not terminally — screwy, which is consistent with an intermittent RAM problem.

To learn more about the Mac's error tones, the Library of Congress recommends Diagnostic Sound Sampler, a program that plays all the tones and explains what they mean (see Figure 4). You should be able to get a copy of this program from a user group such as BMUG (Berkeley Macintosh Users Group).

Act 2: Static Electricity. For the rest of the world, static electricity is what makes a balloon stick to the wall after you rub it on your head, but to computer jocks, it's a force of evil that zaps and destroys electronic components, especially RAM chips. Let there be no doubt that if you shuffle your feet across a carpeted floor on a dry winter day and then touch a SIMM, you'll probably fry the memory.

You need to take some precautions whenever you perform open-Mac surgery. A wrist strap (a band on your wrist that's wired to an electrical ground) is the usual antistatic weapon; any charge you build up passes harmlessly to ground instead of through your Mac. However, due to hairy wrists or a bad strap, sometimes these straps don't work. Personally, I just make a point of touching something big and metal (such as my steel work table or a wall plate) before opening the case. This is a sure way of liberating those pesky-up electrons.

Act 3: What Happened to Your Mac. I dunno, but something's definitely wrong with your memory, and static electricity is usually a good scapegoat for that kind of problem. The fact that it's a sporadic problem makes me suspicious — when a SIMM is killed by static electricity, it usually stays killed. The sporadic nature of the problem could be due to the moisture in your garage. In a certain range of meteorological situations, electrons can't reliably make their trip from the motherboard into the SIMM module.
Move the Mac into the house for a while or install a dehumidifier in your garage, and see if the problem goes away by itself. If not, then maybe the SIMM contacts have become dirty from dust and/or moisture. Get some TV tuner cleaner and clean all your SIMM's contacts (those silvery pads at the bottom of the SIMM) with a cotton swab. If you're adventurous, clean the sockets on the motherboard too; I do it by spraying cleaner on a strip of thin cloth, wrapping the cloth around the SIMM, and then inserting the SIMM into the slot a few times. (Cover-My- Rear-End Department: Remove the cloth before starting up your Mac.)

Another simple procedure is to swap suspect components for ones you know to be good. You could try replacing the new 1-megabyte SIMMs with your old 256K ones (you did save them, didn't you?), or if you have access to a friend's (or better yet, an enemy's) Mac, install your current SIMM set into another machine. If your Mac springs back to life or if the other Mac bites the clay Eskimo, then you know you have defective SIMMs.

Epilogue: Doing Upgrades Yourself. Upgrading memory may seem like a hazardous, daunting job, but once you've done it, you wonder why you were so worried about it. I'll go even further and say that opening up your Macintosh and taking an informed poke around its innards is invaluable educational.

The folks you bought the SIMMs from were telling you the Plain Truth about static electricity. If you first ground yourself (by touching an electrical ground or by wearing a wrist strap), your Mac's chances of becoming a victim of static are next to nil. If you're just plain rolling in dough, then sure, spend the extra $100 or $200 to have an upgrade inflicted by a professional. The only advantage is that if
something goes wrong — all together now — you’ll have someone to sue.

Although thousands of folks use and swear by wrist straps, there is a very vocal minority that feels that providing electronics with a path to ground via your own body may not be such a great idea, in that it may increase your chances of electrocution. Personally, I’m very skeptical of this and haven’t heard of any strap-related injuries, but I am presenting the info anyway.

**CD-ROMs on a Laserdisc Player?**

Q. Is it possible to play a CD-ROM on a video laserdisc player?

Lisa Scott
Austin, TX

Bob: Interestingly, you can play music CDs on the Apple CD-ROM drive. Apple even provides you with a nifty remote control — CD Remote — to let you choose which song you want to hear (see Figure 5).

But to answer your question, Lisa, No, you can’t play a CD-ROM on a laserdisc player — not yet, anyway. I’m waiting for a universal laser player that reads CD-ROMs, audio CDs, and video laserdiscs. I expect it won’t be long before one is announced. When one does appear, as long as it’s not ridiculously expensive, you’ll find me first in line to buy it.

**Devices with Only One SCSI Port**

Q. I have two devices — a scanner and a CD-ROM drive — that each have one SCSI connection. Is there any way to connect both devices on the same SCSI bus? I don’t look forward to turning off my Mac, disconnecting one device, connecting the other, and then restarting each time I want to use one or other of the devices. This is especially inconvenient if I’m working on a DTP project in which I’m using the scanner as well as clip art from the CD-ROM drive.

Paul Selser
Salem, OR

Bob: I think you’re out of luck. If a device has only one SCSI port, it has to be the last device in the SCSI chain. Because you have two devices that have only one SCSI port and only one device can be the last device in the chain, one device will have to remain unconnected.

There may be a solution, however. Tecomar ships a “T” connector with its single-SCSI-port tape drives. You can buy the connectors individually through a dealer for $79 (part number 811677). If you’re feeling creative, you might be able to jury-rig one of your own with some 50-pin connectors and ribbon cable, but there’s no guarantee this homemade connector will work properly in your setup.

Andy: If you have an extra Macintosh handy (huh?), you could always hook it up to the CD-ROM drive, establish it as an AppleShare file server, and then AppleTalk it to your personal Macintosh. You’ll then have both the CD-ROM drive and the scanner available simultaneously, but I kind of doubt that this was the solution you were hoping for (unless, of course, you have a large expense account or you work for the government!).

---

**No Wild, No Wildlife.**

Life in the wild can be pretty tough these days. Without the necessary ancient-forest habitat to live in, some species like the northern spotted owl of the Pacific Northwest are severely threatened.

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To learn more about our work protecting the forest habitats of endangered species such as the northern spotted owl, please write us at:

Sierra Club, Dept. PB
730 Polk Street
San Francisco, CA 94109
(415) 776-2211

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*1000, if you took the test prior to September 1977

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Please circle 155 on reader service card.
Welcome to MiniFinders, your personal buyer’s guide. This month’s installment features a round-up of hardware products reviewed and rated over the past few years. For more recent reviews of color products and fax modems, please see the lab reports in this month’s issue. MacUser editors carefully select and evaluate each product, assigning ratings from one to five mice, in half-mouse increments. All the ratings are relative within a category, and because the market is always changing, our ratings change too. We’ve indicated all of our Eddy (Editors’ Choice) Award winners with a *, along with the year in which they were recognized for their excellence.

**MINIFINDERS INDEX**

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**Display Systems**

**Apple AppleColor High-Resolution RGB Display**

The 15-inch AppleColor High-Resolution RGB Display sets the standard for monitors for focus and color quality. It’s very bright with no built-in glare protection. Can support 24-bit color when used with the Apple Macintosh Display Card 8x24 and 8x24ac. Its 69-dpi screen resolution gives a slightly larger-than-WYSIWYG image. Very reliable workhorse. Requires video card (optional with Mac LC, IICi, or IIsi). $999, with Display Card 48. $1,647. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014. (800) 776-2333 or (408) 996-1010. (Apr ’90)

**Apple Portrait Display**

The 15-inch Portrait Display features a bright, crisp display; good glare protection; perfect geometry; and almost no nuisance factors. Can produce up to 256 gray levels, using a Macintosh Display Card 8x24. Its cable is odd — make sure it fits your card. No software is included. Requires Mac II series with video card (optional with Mac IICi and IIsi). $1,099; tilt-and-swivel stand, $89. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014. (800) 776-2333 or (408) 996-1010. (May ’90)

**Apple High-Resolution Monochrome Display**

The Apple High-Resolution Monochrome Display is a 12-inch monochrome landscape-oriented monitor that can accommodate the full width and more than half the length of a letter-sized page. It has a dim screen with average focus. Requires Mac II series with video card (optional with Mac IICi and IIsi). $299; with 1-bit video card, $498. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014. (800) 776-2333 or (408) 996-1010. (Apr ’90)

**CalComp DrawingCard ChromaVision**

This 21-inch color monitor features good focus, sharpness, and color tracking. It is capable of displaying two A4 pages. Has uneven screen coloration. Requires Mac II series, 8-bit ChromaVision Plus, $8,595. CalComp, 2411 W. La Palma Ave., Anaheim, CA 92801. (800) 722-2667 or (714) 821-2000. (May ’90)

**CalComp DrawingCard GrayVision**

This expensive display system offers good glare protection and a tiltable/adjustable stand. It has a few problems that are too serious to ignore, however, including below average ratings in sharpness and focus. Its video card is not color-capable. Requires Mac II series. $3,195. CalComp, 2411 W. La Palma Ave., Anaheim, CA 92801. (800) 722-2667 or (714) 821-2000. (Oct ’90)

**Cutting Edge Full Page Display**

The Cutting Edge Full Page Display is a 15-inch monochrome monitor with average image quality. Screen geometry is good, and nuisance factors are minimal. More expensive than comparable monitors. Requires Mac Plus or later. $899. Cutting Edge, 97 S. Red Willow Rd., Evanston, WY 82930. (307) 789-0582. (Feb ’91)

**Digi Technology IntGlobal Display**

Full Page Display!!!

The Digi Global Display is a 16-bit color display designed for users who need a large screen area to view full-tabloid-sized pages. Image quality is impressive, because it’s competitive with that of smaller color displays. Comes with a monochrome or gray-scale card. Requires Mac II series. $2,495. Digi Technology, 50 W. 1200 S., Orem, UT 84058. (801) 226-2984. (Feb ’91)

**E-Machines ColorPage 15**

The 15-inch ColorPage 15 offers good glare protection and excellent software. It suffers from dim display, poor focus, and poor color quality. $1,595. E-Machines, Inc., 9305 S. W. Gemini Dr., Beaverton, OR 97005. (800) 344-7274 or (503) 646-6699. (May ’90)

**E-Machines ColorPage T16**

The ColorPage T16 is simply one of the best and brightest 8-bit color monitors. It’s a razor-sharp Sony Trinitron display with nearly perfect color, and the video card is included. Requires Mac II series with NuBus adapter. $2,998. E-Machines, Inc., 9305 S.W. Gemini Dr., Beaverton, OR 97005, (800) 344-7274 or (503) 646-6699. (May ’90)

**E-Machines TX 25**

The TX uses the same physical monitor as the T16 but includes a higher-resolution video card. Requires a four-dpi setting. It’s a good choice for CAD and small desktop systems, but it can text hard to read unless the type size is increased. Requires Mac SE/30 or II series with NuBus adapter. $4,495. E-Machines, Inc., 9305 S. W. Gemini Dr., Beaverton, OR 97005. (800) 344-7274 or (503) 646-6699. (May ’90)

**E-Machines QuickView Z21**

The Z21 uses the same physical monitor as the T16 but includes a higher-resolution video card. Requires a four-dpi setting. It’s a good choice for CAD and small desktop systems, but it can text hard to read unless the type size is increased. Requires Mac SE/30 or II series with NuBus adapter. $4,495. E-Machines, Inc., 9305 S. W. Gemini Dr., Beaverton, OR 97005. (800) 344-7274 or (503) 646-6699. (May ’90)

**E-Helman Full Page Monitor**

The E-Helman Full Page Monitor features a 15-inch monochrome screen, is well worth the investment. Excellent performance is not as high as that of more expensive monitors and image quality is average, but this is still a good bargain. Requires Mac Plus or later. $299. E-Helman, Engineering, Inc., 97 S. Red Willow Rd., Evanston, WY 82930. (800) 257-1666 (or 307) 789-3830. (Feb ’91)

**Generation Systems CT-II**

This 19-inch monochrome monitor scores above average in brightness and focus but only fair in its nuisance rating. Includes Stepping Out II software. Requires SE, SE/30, or Mac II. $899. Generation Systems, Inc., 97 S. Red Willow Rd., Evanston, WY 82930. (800) 257-1666 or (307) 789-3830. (Apr ’90)

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**MICE RATINGS**

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<td>Apple</td>
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<td>Good color accuracy and excellent software support.</td>
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<td>Digi Technology</td>
<td>3.5</td>
<td>Good color accuracy, but software could be improved.</td>
</tr>
<tr>
<td>E-Helman</td>
<td>4.5</td>
<td>Great color accuracy, but software could be improved.</td>
</tr>
</tbody>
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**MacUser** May 1991 277
excellent color and software. Mac II or SE/30, 8-bit, $3,999; Mac II, 24-bit, $4,999. Generation Systems, 1155 South Endor Dr., Sunnyvale, CA 94086. (415) 448-8231 or (408) 734-2100. (May '90)

MacProducts
MagicView Color $$$

This 14-inch color monitor features excellent convergence and some of the best gray linearity available, helping it to display subtle image variation. A bloomy screen and lack of software diminish its value. Requires Mac SE/30 or II series. Mac II, 8-bit, $699; SE/30, 8-bit, $719. MacProducts USA, Inc., 8303 Mopac Expwy., #218, Austin, TX 78759. (800) 622-3475 or (512) 343-9441. (May '90)

MacProducts MagicView 19 $$$

MagicView's solid 19-inch monitor has bright display, above-average MTF-sharpness ratings, and fair focus. $899. MacProducts USA, Inc., 8303 Mopac Expwy., #218, Austin, TX 78759. (800) 622-3475 or (512) 343-9441. (Apr '90)

MacTel Technology Index
Portrait Display System $$$

The Index Portrait Display provides a 15-inch diagonal monochrome screen with high-average image quality. Focus is below average but adequate. More expensive than comparable monitors. Video cards are available for the SE, SE/30, and Mac II family. Comes with tilt/swivel stand. $625. MacTel Technology, 3007 N. Lamar Blvd., TX 78758; (800) 950-8411 or (512) 451-2600. (Feb '91)

Mass Microsystems
ColorSpace II/IX $$$

The Mass Microsystems ColorSpace II/IX monitor board combo brings live 24-bit video to the Mac. The FX board converts composite Ntsc 4.43 or 24-bit video signals to RGB for display on a Mac monitor. The II kit lets you mix live video with computer graphics. Utilities include the Digitizer DA, Desktop Video DA, and MacTV. The software is somewhat quirky, but the boards deliver true live video/ overlay functionality. Requires Mac II series. $2,299.95; ColorSpace FX, $3,499.95; cable, $99.95. Mass Microsystems, Inc., 810 W. Maude Ave., Sunnyvale, CA 94086. (415) 722-7079 or (408) 522-1200. (Mar '90) *88 Eddy

Megagraphics
Megagraphics Megaseen 2000 $$$

This 19-inch monitor rates low on the sharpness scale but offers good focus and excellent color. A16-inch video card is available. Mac II, 8-bit, $3,999; SE/30, 8-bit, $6,198. Megagraphics, 439 Calle San Pablo, Camarillo, CA 93012. (800) 423-0183 or (805) 488-3797. (May '90)

MegaGraphics
Megagraphics Megasync Rival $$$

This 19-inch monochrome monitor features superior performance for playing true whites and deep blacks. Excellent brightness and average focus make it a smart choice. Mac Plus, $1,748; Mac SE/30, SE/30, $1,600. MegaGraphics, 439 Calle San Pablo, Camarillo, CA 93012. (800) 423-0183 or (805) 488-3797. (May '90)

Micro Display MacGenius $$$

This 15-inch monochrome monitor offers a bright display and innovative software that includes inverse-video capabilities. It gives Plus and SE users an attractive video option. Some installation difficulty. Requires Mac Plus, SE, or II series. Mac II series, $1,495; Plus or SE systems, $995. Micro Display Systems, 755 E. 31st St., Fort Lauderdale, FL 33316. (800) 372-4673 or (410) 473-2233. (Apr '90)

Mirror Technologies
PixelView I $$

This monochrome 24-bit display is unlike anything that has been on the Mac market. It can be used with a Mac Plus, for which it includes special software. Image quality is average; $567. Mirror Technologies, 2644 Parrot Rd., Roseville, CA 95651. (800) 654-5294 or (621) 633-4450. (Feb '91)

Mitoshiba Technologies
One Page Display $$$

A good choice for SE owners, the 15-inch monochrome One Page Display offers an interface card with a CPU accelerator to speed up processing. Screen-extension software for the SE is also included. Requires Mac SE, SE/30, or II series. $795. Mitoshiba Technologies, Inc., 5835 Doyle St., Emeryville, CA 94608. (800) 669-0556 or (415) 654-0556. (Feb '91)

Monitorm Viking 272 $$$

This 19-inch monochrome monitor has excellent sharpness ratings. Requires Mac SE, SE/30, or II series. $1,795. Monitorm, 5740 Green Circle Dr., Menlo Park, CA 94025. (650) 925-4151. (Apr '90)

Monitorm Viking 2400 $$

Monitors are generally hard to focus, and the 24-inch Viking 2400 is no exception. It offers OCLI coating for glare protection, however. Requires SE or II series. $2,995. Monitorm, 5740 Green Circle Dr., Menlo Park, CA 94025. (650) 925-4151. (Apr '90)

Nutmeg 19 Monochrome $$$

This 19-inch monochrome monitor is bright, with average focus and fair geometry. It offers Stepping Out II software. Requires Mac SE, SE/30, or II series. $1,695. Nutmeg Graphics Systems, 25 South Main, New Canaan, CT 06840. (203) 966-3226. (Apr '90)

PCPC II 19

Color Graphics System $$

This 19-inch PCPC monitor has average sharpness, average gray linearity, and good convergence. Color is excellent. The display reveals a noticeable flicker. It does Stepping Out II software. The 16-bit model is available for SE/30 system. Mac II, 8-bit, $5,995. Personal Computer Peripherals Corp., 4710 Eisenhower Blvd., Santa Clara, CA 95052. (408) 622-2888 or (813) 884-3092. (May '90)

Princeton Publishing
PictView II $$$

This monitor received poor geometry and focus ratings. Not recommended. Requires Mac SE or later. $555; with board for Mac SE or SE/30, $845. Princeton Publishing Labs, Inc., 101 Business Park Dr., Ste. 100, Skillman, NJ 08558. (609) 924-1153. (Feb '91)

Raster Color Display $$$

The Raster Color Display uses a 19-inch Sony Trinitron tube. Designed primarily for Mac II, 8- and 24-bit color is supported. The 82-dpi screen resolution isn't WYSIWYG, but the display can show two full 8.5 x 11 -inch pages. Low MTF-sharpness, good focus and fair convergence, and excellent software. The 24-bit model has an optional QuickDraw accelerator. Requires Mac II series, Mac II 8- and 8-bit, SE/30, Mac II, 24-bit, SE/30. Radius, Inc., 1710 Fortune Dr., San Jose, CA 95131. (800) 227-2795 or (408) 434-1010. (May '90)

Raster Pivot $$$

The Raster Pivot is an impressive 15-inch flat-panel monitor that features a high-quality display with great focus and excellent brightness. It's expensive, but it has the unique ability to rotate 90 degrees between portrait and landscape orientation. A good monitor on the brink of being great. Requires SE/30 or Mac II series. $1,600. Radius, Inc., 1710 Fortune Dr., San Jose, CA 95131. (800) 227-2795 or (408) 434-1010. (Feb '91)

Raster Two Page Display/19$$$

The Raster Two Page Display/19 is a bright, well-focused, 19-inch monochrome display system that comes with Radius' justly famous software, which includes tear-off menus and screen-capture capabilities. This unit is expensive compared with similar systems. Requires Mac SE, SE/30, or II series. $1,900. Radius, Inc., 1710 Fortune Dr., San Jose, CA 95131. (800) 227-2795 or (408) 434-1010. (Apr '90) *88 Eddy

Relax Ikenaga Trinitron $$$

An annoying flicker and a slight tear-off menu are the only two noticeable faults of this otherwise solid 20-inch monitor. Excellent sharpness. $4,995. Relax Technology, 3101 Whipple Rd., Unit C, Fremont, CA 94538. (650) 848-1313 or (415) 471-6112. (May '90)

Sigma Designs
ColorMAX 8/24$$$

The 19-inch ColorMAX 8/24's videocard can be easily converted from 8 bits to 24 bits for users wanting 16.8 million colors. Good price performance. But it lacks software. Requires Mac II series, 8-bit system, $6,095; 24-bit system, $6,695. Sigma Designs, 4601 Landing Pkwy., Fremont, CA 94538, (415) 770-0100. (May '90)

Sigma Designs L-View $$

This 17-inch monochrome monitor leads the pack in sharpness and focus. Includes exceptional software. Requires Mac SE, SE/30, or II series. $2,495 for Mac SE, $2,995. Sigma Designs, 4601 Landing

May 1991 MacUser
**Objective focus despite high MTF.**

This full-page monochrome monitor offers multiple resolutions — 72, 80, and 88 dpi. Performance is good, and the screen is clear. 4-bit Agfa Focus SBOOGS is just the monitor with cable, weight mirror on the user's forehead, compact receiver unit and a puff switch. The standard keyboard arrangement is visible on screen.$1,985. Chinon Electronics, Sharp Plaza, Mahwah, NJ 07430. (201) 529-8200. (Sept '90)

**INPUT DEVICES**

- **Abaton 8-bit Apple Upgrade**
  - This upgrade kit turns an 8-bit Apple Scanner into an improved 8-bit Abaton 500GS with access to 256 gray levels. $395. Abaton Technology, 48431 Milpom Dr., Fremont, CA 94538. (415) 683-2226. (Sept '90)

**SuperMac 19" Platinum**

This monitor performs exceptionally well and has a complete feature set, including a color-cancelable card, hardware pan and zoom, a virtual desktop, and glare protection. Excellent focus, geometry, and lack-of-nuisance ratings. Average-brightness and sharpness. Requires Mac II series. $1,999; monochrome card, $499. SuperMac Technology, 485 Potrero Ave., Sunnyvale, CA 94086. (415) 424-2202. (May '90)

**Trinitron Display**


**SuperMac SuperMatch 19" Color Display**


**A Taxan Crystal View**

This 19-inch monochrome monitor is bright — but has poor subjacency. Exceeds the high MTF, $1,695. Taxan, 161 Nortech Pkwy., San Jose, CA 95134. (408) 946-3400. (Apr '90)

**Complete PC Complete Half-Page Scanner/400 I/2**

This black-and-white hand-held scanner features true 400 dpi resolution, making it an excellent OCR tool. $399. Complete PC, 1983 Concourse Dr., San Jose, CA 95131. (800) 634-5558 or (408) 434-0165. (Sept '90)

**DataDesk International Switchboard**

This modular, customizable keyboard has three standard modules — a cursor keypad, a numeric keypad, and a QWERTY alpha-numeric keyboard — that users can rearrange to satisfy their ergonomic needs. A trackball module is optional.$239.55. DataDesk International, 9330 Eton Ave., Chatsworth, CA 91311. (818) 826-5998, (800) 883-0602 (CA), or (818) 998-4200. (Nov '90)

**DEST PC Scan 3000**

This gray-scale flatbed scanner control makes every image from 1.95e-5. DEST, 1015 E. Brokaw Rd., San Jose, CA 95131. (408) 436-2700. (Sept '90)

**Hewlett-Packard ScanJet Plan**

This gray-scale flatbed scanner is fast and easy to use. Excellent, intuitive software.$2,190. Hewlett-Packard, 1901 Pruneridge Ave., Cupertino, CA 95014. (800) 752-6000 or (408) 725-8900. (Sept '90)

**HawkScanner 3511**

This flatbed scanner is very large and somewhat slow. Includes powerful color controls in software. Poor OCR. Requires Mac II series, $8,195. Howke, 21 Park Ave., Hudson, NH 03051. (603) 828-5200. (Sept '90)

**HawkScanner 3511**

This flatbed scanner beats the other two slide scanners we tested in only one area — price. Given its slow scan times, poor color fidelity, and unfriendly software, the low price fails to compensate for its overall poor performance. Usable images can be obtained after much tweaking from an application such as Adobe Photoshop.$6,995. Howke, 21 Park Ave., Hudson, NH 03051. (603) 828-5200. (Sept '90)

**Logitech ScanMan Model 32**

Logitech's sharp-looking hand-held black-and-white scanner produces excellent line art and includes the nifty ability to scan a graphic from top to bottom, from left to right, or from right to left. Its 8-bit dithering capability is a little inconsistent.$499. Logitech, 6505 Kaiser Dr., Fremont, CA 94555. (415) 795-8500. (Sept '90)

**Microtek MSF-300GS**

This 300-dpi monochrome overhead scanner has poor resolvability and uneven contrast but includes a nice software bundle.$797. Microtek Technologies, Inc., 2644 Patton Rd., Roseville, CA 95651. (800) 654-5204 or (612) 633-4359. (Sept '90)

**Nikon LS-3500**

This color-slide scanner could use friendlier software, but its excellent resolution and wide range of controls makes it a good buy. Focusing and calibration are automatic. Has variable input resolution but lacks postprocessing capabilities. Requires Mac II series with 2 megabytes of RAM.$9,995. GIBP board, $495. Nikon, 1300 Walt Whitman Blvd., Melville, NY 11747. (516) 547-4200. (Sept '90)

**Pentax SB-A300 Model 2**

Poor gray-scale performance accounts for this gray-scale flatbed's low rating. Scans to RAM only. $1,799. Pentax Technologies, 100 Technology Dr., Broomfield, CO 80020. (303) 460-1600. (Sept '90)

**FreeWheel Pointer**

The FreeWheel Pointer lets users control their Mac by bouncing infrared light off a small lightweight mirror on the user's forehead. Compact receiver unit and a puff switch. The standard keyboard arrangement is visible on screen.$1,985. Microscan Inc., One Mill St., Burlington, VT 05401. (800) 537-1562 or (802) 658-3260. (Oct '89)

**Sharp JX-100**

This inexpensive portable color scanner is actually a hybrid handheld/flatbed scanner. Good resolvability but low resolution. Scans to RAM only. Requires 4-megabyte Mac II. $995. Sharp Electronics, Sharp Plaza, Mahwah, NJ 07430. (213) 321-2121. (Sept '90)

**Thunde erware LightingScan 400**

This handheld gray-scale scanner has good resolution and performance combined with innovative...
software. $495. Thunderware, Inc., 21 Orinda Way, Orinda, CA 94563. (800) 445-1166 or (415) 281-0311. (Sept '90)

**TRUVEL T2-3**
The TRUVEL T2-3 is a high-end gray-scale overhead scanner with exceptional resolution (900 dpi), simultaneous hard-copy output, and the ability to handle large documents. Even uneven illumination at edges. Scans only to RAM. $7,785. TRUVEL Digital Imaging, 6043 Walsh AVE. Chatsworth, CA 91311. (818) 407-1031. (Sept '90)

**UMAX UG80**
The UMAX UG80 gray-scale flatted scanner has excellent resolvability and gray-scale capability. Convenient to use and easy to maintain. $1,695. UMAX Technologies, 2352 Walsh Ave., Santa Clara, CA 95051. (800) 562-0311 or (408) 982-0771. (Sept '90)

**VARIYPER 1200**
The VARIYPER 1200 features high resolution. Excellent OCR capabilities and powerful software controls. The 1200 system is an enhanced Version 1.0 Professional Box, a 210-megabyte hard disk drive, and a Radius 19-inch gray-scale monitor. $29,000. VARIYPER, 11 M. Pleasant Ave., East Hanover, NJ 07936. (201) 887-8000. (Sept '90)

**WACOM SD-510C**
The WACOM SD-510 Cordless Digitizer uses a pressure-sensitive stylus that's much more responsive than a mouse. It is light and very thin unit requires neither a cord nor a battery. The table connects to the modem port. Its sensing area is 6 x 9 inches. The resolution is 770 lpi at high accuracy. At $695, it includes the Pressure Point program. Wacom, Inc., 115 Century Rd., Paramus, NJ 07652. (800) 922-6613 or (201) 265-4226. (June '90)

**MINIFINDERS**

The ponderous performance of this CD-ROM drive makes it lag far behind many other drives. The built-in speaker is inadequate for working with audio, but it doesn't account for the box's large size. You can also operate it as a standalone audio player. $750. DTP, 47421 Bayside Pkwy., Fremont, CA 94538. (800) 825-8150 or (415) 656-8041. (Feb '91)

**DENON DR-253**

This SyQuest-based removable manganic-disk cartridge drive comes in a plastic (not metal) case, and includes a one-year warranty. Documentation is well written. Bundled diagnostic software is rudimentary. With cartridge, $675; additional cartridge, $72. Bay Microsystems, Inc., 210 Columbus Ave., Suite 108, San Francisco, CA 94133. (415) 563-8826. (Feb '91)

**Ray Microsystems 300**
The Ray Microsystems 300 is a high-quality drive with an actual capacity of 291 megabytes. It includes good software but has slow seek times and low throughput. On the plus side, it does include a SyQuest drive, $750. CMS Enhancements, 2722 Michelleon Dr., Irvine, CA 92715. (714) 222-6000. (Dec '90)

**CONVERSION DYNAMICS Optirade EOD-650 5**

Conversion Dynamics is an erasable optical drive that has a good speed rating. It has an auto-switching power supply and includes Redox software. Support is toll-free. $3,450. Conversion Dynamics, 1200 Corporate Dr., Suite 150, Birmingham, AL 35242. (205) 991-8638. (Nov '90)

**Corel 50 MB Removable Cartridge Drive**

This metal-enanced Ricoh-based removable magnetic-disk cartridge drive is durable. It lacks speed, however, and documentation is sparse. Drive with kit, $1,295; kit only, $1,195. Corel, 1600 Carling Ave., Suite 190, Ottawa, Ontario K1Z 8R7, Canada. (613) 728-8200. (Feb '91)

**Dell 330 EOD-650**
The Dell 330 is a 321-megabyte hard-disk drive. Its seek times and throughput rate are average. It has one of the largest cases for hard-disk drives of similar capacity. Dell provides good customer support. $2,350. Dell, 50F E. Wilson Bridge Rd., Worthington, OH 43085. (800) 288-4375 or (614) 433-0045. (Dec '90)

**Cutting Edge 44 MB Removable Cartridge Drive**

This sturdy, well-built SyQuest removable-cartridge drive comes in a metal case. Includes dual-fuse protection and two switched AC outlets. $1,850 or (415) 656-8041. (Feb '91)

**DATA ENHANCEMENTS ProCase FD1045-RM**

This SyQuest magnetic disk-cartridge drive comes with powerful software. It supports A/UX drive partitioning and has a competitive speed rating. Requires Mac Plus or later. $989. Data Enhancements, Inc., 31328 Via Colinas, Unit 102, Westlake Village, CA 91362. (818) 879-2700. (Feb '91)

**Data Enhancements ProSystem PS1350**

The Data Enhancements ProSystem PS1350 is a hard-disk drive with a capacity of 330 megabytes. Its seek times are average, and its throughput is low. $3,189. Drive with excellent documentation and auto-switching power supply, $999. CMS Enhancements, Inc., 2722 Michelleon Dr., Irvine, CA 92715. (714)222-6000. (Feb '90)

**Corel 50 MB Removable Cartridge Drive**

This metal-enanced Ricoh-based removable magnetic-disk cartridge drive is durable. It lacks speed, however, and documentation is sparse. Drive with kit, $1,295; kit only, $1,195. Corel, 1600 Carling Ave., Suite 190, Ottawa, Ontario K1Z 8R7, Canada. (613) 728-8200. (Feb '91)

**Dell 330 EOD-650**
The Dell 330 is a 321-megabyte hard-disk drive. Its seek times and throughput rate are average. It has one of the largest cases for hard-disk drives of similar capacity. Dell provides good customer support. $2,350. Dell, 50F E. Wilson Bridge Rd., Worthington, OH 43085. (800) 288-4375 or (614) 433-0045. (Dec '90)

**DENON DR-253**

This SyQuest removable-cartridge drive features a vertically mounted drive encased in sturdy metal. Its built-in speaker is inadequate for working with audio, but it doesn't account for the box's large size. You can also operate it as a standalone audio player. $750. DTP, 47421 Bayside Pkwy., Fremont, CA 94538. (800) 825-8150 or (415) 656-8041. (Feb '91)

**DIT CubeFlyppity 1.4**

The CubeFlyppity 1.4 is a compact 3.5-inch floppy drive that reads DOS 720K and 1.4-megabyte disks. Includes capability to initialize, mount, and unmount UNIX floppy images, and as a command-line interface. Doesn't read or write Mac-formatted disks, but that capability is planned for the future. With software, $680; software only, $250. Digital Instrumentation Technology, Inc., 901 18th St., Suite 11000, Los Alamitos, CA 90734. (505) 662-2119. (Dec '90)

**Ehman 45 MB Removable**

This SyQuest removable-cartridge drive performs well. It has excellent documentation and an easy-to-use graphical interface. Doesn't play Mac-formatted disks, but that capability is planned for the future. With software, $680; software only, $250. Digital Instrumentation Technology, Inc., 901 18th St., Suite 11000, Los Alamitos, CA 90734. (505) 662-2119. (Dec '90)
performance tests. Requires any Mac. $5,495. Ehman Engineering, Inc., 97 S. Red Willow Rd., Evanston, IL 60202. (800) 669-6606 or (303) 789-3830. (Feb '91)

**Fifth Generation**

FastBack Tape $45.90

FastBack Tape drives offer everything you need to back up your data in one convenient package: an FB/120 tape drive, FastBack II 2.10 manuals for the tape drive and FastBack II. A 3.5-in. disk drive, a block terror, a preformatted DC/120 minicard, and all the necessary cables. It is costly and a little slow compared with other backup devices, but if tape is your backup of choice, you'd be hard-pressed to find a more polished product. $1,395. Fifth Generation Systems, 10049 N. Reiger Rd., Baton Rouge, LA 70809. (800) 873-4384 or (504) 291-7221. (July '90)

**New Products**

FWB HammerDisk44 $1,395

The Beverley Technologies model 44 is a pricier, high-quality storage unit. It features a metal case, a well-designed power supply, and integral backup and recovery, an efficient cooling system, high-quality formatting software, and easy-to-use documentation. Outstanding value. $1,395. FWB, 2040 Polk St., Suite 215, San Francisco, CA 94109. (415) 474-8055. (Feb '91)

FWB Hammer 330 $1,000

The Beverley Technologies model 330 is a hard-disk drive with an actual capacity of 323 megabytes. Highly recommended as a network server because of its superquick seek times and high throughput, this drive just missed a five-mouse rating because of its undistinguished proprietary software and general metal case. $3,495. FWB, 2040 Polk St., Suite 215, San Francisco, CA 94109. (800) 474-8055 or (415) 474-8055. (Dec '90)

**New Products**

FWB HammerDisk 600S $1,395

The Sony-based FWB HammerDisk 600S has one of the best software utilities. $4,495. FWB, 2040 Polk St., Suite 215, San Francisco, CA 94109. (415) 474-8055 or (415) 474-8055. (Nov '90)

**FWB HammerDisk 600S $1,395**

The Sony-based FWB HammerDisk 600S has one of the best software utilities. $4,495. FWB, 2040 Polk St., Suite 215, San Francisco, CA 94109. (415) 474-8055 or (415) 474-8055. (Nov '90)

**GCC UltraDrive 430S $1,495**

The GCC UltraDrive 430S is a high-throughput hard-disk drive with a capacity of 428 megabytes. Highly recommended for storing large database, graph-
MiniFinder

The Ocean Microsystems Tidalwave 650 is a solid product, offering high speed and quality performance in an erasable optical drive. It includes MacTools Deluxe and the Procomm MDO110 software for managing backup, data migration, and erase a 650-megabyte cartridge.

The Procomm MD320 is a 323-megabyte hard-disk drive that features fast seek times and high throughput. $3,295. Procomm Technology, 200 McCormick Ave., Costa Mesa, CA 92625. (714) 549-9449. (Dec '90)

The PM1 Floppy Drive is a floppy-disk drive for Next software with an archive log but has slow performance. The included software can combine many discs into a single volume. $4,795. RACET computes, 3105 Birch St., Brea, CA 92621. (714) 579-1725. (Nov '90)

Relax Optical 600 Plus $$$

The Relax Optical 600 Plus is a 329-megabyte hard-disk drive. It features the fastest seek times among comparable drives, but has only average throughput. $3,115. RACET computes, 3105 Birch St., Brea, CA 92621. (714) 579-1725. (Dec '90)

Relax Mobile 42 $$$

The Mobile 42 is a SyQuest-based magnetic disk cartridge drive, includes an auto-switching power supply and a built-in surge protector. The formatting software is powerful and includes a very quiet fan. Comes with a cartridge. $529. Relax Technology, Inc., 3101 Whipple Rd., Union City, CA 94587. (800) 848-1313 or (415) 471-6112. (Dec '90)

Optima Minifax 310 $$$

The Optima Minifax 310 is a pricey 311-megabyte hard-disk drive featuring slow seek times. It has a small plastic case and good software. $3,295. Optima Microsystems, Inc., 246 E. Hacienda Ave., Campbell, CA 95008. (800) 262-3261 or (408) 374-8200. (Feb '91)

Ruby Systems StarDrive 45RX $$$

The SyQuest-based StarDrive is a small and a little pricey. It includes excellent documentation and an extensive troubleshooting guide. It has a meaty case. $995. Ruby Systems, Inc., 930 Thompson Pl., Sunnyvale, CA 94086. (800) 888-1668 or (408) 735-8855. (Feb '91)

Storage Dimensions MacinStor MCE 880-HC1 $$$

The MacinStor MCE 880-HC1 (formerly known as the MacinStor) offers the largest storage capacity — 1 gigabyte — available. It features an outstanding read rate, making it ideal for read-intensive applications. The non-standard format that it uses is 1-gigabyte capacity can't be read by other drives, however, so don't plan to use cartridges with this format in other manufacturers' drives. In standard mode, the MacinStor can format, read, write, and erase a 650-megabyte cartridge, but its performance suffers when it uses this type of cartridge. Package includes Retrospect backup software, Disk Dimensions, 2145 Hamilton Ave., San Jose, CA 95125. (408) 879-0300. (Nov '90)

Storage Dimensions 325-S1 $$$

The Storage Dimensions 325-S1 is a high-throughput, superquick 326-megabyte hard-disk drive with excellent seek times. Highly recommended as a network server. It has a large custom plastic case — the front pops off to reveal that the unit is protected inside a second mechanism in the same housing. This is a nice option if you need to add more storage capacity in the future. $3,499. Storage Dimensions, 2145 Hamilton Ave., San Jose, CA 95125. (408) 879-0300. (Dec '90)

Snap-on SSR50 Removable $$$

The Sumo SSR50 is a slow Iomega-based removable-cartridge drive that comes in a sturdy and durable case, designed for use in high-traffic conditions and partitions and provides unlimited
data storage in 50-megabyte increments. Good documentation. $1,300. Sumo Systems, 1580 Old Oak Rd., Suite C-103, San Jose, CA 95113. (408) 453-5744. (Feb '91)

Sumo Systems RSSM6000-B

This Sumo RSSM6000-B is a slow erasable optical drive with meager software. Its default format is not ISO. Includes an Option-key sequence format as its ISO standard, Plus/4, and a high cost of the drive because of poor positioning. Processing is somewhat slow. $1,395. Univation, 600 Valley Way, Millpitas, CA 95035. (Feb 90) 263-1200. (Feb '90)

**Xyis XY6000R**

The Xyis XY6000R is an erasable optical drive with very slow performance. Its bundled software includes dynamic partitioning. $5,245. Xyis, 14631 Martin Dr., Eden Prairie, MN 55344. (612) 949-2308. (Nov '90)

**Output Devices**

Agfa P3400PS

This 300-dpi Agfa P3400PS PostScript laser printer is one of the fastest models available but can't produce quality in image quality. This 12-ppm workhorse has two standard trays for 250 sheets each. Includes 20-megabyte hard-disk drive that contains 60 of its 73 fonts. The remaining 13 are stored in ROM. $9,995. Agfa Compugraphic, 200 Ballardvale St., Wilmington, MA 01887. (800) 227-2780 or (508) 658-5600. (Oct '90)

Apple ImageWriter LQ Printer

The Apple ImageWriter LQ produces letter-quality text and images at 216 dpi in six fonts and seven colors (using an optional ribbon). It is limited to four fonts in 12 sizes. Networkable. Printing quality is rudimentary, and the price is low. $4,999. Apple Comp., Inc., 2027 Mariani Ave., Cupertino, CA 95014. (408) 776-2333 or (408) 996-1010. (Jan '90)

Apple LaserWriter NT

This 300-dpi, 8-page PostScript LaserWriter NT is being introduced to show its age in price and performance. This midprice PostScript laser printer is faster than the LaserWriter Plus and produces better quality and faster speed. $4,499. Apple Comp., Inc., 2027 Mariani Ave., Cupertino, CA 95014. (408) 776-2333 or (408) 996-1010. (Jan '90)

Apple LaserWriter IINT

This 300-dpi, 8-page PostScript LaserWriter IINT is beginning to show its age in price and performance. This midprice PostScript laser printer is faster than the LaserWriter Plus. $2,499. Apple Comp., Inc., 2027 Mariani Ave., Cupertino, CA 95014. (800) 776-2333 or (408) 996-1010. (Oct '90)

Apple LaserWriter SC

This 300-dpi, 8-page PostScript LaserWriter SC is a 300-dpi QuickDraw printer that produces near-laser-printer quality at a bargain price. For simple graphics and text output, it rivals the quality of higher-priced PostScript printers. Easy-to-use, well-designed toner cartridge. $1,999. Personal LaserWriter IINT board upgrade, $1,300. Apple Comp., Inc., 2027 Mariani Ave., Cupertino, CA 95014. (408) 776-2333 or (408) 996-1010. (Nov '90)

CalComp PlotMaster 5902A

This 300-dpi, 12-page PostScript laserprinter is one of the slowest on the market. Its print quality is mediocre, and its color gradation is poor. $3,995. CalComp, 2411 W. La Palma Ave., Anaheim, CA 92801 (800) 225-2667, or (714) 821-2000. (May '90)

CoStar LabelWriter

The LabelWriter is a tiny thermal printer that prints labels one at a time. You can set font, size, style, and justification, but these attributes apply to the entire label. A memory feature lets you easily store commonly used labels for quick retrieval. Chooser-selectable drive is promised for future versions. This is an add-on and requires software. $1,240. CoStar Corp., 2915 Bridge St., Millbrae, CA 94030. (415) 384-0030. (Mar '90)

Fujitsu RX7100PS

Fujitsu's RX7100PS is a 300-dpi, 8-page PostScript laser printer that has faster performance than an Apple LaserWriter IINT, but it is still too slow to accommodate networks comfortably. Includes two paper bins and QuickLetter and Select-A-Line software. $3,595. Fujitsu America, 3055 Orchard Dr., San Jose, CA 95134. (408) 432-1300. (Oct '90)

GCC PLP IIS

One of the best laserlike personal printers, the GCCPLP IIS features excellent image quality and speedy output. For simple graphics and text output, it rivals higher-priced PostScript printers. It's sturdy built and includes good bundled software and online facsimile. Can be upgraded to PostScript. $1,899. GCC Technologies, 580 Winter St., Waltham, MA 02154. (800) 422-7777 or (617) 890-0880. (Nov '90)

GCC WriteImpact

This dot-matrix impact printer produces near-letter-quality output. It includes 25 to 400 percent enlargement, print preview, smoothing, and kerning features. It's excellent at paper handling, offering both push and pull tractor feeding, and ribbon feed. Adobe and Bitstream fonts are supported. Performance is very good — equaling that of the ImageWriter LQ without the high price. The only major drawback with this printer is that it's a serial device with no networkable AppleTalk version. GCC Technologies, Inc., 580 Winter St., Waltham, MA 02154. (800) 422-7777 or (617) 890-0880. (Jun '90)

GCC WriteMove

The three-pound WriteMove is one of the smallest, lightest Mac printers available. It's an inkjet unit that produces resolutions of up to 192 dpi. It can run off rechargeable batteries or AC and comes with a good selection of printer fonts. Printing quality varies widely, depending on the paper and ink used. Version 1.0 reviewed: printer driver version 1.3 shipping. Requires Mac Plus or later, 512K, and 355K. GCC Technologies, Inc., 580

Apple LaserWriter NT

This laser printer has a large paper tray, an attractive design, and decent speed. $3,299. Apple Comp., Inc., 2025 Mariani Ave., Cupertino, CA 95014. (408) 776-2333 or (408) 996-1010. (Oct '90)

Apple LaserWriter SC

This LaserWriter SC is a 300-dpi QuickDraw printer that produces near-laser-printer quality at a bargain price. For simple graphics and text output, it rivals the quality of higher-priced PostScript printers. Easy-to-use, well-designed toner cartridge. $1,999. Personal LaserWriter IINT board upgrade, $1,300. Apple Comp., Inc., 2025 Mariani Ave., Cupertino, CA 95014. (408) 776-2333 or (408) 996-1010. (Oct '90)

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Winter St., Waltham, MA 02154. (800) 422-7777 or (617) 890-0890. (Apr '89)

Hewlett-Packard DeskWriter ³³³

The compact, light DeskWriter is the Mac version of HP's DOS-compatible laser printer, a high-quality personal printer at an attractive price. For simple graphics and text output, it rivals higher-priced PostScript printers. Complicated graphics can cause pages to become oversaturated with ink, $995. Hewlett-Packard, 19091 Pruneridge Ave., Cupertino, CA 95014. (800) 752-0900 or (408) 725-8900. (Nov '90)

Hewlett-Packard LaserJet III ³³³

For less money than a LaserWriter INT costs, the 300-dpi, 8-ppm LaserJet III produces text resolution that almost rivals that of higher-resolution printers. PostScript input and output includes ATM font rasterizer and 35 outline fonts. $2,295. PostScript option, $695; Mac interface, $275. Hewlett-Packard, 19091 Pruneridge Ave., Cupertino, CA 95014. (800) 752-0900 or (408) 725-8900. (Oct '90)

Hewlett-Packard LaserJet IID ³³³

The 300-dpi, 8-ppm Hewlett-Packard LaserJet IID is the ultimate paper-handling, offering every feature you'd expect, including a 300-dpi image quality, $2,795. Includes MacRascol. $7,495. Laserjet IIID, 20 Ada Ave., Irvine, CA 92718. (714) 727-2651. (Oct '90)

LaserMAX 1000

Personal Typesetter ³³³

This 8-ppm PostScript-clone laser printer claims resolutions as high as 1,000 dpi. It has above-average performance, but also has some PostScript-compatibility problems. Requires Mac II series. $7,995. LaserMAX Systems, 7150 Shady Oak Rd., Eden Prairie, MN 55344. (612) 944-9083. (Oct '90)

MacProducts MagicPrint ³³³

This 300-dpi, 6-ppm personal PostScript clone is a good buy if you don't need Type 1 compatibility. It is among the fastest performing in handling graphics files. Liquid-crystal-shutter engine produces good image quality, $2,997. MacProducts USA, Inc., 6825 N. Marine Pkwy., Suite 218, Austin, TX 78759. (800) 622-3475 or (512) 343-9441. (Oct '90)

Mirror Technologies ³³³

Mirror Image ³³³

This 300-dpi, 6-ppm PostScript-clone printer is a good buy if you don't need Type 1 compatibility. Among the fastest performers in handling graphics files. Liquid-crystal-shutter engine produces good image quality, $2,997. Mirror Technologies, Inc., 2644 Pacific Ave., Suite 300, Santa Monica, CA 90402. (800) 634-5294 or (612) 633-4450. (Oct '90)

Mitsubishi S340-10 ³³³

This QuickDraw-based color-thermal-wax-transfer printer features excellent image quality but lacks a hardware/software interface. $5,995. Mitsubishi Electronics America, 591 Knox St., Mountain View, CA 94042. (415) 217-5732. (May '90)

Mitsubishi Shinko CHC-345

This product's most distinguishing characteristic is its excellent image quality. Unfortunately, limited color range and below-average resolution mar an otherwise-keepers QuickDraw-based color-thermal-wax-transfer printer. $6,000. Mitsubishi International Corp., 701 Westchester Ave., White Plains, NY 10604. (914) 997-4999. (May '90)

NEC S340-10 ³³³

The beautiful prints produced by NEC's QuickDraw-based color-thermal-wax-transfer printer make this printer the clear choice for the color-proofing crowd. Excellent gradation. Mediocre color range and image quality. $4,995. NEC Electronics America, 991 Knox St., Torrance, CA 90502. (213) 234-9622. (Mar '90)

NEC Silentwriter LC 890XL ³³³

This 300-dpi, 8-ppm PostScript printer is fast and flexible but produces poor-quality images due in part to its LED engine. Includes two 250-sheet paper trays. $3,995. NEC Technologies, Inc., 1414 Massachusetts Ave., Northborough, MA 01532. (908) 632-4636 or (508) 254-8800. (Oct '90)

NEC Silentwriter 2 ³³³

This 8-ppm PostScript laser printer boasts a compact design and some of the fastest processing speed for printers in its class. It's not, however, less noisy than its peers, despite its name. $4,495. NEC Technologies, Inc., 1414 Massachusetts Ave., Boxborough, MA 01762. (908) 632-4636 or (508) 254-8800. (Oct '90)

NewGen TurboPS/480 ³³³

This 8-ppm PostScript-clone printer features turbocharged resolution (800 x 400 dpi) and excellent image quality. It has some PostScript-compatibility problems but lots of potential. $7,495. New-Gen Systems Corp., 17580 New Hope St., Fountain Valley, CA 92708. (714) 641-8600. (Oct '90)

Omicron ³³³

Graphs S232 CPS ³³³

Color PS ³³³

This 300-dpi color PostScript thermal-wax-transfer printer features a wide color gamut and high resolution. With the PostScript driver, when printing text or hairlines but less competent with color gradation. Uses plastic ink. $15,995. Omicron Technologies, 5425 Hubbell Blvd., Roseville, CA 95661. (916) 732-1400 or (800) 634-5294. (May '90)

PrintWare 720 IQ Professional Laser Imager ³³³

PrintWare's 720 IQ Professional Laser Imager produces excellent-quality images. Of the high-resolution clone printers, it is the most compatible with Type 1, but it's very slow. $11,990. Printware, 1385 Mendota Heights Rd., Minneapolis, MN 55120. (800) 456-1406. (Nov '90)

QMS ColorScript ³³³

Model 1 ³³³

Simple to install and use, the QMS ColorScript thermal-wax-transfer PostScript color printer produces excellent print quality and speedy output. Excellent software.$8,995. QMS, Inc., One Mango Pass, Mobile, AL 36689. (800) 523-2696 or (205) 633-4300. (May '90) * $9.99

QMS PS-410 Turbo ³³³

This low-priced personal printer leads the way in innovation and bang for buck. It features an extremely fast processing capability and provides a solution for mixed Mac/PC networks. Requires that it can accept data from all three ports simultaneously and automatically switch among printer languages. $3,995. QMS, Inc., One Mango Pass, Mobile, AL 36689. (800) 523-2696 or (205) 633-4300. (Mar '91) *$ 9.99

QMS PS-810 Turbo ³³³

The 300-dpi, 8-ppm QMS PostScript laser printer ranks high on speed charts, processing good-quality images at a reasonable price. Includes two 250-sheet paper bins. $5,495. QMS, Inc., One Mango Pass, Mobile, AL 36689. (800) 523-2696 or (205) 633-4300. (Oct '90)

QMS PS-820 Turbo ³³³

Less expensive and faster than the Apple LaserWriter LITX, the QMS-PS 820 Turbo is a 300-dpi PostScript printer whose average speeds surpass those of the INTX and Intefix 24-48 printer. Performance is good if not better. Dual trays. $6,495. QMS, Inc., One Mango Pass, Mobile, AL 36689. (800) 523-2696 or (205) 633-4300. (May '90)

Seiko CH-5504 ³³³

This QuickDraw-based color thermal-wax-transfer printer features a wide color range, but poor line resolution. It is compact but slow. Can handle a large print area. Bundled with ATMI, Plus PS/2 and TypeAlign. $7,000. Seiko Instruments USA, Inc., 1150 Ringwood Ct., San Jose, CA 95131. (800) 888-0817 or (408) 969-9687. (Oct '90)

Sharp JS-730 Color Ink Jet ³³³

This color inkjet QuickDraw-based printer is slow and produces mixed quality with low resolution. Color range is good, but it processes only hand-fed paper and does not print transparencies. Can handle paper sizes. The unit is noisy and shaky. $2,195. Sharp Electronics,
The ColorQuick 216-dpi Quick­
colors are supported by TekCo­
lor, driver needs improvement. Op­
835-6100. (May '90)
small size make this printer a good
$16,995. (20 l) 887-8000. (Oct '90)
features excep­
tional image qual­
07936 . (20 l) 887-8000. (Oct '90)
SANE patch pro­
the Ilcx's perfom­rnnce between 5
state Macintosh
"Aox DoubleTime-16

A oxide, test output, it’s also one of the fastest laser prin­
ter. It outperforms both the INT and INTX in out­
paging-page-layout documents, because of its 600-dpi resolution. Al­
though pricey, it’s a viable unit for produc­ing camera-ready PostScript when less-than-mag­azine quality is acceptable. $16,995. Varityper, 11 Mt. Pleasant Ave., East Hanover, NJ 07936 . (201) 887-8000. (Oct '90) • PERFORMANCE ENHANCERS

Aox DoubleTime-16

This 16-megahertz 68000-based accelerator features low cost, modest performance increase, and simple installation. Good choice for users on a tight budget. For Mac SE. Without FPU, $395; with FPU, $595. Aox Computer, Inc., 466 Totton Rd., Waltham, MA 02154. (800) 232-1269 or (617) 890-4402. (Aug '90)

Apple Macintosh IItx Upgrade

This 25-megahertz 68030-based accelerator boosts the IItx’s performance by a third. Requires 80­
mac or faster RAM SIMMs. For Mac SE/II, IItx, or IItc, $556 Atlanta Hwvy, Flowery Branch, GA 30542. (800) 622-7627 or (919) 763-7918. (Aug '90)

Dove MarathOn 030/III

This simple, small accelerator board enc­
cludes the Mac II’s normal speed (32 megahertz). It gives your Mac a 40 percent increase for a modest price. The memory cache must be disabled when you format floppy disks. For Mac II, IItx, $799. Dove Computer Corp., 1200 N. 23rd St., Wilmingtom, NC 28405. (800) 227-7627 or (919) 763-7918. (Aug '90)

MacProducts '830 RailGun­
25MHz

This 25-megahertz 68030-based accelerator features the same basic design as the Novy Quik30/
Plus-33MHz. SCSI expansion ports for 128K and 512K Macs. For Mac SE. Without FPU, $799; with FPU, $999. MacProducts USA, Inc., 8303 Mopac Expwy., #218, Austin, TX 78759. (800) 622-5475 or (512) 343-5000. (Aug '90)

Newer Technology

MacEliator

This 16-megahertz 68000-based accelerator offers a good value and performed well in our lab tests. For Mac SE. Without FPU, $295; with FPU, $595. Newer Technol­ogy, 1117 S. Rock Rd., Wichita, KS 67207. (800) 678-3726 or (316) 685-4904. (Aug '90)

Novy Systems

Quik30/Plus-33MHz

This accelerator board fits your IItc computing power in a Plus. For 128K, 512K, Plus, and SE. SCSI port 128K and 512K Macs, $99. Without FPU, $1,495; with FPU, $1,594. Novy Systems, 1862 Fern Palm Dr., Edgewater, FL 32141. (904) 427-2358. (Aug '90)

Orchid MacSprint II

This 25-megahertz 68020-based accelerator is a quick and easy way to speed up your Mac II. Simple upgrade offers moderate increase in performance, and a de­
ables cache in case of incom­patible software. For Mac II, $229. Orchid Technology, 45365 Northport Loop W., Fremont, CA 94538. (415) 686-0300. (Aug '90)

Radius Accelerator 16 Plus

Installation of this 16-megahertz 68020-based accelerator is com­plex, so it’s best left to the dealer. Limited SCSI throughput but Silverlining 5.2 software helps. For Mac Plus, $795; with FPU, $1,095. Radius, Inc., 1710 Fortu­ne Dr., San Jose, CA 95131. (800) 227-2795 or (408) 434-1010. (Aug '90)

Radius Accelerator 16 SE

This 16-megahertz 68012-based accelerator is simple to install. Easy config­uration where you can choos­e, for example, to turn on Page Protect.
Radius Accelerator 25 SE

Like the 16-megahertz Radius accelerator, the 25-megahertz version includes 88282 FPU for faster performance. Easy configuration via the Control Panel or startup dialog box. For Mac SE, Without FPU, $1,395; with FPU, $1,895. Radius, Inc., 1710 Fortune Dr., San Jose, CA 95131, (800) 227-2795 or (408) 634-1010. (Aug '90)

RasterOps ClearView SE 4080

This 68000-based, 16-megahertz accelerator doubles the speed of the SE and provides extra RAM. It requires that the Mac RAM and ROM be relocated to the accelerator. Includes an optional 19-inch, 1,024 x 768-pixel two-page monochrome display and a video interface for two-page monitor or Apple Portrait Display. For SE. RasterOps Corp., 2500 Walsh Ave., Santa Clara, CA 95051, (408) 726-3545. (Aug '90)

Siclone Si3033

This 68000-based, 33.3-megahertz accelerator is a speedy upgrade for the II or Ix. Retains older CPU to allow operation in the original unaccelerated mode. An INIT is provided to ensure proper floppy operation. For Mac II, Ix, Without FPU, $1,799; with FPU, $1,999. Siclone Sales and Engineering, 107 Benaventura Dr., San Jose, CA 95134, (800) 767-8207 or (408) 263-8207. (Aug '90)

Siclone Si3050

A true speed champ, this 68030-based, 50-megahertz accelerator surpasses all its competition with the exception of the Ix machine. It gives high performance without the expense of special Ix FPU RAM. An INIT is provided to ensure proper floppy operation. For Mac II, Ix, Without FPU, $1,799; with FPU, $1,999. Siclone Sales and Engineering, 107 Benaventura Dr., San Jose, CA 95134, (800) 767-8207 or (408) 263-8207. (Aug '90)

Siclone Turbo SE

Delivering solid 60-percent improvement over SE performance, this 68000-based, 50-megahertz accelerator is a great buy for SE owners. MAC RAM and ROM must be moved to accelerator. Without FPU, $398; with FPU, $579. Siclone Sales and Engineering, 107 Benaventura Dr., San Jose, CA 95134, (800) 767-8207 or (408) 263-8207. (Aug '90)

Total Systems Gemini 830

This 25-megahertz 68030 accelerator board provides performance increases of up to 500 percent, allowing Plus performance past that of a IIc. It has a built-in MPU. Installation is complex. GemKit option speeds SCSI throughput on Plus. For 128K, $345; Plus, $345; with FPU, $2,195; Plus: $1,895; with FPU, $2,395. Total Systems Integra tion, 99 W. 10th Ave., Suite 333, Eugene, OR 97401, (503) 474-3795. (Aug '90)

Total Systems Voyager 830/33

This 68030-based 33.3-megahertz accelerator, manufactured by Siclone, is identical to the Siclone Si3033. A 50-megahertz version with 50-megahertz FPU is also available. For Mac II, Ix, Without FPU, $1,795; with FPU, $1,995. Total Systems 99 W. Ten th Ave., Eugene, OR 97401, (503) 474-3795 or (503) 345-7395. (Aug '90)

PORTABLES

Apple Macintosh Portable

State-of-the-art screen technology and a removable, rechargeable long-lasting battery make this 100-percent Mac machine a must-have for traveling Mac users. The 15.9-pound, 68000-based Macintosh Portable includes a trackball and a standard keyboard. Maximum battery life is 16 hours. Floppy only, $4,799; floppy and 40-megabyte hard-disk drive, $5,499. Apple Computer, Inc., 20525 Mari an Ave., Cupertino, CA 95014, (408) 776-2303 or (408) 996-1010. (Sept '90) * 89 Eddie

Siclone Portable Turbo SE

Delivering solid 60-percent improvement over SE performance, this 68000-based, 50-megahertz accelerator is a great buy for SE owners. MAC RAM and ROM must be moved to accelerator. Without FPU, $398; with FPU, $579. Siclone Sales and Engineering, 107 Benaventura Dr., San Jose, CA 95134, (800) 767-8207 or (408) 263-8207. (Aug '90)

Prices are provided to ensure that the package you buy is what you get. Souped-up compression schemes boost throughput as high as 9,600 bps. $899. Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348. (404) 441-1617. (Jan '91)

Total Systems Voyager 830/33

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TELECOMMUNICATIONS

Anchor Automation 24ES/InMacPac

This 2,400-bps modem has average performance. Includes basic limited software and a good warranty. Requires Mac Plus or later. $359. Anchor Automation, Inc., 20675 Bahama St., Chatsworth, CA 91311. (818) 998-6100. (Jan '91)

Applied Engineering MailLink EX 300

Slow, limited software hampers this 2,400-bps modem's performance. Includes cable and a good warranty. $249, with fax, $349. Applied Engineering, 3210 Bellline Rd., Dallas, TX 75234. (214) 241-6061. (Jan '91)

Computer Friends Lightspeed 2400OLE

The price/performance ratio of this 2,400-bps modem gives it an above-average rating. Throughput for the Lightspeed is not exactly speedy despite the nomenclature. Make sure the right cable (the CBL-124) is included. $159. Computer Friends, Inc., 14250 N.W. Science Park Dr., Portland, OR 97223. (503) 624-0571. (Jan '91)

Relysis Tefax RA2110M

The Tefax is a Group 3-compatible stand-alone fax machine with serial interface that is theoretically to act like a fax modem, thermal printer, or 200-dpi scanner. Great idea, but implementation needs a little work. Print quality is low, which means it doesn't really replace a printer or a scanner. The fax machine works fine but lacks a paper cutter. Requires Mac with a 1-megabyte of RAM. $1,295. Relysis, 320 S. Milpitas Blvd., Milpitas, CA 95035. (800) 735-4799 or (408) 943-0000. (June '91)

Zoom Telephonies Zoom/Modem V.42bis

The Zoom/V.42bis is a stand-alone modem that is a truly excellent price/performance and throughput speeds of 9,600 bps. $249; cable, 1 $12. Zoom Telephonies, Inc., 207 South St., Marlboro, MA 01752. (508) 889-3116 or (617) 423-1072. (Jan '91)
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<td><strong>Syquest, Tape, DAT, Optical</strong></td>
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<td>45R (Syquest, one cart)</td>
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<td>45DR (Dual Syquest, two carts)</td>
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<td>60 (Teac) w/Retrospect and one tape</td>
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<th>Media</th>
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<table>
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<tr>
<th>Product</th>
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<tr>
<td>Microtek 300ZS</td>
<td>$1,679</td>
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<tr>
<td>QMS-PS 410</td>
<td>$2,049</td>
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<td>Quantum 105 Internal</td>
<td>$399</td>
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<td>Qume ScripTEN</td>
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<td>RasterOps ColorBoard 264*</td>
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<td>RasterOps ColorBoard 364*</td>
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<td>Radius 19&quot; Two Page Display</td>
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<td>Radius Accelerator 16 for +, SE</td>
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TI MicroLaser/PS17 $1349
NEC SW2 Model 90 $1599
NEC SW Model 290 $2499
QMS ColorScript 100 $749
ExpressLaser300 dpi printer $1050
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ImageWriter Cable $15

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A National Search for computer based applications to help persons with physical or learning disabilities is being conducted by The Johns Hopkins University with grants from the National Science Foundation and MCI Communications Corporation.

A grand prize of $10,000 and more than 100 other prizes will be awarded for the best ideas, systems, devices and computer programs developed by Professionals, Amateurs, and Students.

Entry deadline is August 23, 1991.

For more information write to:
Computing to Assist Persons with Disabilities
P.O. Box 1200
Laurel, MD 20723

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Entry deadline is August 23, 1991.

For more information write to:
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P.O. Box 1200
Laurel, MD 20723
1. Please indicate which of the following computers you currently use in
your company or organization: (check all that apply)
   a) Mac Plus
   b) IBM PC
   c) Other
   d) Mac II

2. For how many microcomputers do you buy products?
   - 1-4
   - 5-49
   - 50+

3. Your primary job function is: (check one)
   a) Administrative/General Management
   b) MIS/DS/Communications Systems, Programming
   c) Engineering/R&D
   d) Financial Accounting
   e) Marketing/Sales
   f) Computer Dealer/VAR

4. For which of the following products are you involved in selecting brands/models to be
bought by your company or organization? (check all that apply)
   a) Accounting
   b) Spreadsheet
   c) Financial Managers
   d) Project Managers
   e) Word Processors
   f) Database Managers
   g) Graphics
   h) CAD/CAM
   i) Communications

5. Are you involved in the purchasing of microcomputer equipment at your company?
   a) Yes
   b) No

6. If so, what function do you serve in the purchasing process?
   a) Evaluation/Specification
   b) Recommendation
   c) Buyer/Purchaser

7. Are you involved in the purchasing of microcomputer equipment at your company?
   a) Yes
   b) No

8. What is your primary job function?
   a) Administrative/General Management
   b) MIS/DS/Communications Systems, Programming
   c) Engineering/R&D
   d) Financial Accounting
   e) Marketing/Sales
   f) Computer Dealer/VAR

9. Are you involved in the purchasing of microcomputer equipment at your company?
   a) Yes
   b) No

10. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

11. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

12. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

13. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

14. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

15. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

16. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

17. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

18. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

19. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

20. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

21. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

22. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

23. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

24. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

25. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

26. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

27. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

28. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

29. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

30. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

31. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

32. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

33. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

34. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

35. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

36. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

37. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

38. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

39. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

40. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

41. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

42. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

43. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

44. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

45. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

46. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

47. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

48. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

49. Are you involved in the purchasing of microcomputer equipment at your company?
    a) Yes
    b) No

50. If so, what function do you serve in the purchasing process?
    a) Evaluation/Specification
    b) Recommendation
    c) Buyer/Purchaser

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This is a Small Sample of What We Stock — CALL 
We Carry the Very Latest Versions of Products

WriteNow 2.2/Grannitik 120 99  
Apostrophe 108  
Athena 108  
Barnes 108  
Bodoni 108  
Bodoni 108  
Bodoni 108  
Bodoni 108  
Bodoni 108  
Bodoni

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Bodoni 108  
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Bodoni 108  
Bodoni 108  
Bodoni 108  
Bodoni
Contact the professionals at MacTel Technology. We handle only the best in Macintosh hardware, systems and peripherals. Names like Apple, Nikon, Radius, RastertOps, Wacom, PLI, Sharp and our own, top-quality Index brand.

We provide services such as international sales, service and banking; and qualified, reliable technical support (before and after the sale.) It's no wonder if the vast majority of our business is repeat business.

---

**INDEX HARD DRIVES**

**Elite series:**

All INDEX Elite external Hard Drives have an auto-Sensitive Power Supply and include MacTel HD Utilities, Backmatic V-2, AutoSave II and 1.4 Mb FD software.

<table>
<thead>
<tr>
<th>Model</th>
<th>Mb</th>
<th>ms</th>
<th>Internal</th>
<th>External</th>
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</thead>
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<tr>
<td>Quantum 3.5&quot;</td>
<td>80</td>
<td>12</td>
<td>$549</td>
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<td>ProDrive HD</td>
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<td>210</td>
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<td>Imprimis 5.25&quot;</td>
<td>220</td>
<td>16</td>
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<tr>
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<td>16</td>
<td>$1999</td>
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<td></td>
<td>460</td>
<td>16</td>
<td>$3199</td>
<td>$3299</td>
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</table>

**All INTERNAL DRIVES include Bracket cables and software, everything**

* Fits only Mac II, Mac III & Mac IIIx. All INDEX external Hard drives are supplied with universal power supplies, for world-wide adaptability. Backmatic V-2 and AutoSave II are registered trademarks. All INDEX "ELITE" HARD DRIVES ARE BUNDLED with Backmatic V-2 & AutoSave II software.

**DAM DRIVE 1.2 Gb System** $1699

Tape backup system from MacTel. Price includes an open and express.

**Removable & cartridges:**

- MacTel 4SR
- PLI infinity Turbo 40

Syquest Cartridges

SQ 400.......................... $69

---

**INDEX HARD DRIVES**

**Economy series:**

All INDEX Economy drives include MacTel HD Utilities and 1.4 Mb FD.

<table>
<thead>
<tr>
<th>Model</th>
<th>Mb</th>
<th>ms</th>
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<th>External</th>
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<td>Quantum 3.5&quot;</td>
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<td>$1749*</td>
<td>$1849*</td>
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<td>$2900*</td>
<td>$3000*</td>
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<td>1,2</td>
<td>16</td>
<td>$2699*</td>
<td>$2799*</td>
</tr>
</tbody>
</table>

Golden Triangle: DiskTwin

**Special promotion !!**

- MacTel 4SR
- PLI infinity Turbo 40

Syquest Cartridges

SQ 400.......................... $69

**QUANTUM 3.5" ProDrive**

- 52 Mb $279
- 105 Mb $379
- 210 Mb $769

While quantities last

MacTel carries hundreds of professional Mac peripherals (not listed) and the entire Macintosh line.

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For your Apple solutions!

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When purchasing systems, compare the options and features. VisionPro Color Graphic Cards are manufactured under license for MacTech technology and support Macintosh graphical needs now and in the future.

**Video Graphic Systems**
- 8-Bit Business System, VideoCard, 20" Trinitron - 75 Hz
- 8-Bit SystemPro 20", VideoCard, 20" Trinitron - 75 Hz
- 8-Bit SystemPro SONY 19", VideoCard, 19" Sony Trinitron (GDM-1950) - 75 Hz

- 24-Bit VideoPro Interface Upgrade Kit w/ purchase of any SystemPro...

**MacTech Extended Keyboards**

- English $99
- German $119
- French $149
- Suisse $169

**Index Memory Modules**

Our SIMMs are manufactured in-house at our state-of-the-art facilities.

- 1 Mb Surface Mount, 32-Pin, 70/80 ns, lifetime warranty
- 1 Mb FX and LaserWrite II
- 1 Mb X 32 SIMM 70/80 ns

- $44.50
- $45.50
- $199
- $48.50

- All INDEX SIMMS have gold contacts and traces - lifetime warranty - call for current pricing!

**NEW** 1 Mb Ti Microlaser PS 17 & 35 memory upgrade

- Because printing speed and downloading more fonts...
- $89

**Surface Instruments**

- Micro Laser PS-17
- Micro Laser PS-35
- 1Mb Ti Microlaser PS card XL

- $1399
- $1699
- $89

**Ordering Information**

- Macintosh CPU's and Systems
- Mac Classic (fully loaded)
- Mac SE/30
- Mac IIci
- Mac IIcx
- Mac Portable
- LaserWriter II NT, NTX and Personal LaserWriter's
- Also fax/call for quote on complete Apple Macintosh product line and competitive pricing • Government • Universities • Corporations (on approval) - bids requested -

**MacNet: Mactel**

Europe: 0041/46-054020 • France: 0033/88-77-83-20 • Switzerland: 042/36-44-33
Laser Printer Sale

**ScripTEN PostScript® Laser Printer**

$1,599

- 10 Pages per minute
- 11 Font Families (35 typefaces)
- 3 megs of RAM
- Solid Blacks for graphics
- Letter, Legal and transparencies

**CrystalPrint MacPublisher Laser Printer**

$1,699

- 8 Pages per minute
- 11 Font Families (39 typefaces)
- 2 megs of RAM
- Adobe type one support
- Solid Blacks for graphics
- Letter, Legal and transparencies

**CrystalPrint Publisher II Laser Printer**

$2,125

- 8 Pages per minute
- 11 Font Families (39 typefaces)
- 3 megs of RAM
- Adobe type one support
- Solid Blacks for graphics
- Letter, Legal and transparencies

**Microlaser PostScript® Laser Printer**

PS17 $1,449
PS35 $1,749

- 1.5 Megabytes of RAM
- 6 pages per minute
- 17 or 35 typefaces available
- Letter, Legal and transparencies
- AppleTalk Interface Included!

**NEC SilentWriter 90 PostScript Laser Printer**

$1,799

- 6 pages per minute
- Adobe PostScript
- 35 scalable fonts
- 2 Megabytes of RAM
- Letter, Legal, Envelopes, Transparencies, and Labels

**QMS-PS® 410 PostScript Laser Printer**

$1,999

- 2 Megabytes of RAM
- 4 pages per minute
- Letter, legal, envelopes, and transparencies
- Auto switching between Macintosh and IBM.

PostScript® is a registered trademark of Adobe Systems Incorporated.

Visa, MasterCard, and American Express accepted. No surcharge. Your Credit Card will not be charged until your order is shipped. We accept COD orders; additional $5.00 charge. AZ residents add 6.5%. All shipments made by Federal Express. Standard Air which is 1 to 2 day service. COD's shipped by UPS 2 day air. Call for shipping costs. Products purchased in error are subject to a 20% restocking fee. All prices subject to change without notice. All products subject to availability.
1. **Price**—Because of our multi-million dollar buying power, we purchase large volumes of quality hardware at low prices and pass the savings on to our customers.

2. **Delivery**—We offer **Same Day Shipping** on all in stock items if we receive your order by 3 pm Mountain Standard Time. ALL credit card orders are shipped by FEDERAL EXPRESS STANDARD AIR service which means you get your merchandise fast!

3. **Technical Support**—MacLand has the best technical support, period. We provide you with technical support BEFORE AND AFTER your purchase. Best of all, to assure you the highest quality, our trained technicians test ALL hard disk drives for quality and viruses before we ship them to you.

---

**Hard Disk Drive Megabyte Sale!**

### Quantum

<table>
<thead>
<tr>
<th>Drive</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantum 40 19ms</td>
<td>$299</td>
<td>$399</td>
</tr>
<tr>
<td>Quantum 105 19ms</td>
<td>$399</td>
<td>$459</td>
</tr>
<tr>
<td>Quantum 120 15ms</td>
<td>$589</td>
<td>$689</td>
</tr>
<tr>
<td>Quantum 170 15ms</td>
<td>$679</td>
<td>$779</td>
</tr>
<tr>
<td>Quantum 210 15ms</td>
<td>$789</td>
<td>$889</td>
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</tbody>
</table>

Quantum drives have a 2 year warranty!

### Imprimis

<table>
<thead>
<tr>
<th>Drive</th>
<th>Internal</th>
<th>External</th>
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</thead>
<tbody>
<tr>
<td>MacWren 300 16ms</td>
<td>$1,349</td>
<td>$1,449</td>
</tr>
<tr>
<td>MacWren Runner 330 10.7ms</td>
<td>$1,499</td>
<td>$1,599</td>
</tr>
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<td>MacWren 600 16ms</td>
<td>$1,799</td>
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<tr>
<td>MacWren 1.2Gigabyte 16ms</td>
<td>$2,799</td>
<td>$2,899</td>
</tr>
</tbody>
</table>

**Imprimis Drives Now Have a TWO Year Warranty!**

effective on all drives purchased after 3/1/91

---

**SyQuest 42 Megabyte Removable Hard Disk Drives**

$439

Cartridge not included

---

**30 DAY MONEY BACK GUARANTEE**

ON ALL IMPRIMIS, QUANTUM AND SYQUEST HARD DISK DRIVES

---

**Upgrade your Mac's Memory Simm Sale**

$45

**SyQuest Removable Cartridges**

$64

FREE! Included with your Simm order is our 22 page, step by step, easy installation guide.

---

For Ordering and Technical Support Call 1-800-333-3353 (FAX #602-345-2217)

4685 South Ash Avenue, Suite H-5, Tempe, Arizona 85282 (602) 820-5802
### Accelerators

<table>
<thead>
<tr>
<th>Brand</th>
<th>Model</th>
<th>Price</th>
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<tbody>
<tr>
<td>DayStar Digital</td>
<td>Fast Cache IICi</td>
<td>$269</td>
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<td>PowerCache IICi 40 MHz</td>
<td>$929</td>
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<td>PowerCache IICi 50 MHz</td>
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<td></td>
<td>25 MHz Powercard O30</td>
<td>$1,125</td>
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<td></td>
<td>33 MHz Powercard O30</td>
<td>$1,275</td>
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<tr>
<td></td>
<td>50 MHz Powercard O30</td>
<td>$1,949</td>
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<tr>
<td>Radius</td>
<td>Accelerator 16 for Plus/SE</td>
<td>$599</td>
</tr>
<tr>
<td></td>
<td>Accelerator 25 for SE</td>
<td>$999</td>
</tr>
</tbody>
</table>

### Monitor Systems

<table>
<thead>
<tr>
<th>Brand</th>
<th>Warranty</th>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnavox</td>
<td>TWO YEAR WARRANTY</td>
<td>14&quot; Color Monitor with 8 bit Video</td>
<td>$699</td>
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<td></td>
<td></td>
<td>Interface Mac II family</td>
<td>$799</td>
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<tr>
<td>Radius</td>
<td></td>
<td>14&quot; Color Monitor with 24 bit Video</td>
<td>$799</td>
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<tr>
<td></td>
<td></td>
<td>SE/30 8 bit Video System</td>
<td>$799</td>
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### Fax Modems

<table>
<thead>
<tr>
<th>Brand</th>
<th>Model</th>
<th>Price</th>
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<tbody>
<tr>
<td>Abaton</td>
<td>Interfax Modem 24/96</td>
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<tr>
<td>Dove</td>
<td>24/96 Fax Modem</td>
<td>$279</td>
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<tr>
<td>Orchid</td>
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### Scanners

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<tr>
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<td>The Typist</td>
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<tr>
<td>Microtek</td>
<td>300GS</td>
<td>$1,249</td>
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<td></td>
<td>300ZS</td>
<td>$1,689</td>
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<tr>
<td>Abaton</td>
<td>300GS</td>
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<tr>
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### CD ROM

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<tr>
<td>NEC</td>
<td>Portable CD with Interface</td>
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<tr>
<td>Toshiba</td>
<td>External CD with Interface</td>
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### UPS

<table>
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<th>Brand</th>
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<tr>
<td>Safe Power Systems</td>
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<td>Safe 400S</td>
<td>$369</td>
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### Monitors

<table>
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<th>Brand</th>
<th>Warranty</th>
<th>Model</th>
<th>Price</th>
</tr>
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<tr>
<td>Magnavox</td>
<td>TWO YEAR WARRANTY</td>
<td>14&quot; Color Monitor</td>
<td>$439</td>
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<tr>
<td>NEC</td>
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<td>MacSync 14&quot; Color Monitor</td>
<td>$439</td>
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<td>Seiko</td>
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<td>14&quot; Color Monitor</td>
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### Printers

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<tr>
<td>Hewlett Packard</td>
<td>DeskWriter</td>
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<td>QMS</td>
<td>QMS-PS 410 PostScript</td>
<td>$1,999</td>
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<tr>
<td>Oume</td>
<td>CrystalPrint Publisher II</td>
<td>$2,125</td>
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<td>ScripTEN PostScript</td>
<td>$1,599</td>
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<tr>
<td>Seiko</td>
<td>Smart Label Printer</td>
<td>$199</td>
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<tr>
<td>Texas Instruments</td>
<td>PS17 Microlaser with interface</td>
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<td>PS35 Microlaser with interface</td>
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### Keyboards

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<tr>
<td>KeyTronic</td>
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### Modems

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<td>$159</td>
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### Modems

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<td>$159</td>
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</tbody>
</table>

To Order Call 1-800-333-3353

Visa, MasterCard, and American Express accepted NO surcharge. Your Credit Card will not be charged until your order is shipped. We accept COD orders, additional $5.00 charge. AZ residents add 6.5%. All shipments made by Federal Express or UPS. Standard Air which is 1 to 2 day service. COD's Shipped by UPS 2 day air. Call for shipping costs. Products purchased in error are subject to a 20% restocking fee. All products subject to availability.
Sale!

Texas Instruments
microLaser
PostScript® Laser Printer

- 6 Pages Per Minute
- Letter, Legal, Envelopes, and Transparencies
- Optional Secondary Paper Drawer
- Adobe PostScript and HP LaserJet Series II
- Small Footprint
- 17 or 35 scalable fonts
- 1.5 Megabyte of Memory
- 300 Dots Per Inch

PS17
$1,449

PS35
$1,749

AppleTalk Interface Included

For Ordering and Technical Support Call 1-800-333-3353 (FAX #602-345-2217)

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  - MacUser #1 Personal Printer (4.5 Mics)
- TI microLaser XL - Call!
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  - We stock all accessories & supplies.
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- NEC Silentwriter II/90 & II/290 - Call!
- QMS PS410 - $2050
- Color
- CalComp Colormaster Plus - Call!
- Kodak Diconix Color 4 - Call!

**MONITORS**

- E-Machines T16 - $1395
- E-Machines TX16 - $2095
  - Prices Reflect Trade In. Call for Details.
- MegaGraphics Rival 19" - $1095
- NEC MacSync - $455
- RasterOps Systems - Call!
- Seiko 14" w/RasterOps 245 - $995
- Sigma L-View Multimode - $1395
- SuperMac Systems - Call!

**E-ROM**

- Chinon - $589
- NEC Portable - $395
- Toshiba - $695
- Pioneer DRM-600 - Call!
- Minichanger

**OPTICAL DRIVES**

- FWB HammerDisk 600S - $4950
- Pinnacle Micro - Call!
- Mass Micro MO - Call!
- Storage Dimensions Tahiti - $4785
- Storage Dimensions Worm - $2725
- SuperMac LaserFrame - $4499
- Optical Cartridges - $155

**CD-ROM**

- Eagle Syquest Drive
- Mass Micro DataPak
- FWB HammerDisk44

**SCANNERS**

- Abaton Scan 300/Color - $1395
- Caere TYPIST - $465
- Epson ES-300C - Call!
- Howtek - Call!
- Microtek 300ZS - Call!
- UMax UG80 (256 Grey Scale) - $995
- OmniPage - $479

**ACCCELERATORS**

- Mac II, IIX, Ilcx, IICI
- DayStar Fast Cache IICI - $269
- DayStar 40 MHz PowerCache IICI - $895
- $250 Trade-In on Fast Cache IICI Cards!!
- DayStar 25 MHz PowerCard - $995
- DayStar 33, 40 & 50 MHz PowerCard - Call!
- DayStar SCSI PowerCard (0 Meg) - $995
- I'R 32K IICI Cache Card - $199
- Sigma DoubleUp Data Compression Card - $179
- Mac SE, Plus
- I'R SE/FX 40 MHz 68030 - $1995
  - (with 68882, 32K Cache, 4 SIMM Sockets!!)
- NewLife SE 16 MHz 68030 (w/4 SIMM Sockets) - $395
- NewLife SE 25 MHz 68030 (w/4 SIMM Sockets) - $895
- NewLife SE 33 MHz 68030 (w/4 SIMM Sockets) - Call!

**FAX MODEMS**

- Challenger VP24/96 (9600/300 mod fax) - $99
- Abaton 24/96 InterFax - $295
- E DataLink LC - $245
- DoveFax - $275
- Global Village TelePort - $175
- Orchard Fax Modem - $425
- Prometheus 9600M Plus - $649
- Prometheus 14.4/9600 Ultima - Call!

**SYQUEST**

- $68
  - Per 45 Meg Removable Cartridge

**DATA MODEMS**

- Challenger VP2400
- Zoom VP2400 V.42 bis (MacUser #1) - $175
- Hayes V-Series Ultra 9600 - $795
- Practical Peripherals 9600A
- US Robotics 14.4/9600 V.32 - $695

**INPUT & OUTPUT**

- A Quadralink - $199
- DayStar Digital LT200MC - Call!
- DayStar Digital LT200PC - Call!
- EMAC Silhouette - Call!
- Kensington Turbo Mouse - $105
- VoiceLink - Call!
- Voice Navigator II - Call!
- Wacom Tablets - Call!

**44 MEG REMOVABLE DRIVES**

- Eagle Syquest Drive
- Mass Micro DataPak
- FWB HammerDisk44

**SCANNER**

- As the nation's largest Texas Instrument dealer, our prices are always subject to being lowered. Please call for current pricing.

**MACCENTER**

The Center Of The Macintosh Universe

800-950-3726

Please circle 77 on reader service card.
<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Quantum</th>
<th>Maxtor</th>
<th>Seagate</th>
<th>Syquest</th>
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*Our Quantum drives are all state-of-the-art "Pro Series" half-height drives.*

Wholesale 54 brings you the highest quality hard drives available. And, a multi-million dollar inventory allows us to bring them to you at the lowest prices in the industry.

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- power cable
- ONTRACK formatting/partitioning software

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- SCSI cable
- ONTRACK formatting/partitioning software

**Mail List Address:**

- Quantum
- Maxtor
- Seagate
- Syquest
- MICROPOLIS

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### Software

<table>
<thead>
<tr>
<th>Package Name</th>
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<td>Adobe Illustrator 3.0</td>
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<td>Adobe Photoshop 3.0</td>
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<tr>
<td>Adobe PageMaker 2.0 for MS-DOS</td>
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<td>Adobe PageMaker 3.0 for MS-DOS</td>
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<td>Adobe TypeWriter 2.0 for MS-DOS</td>
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### MAC TO MAC

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<td>Custom Applications for MS-DOS</td>
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### MAC/MS-DOS

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### TEXT CONFERENCING

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### MULTI-AD SEARCH

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### PEACHTREE SOFTWARE

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<td>Peachtree Plus for Macintosh</td>
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### CORPORATE MEDICAL PLANS

Open an account within 24 hours
Volume discount pricing
School purchase orders accepted

Please circle 161 on reader service card.
Hardware

APPLIANCE

ABATON

Interfax Fax-Modem 2400...$335
256 Grey Scale Scanner...1,250
300 Color & Gray-scale Scanner...1,699
Postscript Laser Printer...1,995

ABCOM

Extended Carry Case for SE...$75
Carry Case for Mac IIx/ ImageWRS...75

CAYMAN SYSTEMS

Gellbox...180
GellCard E/B for Mac II...430

COMPATIBLE SYSTEMS

Ether Route...$105
Ether Plus...$108
Ether II...$318

DART PRODUCTS

Toner Chip...$34
Mac-101 Keyboard...$137
Mac-101 Keyboard (for Plus)...$119

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Personal Scan...$669

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QuickView Z11...$175
QuickView Studio...$193
E-Machines TX...$518
E-Machines T19...$695

ENGERTON

FARALLON

MacRecorder...$155
PhoneNET Star Controller...$200
PhoneNET Star Controller EN...$1,575

GENERATION SYSTEMS

Classic Monitor System 19"...$1,095
Classic Monitor System 19" E...$695

ICD

Graphlex...$83
IDS

Pro series 40 Meg...$452
Pro series 50 Meg...$520
Pro series 100 Meg...$822
Pro series 200 Meg...$1,150
Wip...Same prices as above

IKEGAMI

24-bit color system...$399
6-bit color system...$275

KINETICS

Ether Port II...$405
KODAK

Dionex M150 Portable Printer...$995
Color Printer...$1,172

MARSTEK

Mac-800...$399
M.A.S.S. MICO III...CALL
Mass Micro...CALL
Data Pak...$695
QuickImage 24...$240

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19" Rival System, SE/SE-30, 1085
16" Sony Color II, Rcll SE, 1025...$950

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MEGAFAX Color Scanner with
PhotoShop...$1,790

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The PageBrush/Color scanner scans up to 4096 colors with 400 dpi. Image enhancement and processing are possible with features like palette optimization, brightness/contrast control and gamma and hysteresis correction. The PageBrush/Color solution is complete imaging software.

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ClearVue/GS Gray Scale 19"...CALL
ClearVue/SE System 19"...CALL
ClearVue System 19"...CALL
Video Color Board 364...$369

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JX-453 Color Scanner & Int...$1,985
JX-300 Color Scanner & Int...$1,985
Color Printers...CALL

SHIVA

FastPath 4...$1,695

SIMS

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SONY

1304 Color Monitor...$695

SUPRA

Supra 2400 Baud External Modem...$1,095
Supra 2400 Baud Ext, MNP...$1,565

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Gemini 25 MHz...CALL

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12"X12" Standard Surface...CALL

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300 Color & Gray-scale Scanner...1,699
Postscript Laser Printer...1,995

ABCOM

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Carry Case for Mac IIx/ ImageWRS...$75

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GellCard E/B for Mac IIx...$430

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Ether Plus...$108
Ether II...$318

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from the US & Canada
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(800) 825-6227
from the US & Canada
FAX (818) 501-3760 or (818) 377-7865
## Hard Drives

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<td>1050(Mb)</td>
<td>Micropolis</td>
<td>16</td>
<td>NA</td>
<td>2699</td>
</tr>
</tbody>
</table>

### Removable SyQuest
- $299
- 30ms. Includes 48Mb cartridge. Extra Cartridge $75.

### CD/ROM
- $599
- External optical storage unit. 300ms access time. Uses Toshiba or Chinen mechanism - your choice.

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- 1Mb* (4x8-80ns) $46
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*2 Year Replacement Policy

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**They're all**

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- Super fast 14ms - 28ms access time.
- No less than 30,000 hours MTBF.
- Compatible with Mac IIx, IIci, SE, SE/30, Plus & fx.
- Your choice of brand name hard drives.

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**HARD CORE**
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**HARD TO RESIST**
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  - COMPUTER EYES COLOR ......................... $320
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  - 1050D DIGITIZERS ............................... $240
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  - SCANMAN ........................................... $137
- CAERE
  - GCE VYFST Handheld Scanner .................. $468

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  - VOICE NAVIGATOR II ............................. $220
  - VOICE LINK ...................................... $119
- DAYSTAR & DIGITAL
  - FAST CACHE IN .................................... $279
  - POWERCACHES ISO FOR INI ...................... $599
  - VORTEX W/PCU ................................. $1220
  - POWERCACHES ISO FOR INI ...................... $1645
- MONITORS & VIDEO CARDS
  - E-MACHINES 16" 16" Monitor COLOR ............... $1599
  - NEC MultiSync 14" color monitor ............... $459
  - Upgrade NEC 94 bit bundle ..................... $585
  - MACVANTAGE 14" Color ...................................... $483
- PRINTERS
  - APPLE IMAGEWIZ II .............................. $450
  - LASERWRITING PERINERAL MT ................. $729
  - GCC BLP NS ......................................... $1789
  - KODAK
    - XOMA 4510 PLUS Portable Printer ............. $515
- TONER
  - GMS/Apple Compatible, UNCONDITIONAL GUARANTEE! $495
    - Without Exchange ............................ $495
    - With Exchange ................................ $59.95
- MODERN & TAXMODES
  - LOGICODE
    - QUICKCUT 9000 SENSIFAX and Modern ........ $1170
  - DVO Monitor/Fax Desktop 1MB ............... $299
  - Professional Panphones 19" Road ............. $599

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  - A/P, A/P, Q/L, Payroll, Inventory & Project Mgmt.
  - Push Button Payment 4.0 ......................... $498
  - Check Master II ................................ $159
  - Microcheck 2.2 ................................ $245
  - Microcheck Word ................................ $245
  - Quark Express 3.0 ................................ $479
  - TOPS Network MAC Bundle ....................... $1185
  - TOOLS For Opening Your Mac ................. $25.95

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- SIMMS-SONS 1MB 800/900 PCMCIA F/W 14.4 Ver. 1.2 $99
  - 256 Color 320x200 800x900 F/W 14.4 Ver. 1.2 $299
  - 256 Color 320x200 900x900 F/W 14.4 Ver. 1.2 $499
  - 256 Color 320x200 900x900 F/W 14.4 Ver. 1.2 $599

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- 1 MB SIMMS-800S ................................. $49.00

** MEMORY**

- QMS
  - HOT ITEM!
    - PostScript quality on an affordable printer $0.95
      - QMS PS 4100 ................................... $4070
      - ColorClub M81 10 COLOR PostScript ....... $6795

**UMAX**

- $2350
  - CrystalPrint Publisher 16PPM, PostScript, 3MB .... $2350
  - Apple or MSOS compatible

**MEGAGRAPHICS**

- $2195
  - MEGA Graphics with interface for /Mackat/S5/5530
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Please circle 8B on reader service card.
### ACCESSORIES

<table>
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- $128

**TelePort/FAX 9600**
- $184

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Practica Musica
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**Mac Pro Plus $139**

**Keytronic** New enhanced 105-key layout compatible with any Mac (cables included) Includes productivity features such as Period/Comma Lock capability & interchangeable Caps Lock and Ctrl keys. Limited life-time warranty. Free offer for Tempo II™.

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**Mac Pro Plus $139**

**Keytronic** New enhanced 105-key layout compatible with any Mac (cables included) Includes productivity features such as Period/Comma Lock capability & interchangeable Caps Lock and Ctrl keys. Limited life-time warranty. Free offer for Tempo II™.
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I PERSONALLY GUARANTEE you'll be pleased with the power, performance, and competitive price of RealTech products. They're:

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<table>
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<th>CPU</th>
<th>Monitor</th>
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<td>Mac Portable</td>
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Powerful, affordable laser printing...from TI’s compact microLaser PostScript printers. 300 dpi with HP LaserJet Series II emulation standard. 1.5 MB RAM upgradeable to 4.5 MB RAM. Optional accessories: 2nd paper tray, separate envelope tray!

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• Vertical refresh rate of 75 Hz
• Full gray scale capability
• Flat CRT, P4 phosphorus, polished screen
• One-year warranty

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<td>Mac Portable</td>
<td>Mono</td>
<td>$849</td>
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$619
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Amazing color. High-resolution Trinitron tube makes it possible to view 16 million shades of color!
- 640 x 480 resolution
- 14" display, 72 dpi
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43% brighter than the leading competitor!

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- 75 Hz vertical refresh rate
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ColorBoard 24S ...................................................... 579
ColorBoard 264 SE/30 ................................................ 649
ColorBoard 364 ...................................................... 949
SE30 24-bit 14" Trinitron ........................................... 1269
FrameGrabber (NTSC) .................................................. 729
14" Trinitron 24-bit .................................................. 1198
16" Trinitron 8L ...................................................... 3795
19" Trinitron 8L ...................................................... 3950
19" Trinitron 24L ...................................................... 4990
Pro Video 28 ...................................................... 1449

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NEC Mavsync 14" w/8-bit ........................................... 828
Sony Trinitron 1304 14" w/8-bit ................................... 1108

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1. What combination of CPU, HD, monitor & video card best fits your needs?
2. How much RAM will be enough?
3. 8-bit vs. 24-bit, which is for me?

Other monitors available! Please call.
<table>
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<td>$1385</td>
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<td>$3649</td>
<td><strong>Mac Ilsi B&amp;W Full Page System</strong>, 2 Mb Ram, 40 Mb Hard Drive, Mac 101 Keyboard, Felix</td>
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<td>$4279</td>
<td><strong>Mac Ilsi 14&quot; Trinitron System</strong>, 5 Mb Ram, 105 Mb Quantum, Datadesk Switchboard</td>
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<td><strong>Mac Illi B&amp;W 21&quot; Dual Page System</strong>, 4 Mb RAM, 105 Mb Quantum, Mac 101 Keyboard</td>
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<td>$12,759</td>
<td><strong>Mac IlfX</strong>, w/1 Floppy Drive, 8 Mb RAM, 325 Mb Internal Hard Drive, Ikegami 24-bit 19&quot; Color Monitor and Video Card, Datadesk, Mac 101 Keyboard</td>
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<td>$5695</td>
<td><strong>Mac Illi 14&quot; Trinitron System</strong>, 4 Mb RAM, 105 Mb Quantum, Mac 101 Keyboard</td>
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**SYSTEMS**

- Classic, 4 Mb RAM, 40 Mb Hard Drive...
- Mac Ilsi B&W Full-Page System, 2 Mb RAM, 40 Mb Hard Drive, Mac 101 Keyboard...
- Mac Ilsi 14" Trinitron, 2 Mb RAM, 40 Mb Hard Drive, Mac 101 Keyboard...
- Mac Ilsi B&W Full-Page, 5 Mb RAM, 40 Mb Hard Drive, Mac 101 Keyboard...
- Mac Ilsi B&W 21" Dual-Page, 5 Mb RAM, 105 Mb Quantum, Mac 101 Keyboard...
- Mac Ilsi 14" Trinitron, 9 Mb RAM, 105 Mb Hard Drive, Mac 101 Keyboard...
- Mac Ilsi B&W 21" Dual-Page, 9 Mb RAM, 105 Mb Hard Drive, Mac 101 Keyboard...
- Mac SE/30 System, 5 Mb RAM, 105 Mb Quantum, Mac 101 Keyboard...
- Mac SE/30 14" Trinitron 24-bit Color, 5 Mb RAM, 105 Mb Quantum, Mac 101 Keyboard...
- Mac IIX 19" Trinitron 8-bit Color, 5 Mb RAM, 170 Mb Quantum, Mac 101 Keyboard...
- Mac Illi GS 21" Dual-Page System, 4 Mb RAM, 105 Mb Quantum, Mac 101 Keyboard...
- Mac Illi 19" Trinitron 8-bit Color, 4 Mb RAM, 170 Mb Hard Drive, Mac 101 Keyboard...
- Mac Illi 19" Trinitron 8-bit Color, 8 Mb RAM, 170 Mb Hard Drive, Mac 101 Keyboard...
- Mac IlfX 21" B&W Dual-Page, 4 Mb RAM, 170 Mb Hard Drive, Mac 101 Keyboard...

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**$24,500**

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RealTech 24-Bit Color Scanner
(Includes Adobe Photoshop LE)
Versatile, full-featured desktop flatbed scanner can handle color, gray-scale, line art and text at a price/performance level superior to any other color scanner. Uses a single light source, for scanning without vertical color offset. 300 x 300 dpi resolution (in increments of 3 dpi). Scales 1% to 100%.
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- Scanning speed 80 seconds (letter size)

$1499

Affordable options to enhance your system.

**SCANNERS**
- Microtek MS II .............. 1129
- Microtek MS 300GS (256GS) 1329
- Microtek MS 300ZS .............. 1895
- Microtek MS 400GS (256GS) 2859
- Microtek Transparency Conv. ........................................... 1895
- XRS Transparency Scanner, 3950
- ScanMan M32 ....................... 369

**ACC & OTHER PERIPHERALS**
- Kurta 12 x 12 Tablet .............. 399
- Kurta 17 x 12 Tablet .............. 659
- MacFlip (80 diskettes) .............. 18
- Mac 101 Keyboard .............. 149
- Switchboard ....................... 195

**PERIPHERAL LAND**
- 1.44 Mb Floppy .............. 329
- Infinity Turbo 40 .............. 699
- Infinity Dual Turbo 40 .............. 1850
- PL 200 Int. .............. 1465
- PL 250 Int. .............. 1765

**CDC HARD DRIVES**
- Int 325 Mb ....................... 1585
- Int 330 Mb (Wren Runner) ....... 2150
- Int 650 Mb ....................... 2285
- Ext 325 Mb ....................... 1865
- Ext 650 Mb ....................... 2565

**ZOOM MODEMS**
- All with software included:
  - Zoom 2400 .............. 99
  - Zoom 2400 w/sendfax .............. 119
  - Zoom V.42 bis .............. 179

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- AP 110 SE .............. 229
- AP 360 SX .............. 259
- MinuteMan 300 .............. 429
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<table>
<thead>
<tr>
<th>Printer</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal LaserWriter NT</td>
<td>$2,175</td>
</tr>
<tr>
<td>TI MicroLaser PS-35</td>
<td>$1,599</td>
</tr>
<tr>
<td>HP DeskWriter with LocalTalk</td>
<td>$679</td>
</tr>
<tr>
<td>ImageWriter II</td>
<td>$410</td>
</tr>
<tr>
<td>CoStar LabelWriter</td>
<td>$199</td>
</tr>
</tbody>
</table>

**Drives & More...**

**Internal**
- ETC 40 Quantum 3.5 19 msec: $280
- ETC 52 1” 17 msec Classic/si/LC: $299
- ETC 105 1” Quantum 11 msec: $470
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- ETC 210 Quantum 3.5 11 msec: $765

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*Some limitations may apply
### Quantum 10 - 12ms Access

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>40mb</td>
<td>$259</td>
<td>$349</td>
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<td>52</td>
<td>329</td>
<td>429</td>
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<tr>
<td>105</td>
<td>379</td>
<td>469</td>
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<tr>
<td>105LPS</td>
<td>499</td>
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<td>120</td>
<td>639</td>
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<td>729</td>
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</tr>
<tr>
<td>210</td>
<td>799</td>
<td>899</td>
</tr>
</tbody>
</table>

### MAXTOR 15 - 17ms Access

#### Capacity

- **Low Profile, fits LC, Classic & SI too**
- **Low Profile, fits LC, Classic & SI too**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Internal</th>
<th>External</th>
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</thead>
<tbody>
<tr>
<td>40</td>
<td>$299</td>
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<td>80</td>
<td>399</td>
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<tr>
<td>200</td>
<td>759</td>
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#### Conner 25ms Access

- **Internal Configurations Only**

<table>
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<th>Capacity</th>
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<tbody>
<tr>
<td>40</td>
<td>$319</td>
<td>599</td>
</tr>
<tr>
<td>120</td>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>

### Syquest

- **45 meg Removable**
- **Dual 45 Meg**
- **45 meg Removable**

### Syquest

- **All include one cartridge, $72 per cartridge for additional cartridges**

### Teac 155mb

- **Tape**
- **Include Retrospect**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Gig WREN/WangDAT</td>
<td>$4799</td>
<td>3599</td>
</tr>
<tr>
<td>600 mb/WangDAT</td>
<td>2599</td>
<td></td>
</tr>
<tr>
<td>600/Teac 155</td>
<td>2399</td>
<td></td>
</tr>
<tr>
<td>600/SyQuest</td>
<td>2049</td>
<td></td>
</tr>
<tr>
<td>330/Teac 155</td>
<td>1999</td>
<td></td>
</tr>
<tr>
<td>330/SyQuest</td>
<td>2399</td>
<td></td>
</tr>
<tr>
<td>330/SyQuest</td>
<td>2399</td>
<td></td>
</tr>
</tbody>
</table>

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<tr>
<td>Pro 40</td>
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<td>Pro 170</td>
<td>729</td>
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<tr>
<td>Pro 210</td>
<td>799</td>
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<th>Size</th>
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<td>185 MB</td>
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<td>680 MB</td>
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<td>1.2 Gig</td>
<td>$2698</td>
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<table>
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<tr>
<th>RAM Type</th>
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<td>Video Ram</td>
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<tr>
<td>1 Meg SIMMs Mac Ilfx</td>
<td>HP Laserjet Cache Cards</td>
<td>$599</td>
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<tr>
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<td>Mac Ilci Cache Cards</td>
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What's happened to the world of the Macintosh? It's become more boring than that of the PC. The Macworld Expo in San Francisco last January closed the lid on the coffin. Everywhere you looked, you saw expensive multimedia applications, pricey typesetting engines, $5,000 monitors. For sure, this stuff makes the Mac a powerful tool for dubious video applications and special applications such as prepress and color separations. So what? I thought spreadsheets were boring. Let's talk megaboring and discuss color separations.

This is the new direction for the Mac — boring high-end applications for specialists. This is partly the fault of Apple's marketing and strategic-planning departments. Although Apple rolled out three inexpensive Macs to rekindle interest from the "rest of us," it made the move too late to prevent this dangerous turn in direction. It may be too late to prevent a turn in overall public perception.

The irony is that Apple is rumored to have 150,000, maybe more, Mac Classics back-ordered. One showgoer told me he felt sorry for any newcomer to the Mac who attended the Macworld Expo. "Can you imagine some poor schmuck coming to this jammed show and finding that he wanted to do anything with the Mac, it would cost a fortune?!"

Even typesetting companies were there showing equipment that costs tens of thousands of dollars. There is nothing exciting about any of this.

Perhaps the Mac has run its course. Its word processors can go no further without turning into desktop-publishing programs that are time-consuming and useful only if you're doing a book or laying out an ad. How many people need this capability? The painting programs have gone as far as they can go. When Radius and the rest of the monitor sellers went to 24-bit color, they hit a brick wall. What next? Have you looked at any of these super-duper painting programs? If you're a professional artist, you'll find them useful. They do everything, especially if you devote your life to them. But how about the rest of us?

It gets worse. There's the dreadfully boring multimedia. I went to a hotel suite and saw videotapes of staid, overproduced, superslick promotions made for corporate clients — the kind of boring, boring video presentations you see at every trade show. Someone is sitting in front of a textured background jabbering about how "when our company

switched to Hechstone Electro-Crappers in the bathrooms, employee morale improved dramatically."

A deep voice-over tells the Hechstone story while the video shows all sorts of special effects — such as flying toilets — to accent the imagery. Gads. "It costs us $1,000 to produce this tape, and we charged the client $30,000, and they were glad to pay it," I was told. "This is what multimedia is all about," the man said.

Of course there was only one guy in the company who could make the multimedia engine do all this fancy footwork. And it took special boards and more fancy footwork to get an NTSC master tape out of the Mac. It saved money, but it was boring. The application is boring. The tapes were boring.

This brings me to another boring type of application that flooded the show and seems to be flooding the pages of Mac magazines: animation programs. Maybe it's just me, but I don't get too excited about animation programs anymore. The first couple I saw I thought were interesting, until I realized I don't want to be an animator.

How many people would ever use an animation program? Not many. Maybe some professional animators and some bored high school kids. That's about it.

Personally, I don't much care. I'd rather job out animation than do it myself. Maybe animation programs help some animators someplace. Maybe they charge less money now. But I doubt it, given the $30,000-and-happy-to-payout gauze those industrial types took for the boring video I just mentioned. Whatever's the case, I'm sure not going to invest the time to learn any of the dozens of animation programs out there.

I've yet to see an animation program that really uses the computer's power. I want one that I can just tell what to do. "Draw a Donald Duck. Draw a red fire hydrant. Have the duck walk to the hydrant. Have him pull it up and throw it to his left." That kind of thing. But why would I want to do this anyway? Again, I'm not an animator. I don't think I'll ever become one. It's boring.

I'm scared this isn't a phase but a trend — the Mac as a humdrum device used to help animators or typesetters or makers of industrial videos. If the enthusiasm dies, so will the Mac. All these applications lack magic, and most can be done on a PC. This doesn't look very exciting to me.
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