GET THE BEST: 89 MACINTOSH UTILITIES REVIEWED AND RATED

MacUser

32 HARD DRIVES

Tough tests, easy choices

HOT!

Apple’s amazing DTP hardware

NOVEMBER 1991
Yes, Paul, you can incorporate any of 68 chart types (24 of which are 3-D) right into your worksheet, along with text and data. And notice the outlining feature on the left? Go nuts.

Or the fact that this is the first System 7.0 application available? We did fall short in one area, however, with Ralph Levy's cat. Here in Redmond, we're not very well-versed in how to remove cranky, sharp-clawed felines from atop user manuals.

Let the cat have your old manual, Ralph. You'll get a new one when you update your version of Microsoft Excel for $129 (or $50 if you acquired it on or after 12/7/90). Call (800) 541-1261, Dept. Q80, to find out more.

And by the way, Bryan Larson of Mission Viejo, California: we said hi to Bill for you. He sends his regards.

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

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

Power made easy.

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

Highlight a row or column of numbers, hit the ∑ button (that's Autosum), and voilà – it all adds up.

Do quick, push-button formatting.

Use outlining features to collapse or expand worksheets without having to create multiple files.

As for charting, we took our cue from Paul Woods of St. Paul, Minnesota, who began his letter with the salutation, "Charts, charts, charts!" Hey, Paul – check out the picture for the full scoop.

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

Or the feature called Goal Seek? Put in the total you want, and Microsoft Excel works backwards from there to fill in the variable you need.
We'd like to respond to your suggestions on how to improve Microsoft Excel.
9 out of 10 Mac spreadsheet users use Microsoft Excel. What are we doing wrong?

Out of 10 Mac spreadsheet users, 9 use Microsoft Excel.

"Collapsing cells". Collapsing cells could be a spreadsheet feature that allows you to hide columns or rows of data, similar to a vertical or horizontal orientation. By default, these cells remain active, suggesting a missing feature or documentation. It could be worth researching this further to gain a better understanding.

Microsoft Excel

9 out of 10 Mac spreadsheet users use Microsoft Excel. What are we doing wrong?

"System F support". It seems like a system F support is not available on the Mac spreadsheet.

Microsoft Excel

9 out of 10 Mac spreadsheet users use Microsoft Excel. What are we doing wrong?

"3D Charts". It seems like 3D charts are not available on the Mac spreadsheet.

Microsoft Excel

9 out of 10 Mac spreadsheet users use Microsoft Excel. What are we doing wrong?

"Better charting features". It seems like better charting features are not available on the Mac spreadsheet.

Microsoft Excel

9 out of 10 Mac spreadsheet users use Microsoft Excel. What are we doing wrong?

"Drawing tools". It seems like drawing tools are not available on the Mac spreadsheet.

Microsoft Excel
Sneak preview: Apple’s new imaging hardware.

Douglas Adams debunks desktop myths in our new Personal Macintosh section.

Double-Duty Drives: Multifunction Optical Storage
With unlimited storage capacity and the ultimate in data security, multifunction optical drives offer a decided advantage over WORM, CD-ROM, and tape drives. MacUser Labs checks out 20 drives that combine WORM and erasable optical technologies in one box.

Searching for Storage Perfection: 100-Megabyte Hard Drives
Do you crave performance, or are you interested in value, service, construction quality, or portability? MacUser Labs pinpoints the drive for you in this showdown of thirty-two 100-megabyte hard drives.

Super Server Software: NetWare for Macintosh 3.0
Novell’s NetWare 3.11 with NetWare for Macintosh 3.0 is the fastest file server around; can link your Mac with DOS, OS/2, and UNIX networks; and beats plain-old AppleShare by a long shot. But there’s a catch.

Jon Zilber
Bureaucracy bashing made easy.

Guy Kawasaki
Smile :) — it’s Guy’s guide to on-line etiquette.

Michael Swaine
Captain Kirk thought “space” was hot, but interapplication communication is the final Frontier.

John C. Dvorak
Apple Computer — remember it?

Letters
The problem with grammar checkers, the word-processor follies, the startling history of Excel for the Mac, what Andy Ihnatko really meant to say, and more.

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"One thing that Apple left out of the Mac’s desktop metaphor was the pair of legs sticking out from under the desk while you’re trying to find out what your computer’s getting itself into a tizzy about now."
TouchBASE is the Macintosh desk accessory database for managing personal contacts. Easy to learn and very easy to use, it will quickly become one of your favorite programs. You get:

**Contacts on tap:** All your contact information, including up to 7 pages of searchable notes, is always available instantly. Find anyone, fast.

**Printing plus:** TouchBASE has the most comprehensive printing capabilities of any contact manager, including labels, envelopes, address books, reports, and even FAX covers.

**Import/export:** to and from Macintosh applications, and now, to Sharp Wizards!

Share if you want: Single user mode for individual productivity, network mode for office productivity.

**Plus these New, Version 2.0 Features:** You told us how to improve. We deliver: Tickle! Set deadlines and reminders with handy new fields! Go! Print data in Address Book form, or send to your Sharp Wizard! Customize! Make your screen show what you want. **Multiply!** Multiple level sorting, multiple return addresses. **Accelerate!** 2.0 is 50% faster!

TouchBASE 2.0—the bargain of the century. Just $125. 1.0 owners, upgrade for $25. Try our FREE DEMO. You'll be hooked in minutes.
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*

Abaton
We Make Your Ideas Acquire a Presence.

*Suggested retail price. LaserScript, LaserScript LX, Abaton, the Abaton logo, and "We Make Your Ideas Acquire a Presence" are trademarks of Laseret Systems, Inc. Other brand names and product names are trademarks or registered trademarks of their respective companies.

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Fits like a glove.

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INTRODUCING NEW CONTROL PANEL SOFTWARE

MacTRAC's new Control Panel software provides you with the most complete selection of button functions at any one time. Whether you are using System 6 or 7, utilize the eight pre-set command key assignments to perform menu shortcuts. Or, use the edit feature to easily create your own custom key assignments. You can also change the tracking speed of the MacTRAC from 50 to 1200 dpi, at a touch, with the convenient slider control.

When you choose a trackball, MacTRAC 2.0 from MicroSpeed® is the fitting choice.

HAVE A BALL WITH COLOR

The MacTRAC ball is available in a variety of exciting colors. See coupon inside your MacTRAC package for details.

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MacUser

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Information Exchange

If you have a question or problem or a tip to share, write to Help Folder or Tip Sheet, respectively, c/o MacUser, at the above address. If you are interested in contributing to our utilities disk or labs-benchmark disk series, write to Michele Hasson at MacUser. For more help, you can take advantage of local user groups. Call Apple toll-free at (800) 338-9696, ext. 500, for information.

Zmac: MacUser On-Line

Follow these steps to join Zmac: Call (800) 635-6225 (voice) to find your local access number. Set up your telecom software with the following settings: 8 bits, 1 stop, and no parity. Dial the local access number. When connected, press Return. At the following prompts, type in the responses printed in bold: Host Name: CIS User ID: 177000.5200 Password: Z*MAC Agreement Number: Z12D9014. CompuServe users can just type GO ZMAC at any time prompt.

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STEP UP TO THE INFINITY 88 TURBO REMOVABLE CARTRIDGE DRIVE

SUBSTANTIAL PRICE REDUCTION

One of the most exciting advances in data storage technology of the eighties meets the capacity and performance challenges of the nineties.

Why do more than 600,000 people worldwide use this storage technology? Because it's the simplest, most effective system for security, back up, archiving, and data sharing available today. Remove a cartridge and lock it away, store it, or take it with you.

Easy to Use
There's nothing to learn. If you know how to use diskettes, you already know how to use the Infinity 88 Turbo. Backups are fast and reliable. You don't have to restore data to use it.

Unlimited Storage
When you run out of space, just put in a new cartridge. Imagine how you can streamline your work with a different cartridge for each client or project, or for transporting huge graphics files.

Fastest Possible Performance
You don't have to sacrifice performance to get portability. This is the fastest removable-media technology available. The access time is just 20 ms. PLI alone includes TurboCache, a disk drive accelerator program that can speed up your other drives, too. TurboCache uses system memory to create a cache, boosting data access time by up to 50% with many applications.

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It's affordable — both the drive and the cartridges are much less expensive than optical drives and cartridges. Additional 88MB cartridges cost less than $2 a megabyte.

PLI is one of the oldest manufacturers of hard disk systems for the Macintosh. We have been making innovative, highly-rated storage solutions since 1983. When SyQuest was ready with a removable-cartridge drive, PLI was ready to deliver it to you — right from the start. Through our experience, we have learned to make the most reliable SyQuest-mechanism drive you can buy. You can extend the 2-year warranty to five years.

PLI offers a full family of SCSI storage devices for the Macintosh, including the Infinity 40 Turbo drive, DAT drives, optical drives and jukeboxes, floppy drives, and fixed hard drives in capacities ranging from 40MB to 1.2GB.

Don't miss this chance to get started with the best. Call PLI today.

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800-289-8754 or FAX 415-652-9713
Everyone agrees that the Typist is the best thing that ever happened to hand scanners. The ability to read words and numbers easily and accurately really makes a difference when you're pressed for time. Or like most people you simply hate to type.

With the Typist you can scan almost any document just like you were typing it yourself; into just about any PC compatible or Macintosh word processor, spreadsheet or database.

It's not surprising then that the Typist has so quickly become the hand scanner of choice when it comes to OCR. The clear standard.

So you might say that the writing was already on the wall, and it was only a matter of time before the Typist allowed you to scan and edit graphics as well.

That's why Caere Corporation created the Typist Plus Graphics, the hand scanner that adds yet another dimension by allowing you to scan and enhance photos, artwork and illustrations with incredible ease and accuracy.

The Typist Plus Graphics lets you put your best image forward because of a major innovation called the Graphic Editor, which creates full tone images — 256 shades of gray — in software. You can display grayscale images up to the full capacity of your screen; modify and edit in either grayscale mode for photographs, or black and white mode for line drawings; and later output in picture perfect form.

In fact, when it comes to printed output, the Typist Plus includes LaserGray, yet another proprietary technology from Caere. So you can print halftones that look just like grayscale images. The photos that...
you modify on-screen have a crisp, sharper look and feel. A professional touch.

Just think of what the addition of picture perfect graphics can mean for your business or profession.

Use the Typist Plus Graphics to capture photos that you can incorporate into your most critical business presentations or reports. Scan company logos and place directly onto your stationary, invoices or slide presentations. You can add graphics to all of your Macintosh desktop published documents, including training manuals, newsletters - even invitations to company events.

The word is out about the Typist Plus Graphics. Now you get the full picture - words and graphics - in one intuitive and easy-to-use hand scanner.

To learn more about the Typist Plus Graphics and how it can be of assistance to you, contact one of Caere's authorized dealers. Caere, the Complete Recognition Company.

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Get The Speed You Need
From the economical FastCache up to the 50 MHz PowerCache, we have an upgrade for you.

FastCache® - Now, the ever-popular 64 K FastCache Ilci is also available for the Mac IIx. Work up to 1.5 times faster.

25 MHz PowerCache® - Affordably put Ilci speed into your Mac SE/30, LC, II, IIx, or IIcx. Work up to 1.8 times faster.

40 MHz PowerCache® - Now, you can turn your Mac into a Ilfx-class powerhouse. Work up to 2.6 times faster.

50 MHz PowerCache® - Get workstation performance. We’ve turned flips with this one! It’s even faster than before... fits into any Mac... and costs less. Work up to 3.2 times faster!

All these cards are 100% compatible (including System 7 and AU/X). They will make your work fly! The payback is just as fast.

Come join us. 1-800-962-2077

DayStar Cache Cards
CPU performance upgrades the Mac SE/30, LC, II, IIx, IIcx, IIfx and IIfc.

Our cache cards are the easiest way to get super productive speeds from your mid-line Mac. Simple to install, and with automatic operation. The price is right... starting in the hundreds, not thousands. Now, you can afford to take your 16, 20, or 25 MHz Mac up to speeds of 50 MHz, and with proven '030 compatibility!

Get The Speed You Need
From the economical FastCache up to the 50 MHz PowerCache, we have an upgrade for you.

FastCache® - Now, the ever-popular 64 K FastCache Ilci is also available for the Mac IIx. Work up to 1.5 times faster.

25 MHz PowerCache® - Affordably put Ilci speed into your Mac SE/30, LC, II, IIx, or IIcx. Work up to 1.8 times faster.

40 MHz PowerCache® - Now, you can turn your Mac into a Ilfx-class powerhouse. Work up to 2.6 times faster.

50 MHz PowerCache® - Get workstation performance. We’ve turned flips with this one! It’s even faster than before... fits into any Mac... and costs less. Work up to 3.2 times faster!

All these cards are 100% compatible (including System 7 and AU/X). They will make your work fly! The payback is just as fast.

Come join us. 1-800-962-2077

DayStar Cache Cards
CPU performance upgrades the Mac SE/30, LC, II, IIx, IIcx, IIfx and IIfc.
How FileMaker Pro makes one man seem like a cast of thousands.

Jay Nathanson wears a lot of hats. His company — Target Marketing of Richmond, Virginia — is one of the fastest growing small businesses on the East Coast. Ask Jay to explain his success and he’ll give you an uncharacteristically succinct response: FileMaker® Pro.

FileMaker Pro wears a lot of hats too. Jay literally built his business with it. He and his lean, mean staff use it to quickly research, quote, present, schedule, ship, label, invoice and generate checks and correspondence for every job. The entire staff can access that data simultaneously — and effortlessly. So almost any question a customer can think of can be answered while they’re on the phone.

FileMaker Pro even closes Jay’s books every month, in 45 minutes. As you might expect, those books look pretty good.

Jay Nathanson is just one of over a quarter-million people who benefit from FileMaker Pro. You can too. To see how call 1-800-729-2292, ext. 20.
For fast, easy file access, get new HAND-Off II

Get more done in less time with HAND-Off, the collection of productivity tools that make accessing files a snap. As MacWEEK said, “It’s so good that Apple should have put it in their system software.”

Here’s how the new System 7.0 savvy version can make your Mac even more productive:

**Locate and launch files fast using the Apple menu**
Click open any document, alias or application directly from the Apple menu. Speed through your control panels with a mouse stroke. HAND-Off II’s new SuperMenu turns the System 7.0 Apple menu into a multi-level hierarchy for viewing, launching and opening both folders and files.

**Pop-up menus open many files simultaneously**
Organize files and applications the way you work. With the HAND-Off II pop-up launch menu you can easily open any file or group of files. This custom pop-up menu is ideal for opening all of the letters, charts, spreadsheets and files associated with a project.

**Finder enhancements for increased productivity**
You can create custom settings for any application, so whatever is running, your Mac will automatically switch to the environment you prefer. HAND-Off II lets you individually set the color depth and sound level for any application. It’s all automatic.

Run your Mac in full color when you use your favorite graphics programs. Then HAND-Off II will transparently change to the faster black and white mode when you switch to a word processing or spreadsheet program.

Moving through a clutter of overlapping windows can be confusing. Your desktop will be easier to use when you pair HAND-Off II’s new Autohide feature with System 7.0. Autohide lets you automatically hide all windows except the ones that your current application is using. The result is a cleaner, more productive desktop.

**Automatic substitution for your missing applications**
Say goodbye forever to the annoying “Application Not Found” message. If the program you need is missing, HAND-Off II’s application substitution will automatically use an alternate.

Now, whenever you click on a file, you can automatically open a compatible alternate application.

With HAND-Off II’s “on-the-fly” application substitution this error message is obsolete.

You can even pre-assign application substitutions. HAND-Off II lets you double click on any file—even one from a DOS machine—and automatically open it using a compatible alternate program.

Get HAND-Off II, the productivity tool that MacUser rates live mice. Call your software supplier or Connectix direct at (800) 950-5880 or (415) 324-0727.

“This utility is definitely in a league with Suitcase II—and it’s indispensable.”

MacUser, February 1991

800-950-5880

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Upgrade Inflation

Ever since the hullabaloo began about software companies' responsibilities to loyal customers (if the companies want to see an end to software piracy), most upgrade prices have been reasonable — anywhere from nothing for bug fixes to $25 for major feature upgrades and around $10 to $15 for compatibility upgrades. You can imagine my shock, then, when I was told by La Cie that the Silverlining System 7-compatible upgrade was $50. I originally paid $78 for the program.

I wouldn't have bought Silverlining in the first place if I had known La Cie was going to exploit a situation in this way.

Loy Spurlock
La Mirada, CA

Silverlining retails for $149, and the company considers the new version to be a major feature upgrade. Owners of the previous version (3.28) can upgrade for $10. In any case, we'd have to think that publishers should feel obliged to price upgrades reasonably or expect their customers to steal from them if they didn't. — JB

Toaster Master

"Putting Your Mac on TV: Desktop Video" (August '91, page 94) was a great article that really highlighted the fact that no single computer can do everything at a professional level. The Mac is truly one of the greatest personal computers for DTP, but it's not really suited for video. Selecting the appropriate tools for the job is an important element in successfully completing a project, and a Toaster-equipped Amiga is the tool of choice for video.

It's refreshing to see articles that "call 'em like they see 'em," even when the final analysis reveals a preferred platform that isn't what the intended audience expects to find.

Larry Owens
Seattle, WA

TV Stand

"Although a Mac-produced video will never be good enough to air on MTV, don't be disappointed ... " So says your lab report "Putting Your Mac on TV: Desktop Video" (August '91, page 94). Sorry to disappoint you, but we produced a 30-second public-service announcement for gun control that was broadcast on MTV. It was 100-percent Mac — audio and video. We used a NuVista+ with the Truevision XOBJV in MacroMind Director.

Although we concur with your appraisal that the NuVista+ and its software is the best Mac DTV product, we cannot figure out how you can say it does not meet NTSC (broadcast) standards.

Dear Mr. Sculley ...

Well, the lamb has lain down with the lion. Apple and IBM are cooperating in the development of (among other things) a new operating system, code-named Pink. The pundits are unanimous: It's either the smartest or the dumbest thing Apple could do.

Speak Up:

Is Apple signing its own death warrant by joining forces with IBM?

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

As Mr. Sculley looks toward Apple's next-generation operating system, some Mac users are still hesitating about jumping on the current bandwagon. In August we asked readers whether they planned to switch to System 7. Many cited cost and concerns about compatibility as reasons not to switch.

Larry Hacker, of Mabelvale, Arkansas, was ready to try System 7 but stopped before he really got started. "When I ran the Compatibility Checker, I found that I had only one program that was compatible, I called Apple, and all I received were condolences." Actually, the condolences may be due to Apple for having put so much effort into creating a software program that often seems to scare people away from its own system software.

Bruce Long, of Tempe, Arizona, plans to switch only when "it can be reliably demonstrated that hell has frozen over. I consider System 7 to be the Edsel of system software. At least three of the applications I use most frequently are incompatible, and with System 7 you are chained to MultiFinder every moment your Mac is in use."

Charlotte R. Hitchcock, of New Haven, Connecticut, won't switch in the near future, because the cost seems unnecessary. "I have no money to spare for an expensive upgrade. I can't afford any new software either, so why bother when 6.0.5 works OK?"

Another chea— er, thrifty reader is David Robertson, of Spokane, Washington: "It would cost a lot to upgrade all the applications I use, and Apple is charging $100 for something that Mac users have always received for free. If I could get System 7 for free, I'd try it to see if there were things I could learn to do without. But do without some of my favorite INITs — Boomerang, for instance? I doubt it. Actually, no one need do without Boomerang. A System 7-compatible version of SuperBoomerang should be available soon.

MacUser November 1991
What's the Difference between a Font and a Typeface?

...And what's all this about PostScript versus TrueType? Is there a difference between tracking and kerning? What is an outline font, anyway?

At Altsys, we've spent the last 6 years understanding and developing Macintosh software for creating and editing type and fonts. And during that time, a special vocabulary has developed just for computer type. It's made up of new words and different uses of traditional typographical terms.

So, to help you understand fonts in this age of technology, we'd like to offer you a free copy of our booklet, *Type Terminology on the Desktop*. Just call us at the phone number and extension below or use the enclosed magazine reader reply card.

CIRCLE 22 ON READER SERVICE CARD.

Mixing the Mac and TV is like sticking a Porsche engine into a VW Beetle. But if the engineering is sound and you learn how to drive it, it works.

Jim and Charlie Rice
Linden, VA

Our comment that the signals from all the Mac video products were not "broadcast quality" was specific to the composite output from the video boards. In the "Bottom Line" sidebar, we made it clear that you can get clean broadcast-quality signals if you take the RGB output from the NuVista+ and use an industrial encoder to convert the signal to a composite or component signal. — PY

In-House Work
Boy, were we surprised to learn that the original development work on Microsoft Excel for the Mac was done externally ("Spreadsheet Skirmishes," August '91, page 291). In fact, Robert Wiggins is wrong. In the fall of 1983, on a retreat for key-application developers, Bill Gates challenged us to develop the "world's greatest spreadsheet." In September 1985, we shipped Microsoft Excel for the Mac.

As the group product manager throughout the development of version 1.0, I can assure you that all the original design and development work was done internally, by Microsoft employees.

Pete Higgins
Vice President, Analysis Business Unit
Microsoft Corp.
Redmond, WA

System 7-Savory
All the bellyaching over the "incompatibilities" of System 7 is just that — bellyaching. Despite what Apple's Compatibility Checker says, I've found none of my commercial programs totally incompatible. For instance, I can still use Microsoft Word 3.02, as long as I don't use TrueType fonts. And I can still use many INITs, such as Boomerang 2.0, PopChar, Superclock 3.9, Moire 3.0, and Virex 3.1, after a little putting around to figure out the best place to put them. After a modest taste of Apple's System 7, I think Jon Zilber's recipe for System 8 ("Compatibility Checkmate," August '91, page 23) sounds about as appealing as DOS 5.0.

Ken Trammel
St. Louis, MO

If the FDA released a list of foods guaranteed not to cause cancer, would you risk ingesting something that wasn't on that list? You might, but if Apple is going to put its imprimatur on what's safe and what's at your own risk, the company incurs the responsibility to keep the list current and distribute it frequently — at no charge to registered users. — JZ

Checkers Speech
Regarding Figure 6 on page 122 of your September '91 issue ("Proper English"): At first I thought it might have taken to long two use the grammar checker too allow a spelling checker too be used to. Then it occurred to me that the ambiguities of the English language are simply to much for any help program too catch, so use of these automatic assistants ain't no guarantee that you will produce "perfect English."

Two bad too.
Bob Hunt
Santa Ana, CA

Your write, but the grammar checkers are supposed too flag homophones, whic...
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GO WHEREVER YOU WANT. With enhanced color capabilities, including a built-in process (CMYK) color separator, PANTONE® color support, and automatic gradient fills and blends, Canvas 3.0 is blowing the doors off the competition. But it doesn't stop there. You'll also find technical features like custom hatching, parallel lines and curves, and dashed lines, curves and borders. Automatic dimension lines. And a Smart Mouse™ drawing aide for precise alignments. What's more, there are new built-in file translators for important multi-platform formats like EPSF, TIFF, CGM, DFX™, IGES, and Illustrator®.

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Well, trade-in any used model of MacDraw®, MacDraft®, Illustrator® or Freehand™ for a brand new Canvas 3.0 dream machine for only $149.00. Mail your original program disk with payment to our main address below. Include your MC, VISA or Amex card number, account name and expiration date, or a check in US dollars drawn on a US bank. Add $10.00 shipping. Offer valid in the United States and Canada. Expires on 12/31/91. Please allow four to six weeks for delivery.

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CIRCLE 186 ON READER SERVICE CARD.
The Last Round Up

On reading Bob Kimble’s Tip of the Month (Tip Sheet, September ‘91, page 269) concerning the rounding of numbers, I couldn’t help but wonder what my high-school chemistry teacher would think of his rounding technique.

Scientifically, the rule is that when you round to whole numbers, an exact half number of .5 is rounded to the even number — not to the next-highest number, as the result would always be using Mr. Kimble’s formula.

“Incorrectly” rounding a student’s grade of 84.5 percent up to 85 percent rather than down to 84 percent could mean the difference between a B- and a C+. My chemistry teacher never gave anyone the benefit of the doubt (although I’m not necessarily speaking from personal experience).

Jay J. Jacobs
Western Springs, IL

PC Intrigues

What Guy Kawasaki can’t tell us, we can infer from his column “Sleeping with the Enemy” (September ’91, page 29). Several years ago, Apple and Microsoft secretly settled their lawsuit. Thus, Microsoft wrote System 7 — a technical step forward but as user-hostile as Word 3.0. In return, Apple promised Microsoft that it would foist the TrueType format on IBM (as well as on Mac users); sweet revenge by two old antagonists upon the third (as well as on Adobe, which committed the unpardonable sin of offering a single, simple standard — PostScript).

I’m aware that there’s pain in progress — adapting to new operating systems, hardware, and so on — but if Apple continues to kludge up the Mac’s elegant simplicity with giant leaps of incompatibility instead of thoughtful, gradual improvement, I will surely pause to consider what’s NeXT.

Brad Nelson
Bremerton, WA

Getting His Backup

Regarding the article “Overnight Success: Network Backup” (August ’91, page 112), I don’t know where you’re purchasing 8-millimeter-tape cassettes that “cost about $60,” but our source sells standard-grade cassettes for less than $5 each in bulk (100 cassettes). Premium-grade D8 (data, 8-millimeter) cassettes can cost upward of $12 in single quantities. It will be some time, if ever, before DAT is as easy to purchase as 8-millimeter tape is.

I fully agree with your criticisms of NetStream: clumsy interface, slow backups, and no ability to restore directly to the client. I hope that version 3.0 will fix some of these problems. There were some inaccuracies in Table 1, however. Contrary to the information in your article, a client cannot cancel a backup with NetStream if you press Command-period at the time of backup or remove the client RBS (Remote Backup Set) from the System Folder to prevent a future backup.

The client can force backups to be encrypted by using either a proprietary PCPC scheme or standard DES encryption. You can find this in the Set Preferences for Security menu.

You can write-verify by selecting the Check Disks: During option on the Set Preferences for Backup menu.

One question I had wasn’t answered by your review. NetStream will not find files to back up if the name of a disk drive, a file folder, or the file itself has been changed since the creation of the RBS. Is this a fault common to all the backup programs you reviewed or only to NetStream?

John H. DeRosa
Arlington Heights, IL

Who Shipped First?

We were pleased with the in-depth information provided in the review of SAM 3.0 (August ’91, page 75). However, we’d like to mention one small inaccuracy. Under “Virus Alert,” you stated that Virex “is also currently the only program that combats an unconventional HyperCard virus that originated in Europe.” This virus was discovered on April 1, 1991, in Belgium. Symantec responded immediately — issuing both user definitions and a virus-definition file by eight o’clock that night. Our response came weeks ahead of Microcom’s because of code changes necessary for Virex to address the new virus.

Elizabeth Hencyck
Product Management
Symantec Corp.
Santa Monica, CA
Now that the new Macintosh you've always wanted is finally within reach, you'll no doubt also want all the software you can get your hands on.

That would be Microsoft Works.

Works comes with a word processor for creating professional reports, memos and letters. There's a database for managing information. A spreadsheet for number-crunching and business graphics. Communications capabilities. And, of course, drawing tools to design logos, newsletters and much more.

Works is powerful, easy to learn and marvelously affordable. And if you get it now, we'll throw in a copy of new Quicken 3.0 — the leading personal finance package — free.

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CIRCLE 67 ON READER SERVICE CARD.

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LETTERS

When we called Microcom in mid-April, we were told that its response was ready, which turned out to be a premature assessment. At the same time, we called Symantec's tech support and were told a HyperCard virus response wasn't available, even though apparently it was. We regret any confusion caused by these errors. — BT

Free Medicine
You left out Disinfectant, the best virus checker around, in your August '91 review of SAM and Virex (page 75). When you manage a few hundred Macs, it is unfeasible to purchase 200 copies of SAM or Virex when you can get the same protection for free.
Ben Olken
Sharon, MA

Revenge of the Wimps
For years I’ve resisted the urge to write this letter, but the Dvorak article on word processors (“Wimp Processors,” August ’91, page 326) finally nuked my resistance. You’re not paying him for his misinformation, are you?
Dvorak did, inadvertently I presume, incorporate one interesting insight. If you concatenate the first and last sentences in his first paragraph, it reads: “Word processing on the Mac hasn’t improved one iota since MacWrite came out seven years ago. Now many word processors for Windows and the PC are as powerful and easy to use.”

Did he really mean to admit that it has taken the PC world seven years to catch up with where the Mac world was seven years ago? That’s not what he’s been saying for the past seven years!
C. J. Thompson
San Clemente, CA

If you looked over John C. Dvorak’s copy before publishing it, you might be able to prevent him from making a fool of himself in public. In “Wimp Processors,” for example, he writes of a “hypothetical situation” in which a “complex table” resides on page 2 of a 100-page document. He wants to change all of the document except the table from one typeface to another, but, he laments, “There’s no way to deselect this little chunk.”

Has he actually used a Mac word processor lately? In Microsoft Word, the change can be made in six quick steps.
Frank Kofsky
Benicia, CA

John C. Dvorak complains about some “missing” features that he wants in his word processor, but he apparently never bothers to read his manuals, because Microsoft Word can easily handle his items 5 and 6. As for most of his other items, I personally hate the growing featureitis of all software. I used to think that 80 megabytes was a reasonable size for a hard disk, but when a spreadsheet program or word processor hogs 5 megs for its glowing-in-the-dark menus and dancing toplevel icons, I’m stuck with being able to use fewer than 20 applications.

I suggest that you create a sister magazine entitled MacUser sans Dvorak — the circulation potential is enormous. Fornow, would you please simply remove the last page from my issue before mailing it?
Gary Kowalski
Santa Ana, CA

It’s clear from John C. Dvorak’s August column that he’s never used Nisus. With the exceptions of automated envelope printing and new special effects (who cares?), Nisus already does everything on his word-processor wish list.
Jon H. Clinch
Harleysville, PA

With regard to his August column, I am forced to conclude that Mr. Dvorak was secretly paid by Microsoft to goad hundreds of Word users into writing testimonials.
Mr. Dvorak’s remarks remind me of the man who took his car back to the dealer for a refund, bitterly complaining that it leaked when he drove it underwater. If he truly requires the shrunken heads and rubbery margins of “a good desktop-publishing program,” then maybe he should use one. Or maybe he should invest some time in practicing with and studying today’s high-end Mac word-processing programs.
Rick Conner
Beltsville, MD

John C. Dvorak was right on in his indictment of Mac word processing. Except for one thing. I don’t know about the other products, but in WriteNow 2.2, he need only follow these simple steps:

Robert Jarling
Madison, WI

Mr. Dvorak was unavailable for comment — he’s busy trying to find a Mac spreadsheet program that can handle 3-D graphics. — JZ
Man Heaving 75-lb. Boulder.
Woman Emptying Bucket of Water on Seated Companion. Man Balancing on One Foot. A ballet for eccentric acrobats? Yes, but at the time, also the world's most ambitious photographic research project. Refining the techniques he developed taking pictures of Leland Stanford's race horses in California, Eadweard Muybridge produced 100,000 negatives in the span of a year and a half.

On a good day, he would take five or six hundred 4 x 5 pictures. — In your own quest for fresh insight, which type for the Macintosh® will be your most faithful servant? Perhaps it will be type from the foundry that spares nothing when it comes to capturing the original. Bitstream, where the spirit of type burns brightly. Where the kerning is exquisite. Where people go to outrageous lengths to preserve the integrity of a type designer's dream.

Where our library of over 1,000 faces is growing all the time. Call to order or ask for a complete showing of PostScript®-compatible fonts. Bitstream. Labor of love.
Some things are clearly built for speed.

Hang on! At 17 pages per minute, the new HP LaserJet IISi printer for the Macintosh runs full tilt. And while other machines may keep you waiting, this one whips through PostScript® printing. With a high-speed engine, more standard memory (5MB, expandable up to 17MB), and a RISC-based formatter, this printer can have your work finished faster than you can shout “the Hewlett-Packard LaserJet IISi for the Macintosh.”

What's more, the built-in true Adobe® PostScript makes this a LaserJet printer manufactured specifically for Macintosh. Simply plug into the LocalTalk network, and your workgroups are ready to roll. Also, the two 500-sheet input trays, a 500-sheet output capacity, and a 50,000-page-per-month duty cycle ensure that it can handle high-volume printing. In addition to quick turnaround, you gain paper-handling versatility with job offset and a tray-full sensor. And for even greater flexibility, you have the option of adding two-sided printing and an envelope feeder.

Yet what makes all of this worth the ride is the end result.
Others aren't so obvious.
Introducing the LaserJet III Si
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Thanks to our Resolution
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Perhaps the best news of all is
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Now you can change from one type of media to another and never purchase additional hardware. Or incorporate a different type of media into an existing network for only the cost of the cable. For instance, to change your Ethernet media from thin to 10BaseT, you simply unplug the thin cable and plug in the UTP wire. With these choices you’ll never have to change Ethernet cards again. Nothing could be simpler.

Each Asante 3-in-1 card has ports for thick, thin and 10BaseT, and are available for the Macintosh® II family, SE/30, SE and LC. These cards also feature autosensing ports which can automatically configure the card for whatever type of media you connect. And Asante’s EN/SC™ SCSI adapter allows you to bring Ethernet to computers which do not have an available expansion slot.

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No matter what kind of Macintosh or Ethernet media you choose, one simple fact still remains unchallenged. When it comes to Ethernet, only Asante has All The Right Connections. Call us today at 1.800.662.9686 to find out more about our complete family of products.

Resellers: Asante products are available from distributors Ingram Micro, Merisel/Macamerica and Tech Data.
The Uncivil War

How to succeed with bureaucracies without really trying — and get the Macintosh or upgrade you’ve always wanted.

It wasn’t like I was trying to orchestrate a leveraged buyout of Sony or anything. All I wanted was a box of floppies.

But that’s bureaucrats for you. You can’t live with ’em, you can’t live without ’em, and you can’t get ’em to get you a box of floppies without jumping through hoops in triplicate.

Just try and get them to approve the purchase of a new Mac or CPU upgrade when they’re convinced that a 286 clone is the ideal machine for you. All of their paperwork and requests for justification just take too much time. And after all, time is what you don’t have enough of — that’s why you need the faster machine in the first place.

If you’ve ever been frustrated by a rejected request for the Mac equipment you want, you need an arsenal of strategies to get results.

What it comes down to is simply this: It’s a war, between us— the Mac users who understand the products and what they can do for us — and them — the paper pushers and keepers of the purse strings who understand how a carefully worded set of contradictory company guidelines can keep them from having to fulfill any request that comes their way.

Bureaucracies generally work according to clearly defined rules known only to the people who set them up — who have long since left the organization. Pinning down those rules is often a Catch-22 of Olympic proportions. If your request for something gets turned down because you didn’t follow the rules, the logical next step is to ask to have the rules explained. But that request gets turned down because you didn’t follow the rules for policy-clarification requests.

Face it — all bureaucrats worth their rubber stamps have more objections than Perry Mason in a cranky mood. But here are three strategies for overcoming the obstacles and getting the hardware and software tools you need to get your job done.

1. Up the Ante

One surprisingly effective way to get things past the bureaucracy is to up the ante. A simple matter — such as a request for a box of floppies — easily falls through the cracks. It wasn’t budgeted, nobody knows whether to code it as “computer supplies” or under “incidents.” There’s no designated in-house floppy guru to consult on the choice of brands.

But give the bureaucrats something juicier to sink their teeth into — make it a request for “personal computer subsystem storage media provisions restocking” — and they’ll get on it right away. They’ll get a whole committee on it right away. And they’ll even give it an acronym — PCSSMPR — before you can say “single- or double-sided?”

But the up-the-ante strategy works only if you have the time — and the stomach — to follow through: to outcommittee their committees, to outmemorize their memos, and to outjargon their gibberish.

II. Strike Preemptively

Education is the shortest distance between two points — two points of view, that is. Get them to see things your way before you even ask the question, and they’ll be predisposed to grant your request with a smile and a pat on the back.

Fortunately, the job of preemptive education may not be as gargantuan as it might seem. If the letters we get from readers are any indication, the same reasons for turning down requests for Mac equipment come up over and over again. The same misguided notions about the Mac permeate corporate America, all levels of government, and even many so-called institutions of higher learning.

The solution here is obvious: Start a chain letter. You know how it works: Send a copy to ten people, each of them sends a copy to ten people, and so on. Before long, two things will happen: (1) There will be more copies of this letter floating around than there are unopened free copies of Windows 3 on the shelves, and (2) you’ll notice a marked rise in the frequency of visits from your copier repairman.

Here’s the text of the letter:

This is a chain letter. Follow the chain, and you will have good luck. Break the chain, and you will have bad luck. Arnold Kaplotnik, of Happinace, Wyoming, followed the chain and successfully installed System 7 without a hitch. Edna Wilkinson, of Doshville, Nevada, broke the chain and bought a Mac SE the week before Apple introduced the Classic for half the price.

This letter dispels the ten most frequently cited misconceptions about the Macintosh. Photocopy this letter, and send it to any ten bureaucrats in your organization who have ever turned down your request for bigger and better Macintosh equipment. Use a yellow highlighter to call the recipient’s attention to the lame excuses used to turn you down.

Myth No. 1: Macs are too expensive.

The Mac Classic ended this myth once and for all. Try finding a DOS clone powerful
enough to run a graphical user interface with a monitor, networking, HyperCard, and operating-system software for anything close to the price of the Classic. A decent range of low-priced CPUs lets you add exactly the color, performance, and expansion capabilities you need.

Myth No. 2: The Mac doesn't run the key applications we need.

Mac users have become well-versed in virtually all the dominant DOS products. Everything from WordPerfect to NetWare to Oracle has been available on the Mac for years. The final (and perhaps the most critical) holdout — Lotus 1-2-3 — was due to ship any moment as of this writing, and it looks like a winner.

Like the aforementioned products, Lotus provides a graceful way for potential Mac users to migrate to the Mac. Lotus Mac even provides an instant toggle between two interfaces; one that exploits the Mac's graphical interface and one that offers Lotus experts a familiar — if less intuitive to novices — replica of the DOS-style Lotus interface.

Myth No. 3: Macs are wimpy.

Give me a break! Sure, the 128K Mac had their limitations. The original IB PC was no powerhouse either. Neither was the Commodore 64, although that never stopped it from becoming the best-selling computer in the world.

Get real. Have you driven a Mac lately?

Myth No. 4: Apple doesn't offer any truly portable machines.

Apple has promised to enter the notebook marketplace by the end of 1991. Although the company hasn't publicly released any details, you can be sure that Apple has learned its lessons from the less-than-stellar response to the first Mac Portable. And Apple's stated intention to pursue low-cost consumer electronics promises to take portability into directions that IBM-compatible computers seem to be overlooking.

In addition to Apple's forthcoming products, Mac users already have a wide range of portables to choose from, including products from Outbound, Colby, DynaMac, and others. If you need more options, DOS-to-Mac transfer software makes DOS notebook computers viable companions to Mac desktop machines.

Myth No. 5: You can't get here from there.

Because everybody has to share tiles, everybody has to use the same computer, right? And if the computer everybody else already uses is a PC, nobody gets Macs, right? Wrong. DOS-to-Mac file transfer is built in at the system-software level, and third-party products make it even easier and more completely transparent. You can even get full DOS emulation on a Macintosh with the SofiPC family of software products or the Orange Micro 386-on-a-board.

A host of new products have finally provided the missing link in the opposite direction. For Mac-to-DOS transfer, you can get file-exchange compatibility with
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Meanwhile, it tracks exactly where your money goes — utilities, clothes, charity, etc. — to give you complete, accurate reports and cut tax preparation time to minutes.

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software from PLI and Pacific Micro or hardware from Central Point. You can even get a Mac-on-a-board from Hydra Systems for full Macintosh emulation on your PC (for the same price as a Mac Classic).

Myth No. 6: You can't get here from there, part II.
Ignorance is bliss — unless it means you’re losing out on Macintoshes for no reason. Many MIS managers believe that Macs don’t easily fit into mainframe-based networks. What we’re dealing with here is lousy marketing, not missing capabilities. Apple has been remiss in failing to educate network managers about the options available to them — such as minicomputer-and-mainframe-database access that makes the Mac the ideal universal client on practically any network. And new products are arriving daily to simplify the process. For example, a software package called, simply, Both bundles an easy-to-use IBM-mainframe-interface builder with on-site developer training from its creator, Connectivité.

Myth No. 7: We can’t buy Mac computers through our standard computer-requisition channels.
The channels are changing for everyone: there are no standard channels anymore. And one consequence of the recent Apple/IBM alliance is that Apple will get access to the IBM enterprise-wide sales force. That’s about as standard as sources get these days.

Myth No. 8: No clones means no second source.
How about IBM? In light of the technology alliance, IBM has become, if not a source, a powerful guarantor of continued support for the Mac. As the Mac has become a secure standard in the computing marketplace, second-sourcing has ceased to become a serious issue. And when the new “Pink” RISC-based operating system jointly developed by IBM and Apple comes on-line in the next couple of years, Apple, IBM, and all other licensees of the OS will effectively become each others’ second sources.

Myth No. 9: What’s the big deal about windows and icons, anyway?
Not much. The hoopla surrounding the superficial cosmetic attributes of Windows 3 led many Mac-illiterates to believe that was all the Mac was about — icons, scroll bars, and pull-down menus — and that you no longer needed a Mac for any of those tricks.

Which is like saying that Mozart and Madonna are roughly comparable: They exploit the same musical building blocks to achieve essentially the same outcome, so who needs Mozart? What Windows — and Madonna, for that matter — lacks is a rock-solid foundation and heritage to build on. The real advantages of the Macintosh lie behind the pretty pictures. For example:

• The Mac OS was written specifically for the Mac hardware, which is optimized for a graphical interface.
Once they've decided they want to become one of us, you'll have them coming to you to ask what to get you next.

If you've found a strategy that's worked for you, let me know about it. Send your tales of successful strategies to me at the Better Bureaucrat Bashing Bureau, MacUser, 950 Tower Lane, 18th Floor, Foster City, CA 94404.

If it's a good story, I'll make it worth your while: I've got a box of floppies with your name on it.

Myth No. 10. No good games.

Ah! The real objection emerges. True, Apple's idea of entertainment is a Fridayafternoon beer bash to celebrate — or mourn — the latest corporate reorg.

But a new crop of games has utterly shattered the myth that the Mac comes up short on entertainment value. For sheer elegance, you can't beat Accolade's Ishido. For cognitive thrills, think Inline Design's 3 in Three and Cyan's Cosmic Osmo and Spelunx are unsurpassed. And for raw nail-biting chills, Velocity Development's Spectre offers fast-paced networkable game play and absolutely stunning realtime 3-D graphics that are unequaled this side of a Cray.

This chain has been circling around the world since 1984. In 1990, Andy Hoonak kept the chain going and got a job co-writing MacUser's Help Folder. Years earlier, Andy Rooney had his chance and blew it. Shortly thereafter, he was forced to publicly humiliate himself by whining coast to coast every Sunday evening.

Keep the chain going, and you'll have good luck. Good luck.

III. Convert the Infidels

The third strategy is the hardest — but it's the most effective in the long run. Get the bureaucrats to see — and envy — what they've been missing. You have to be subtle, though. Make your next request for equipment a Macintosh-based multimedia extravaganza — a little animation, a few scans, a dollop of sound — and then casually drop a few hints around the office about how quickly and easily you put the whole thing together.

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E-Mail Etiquette

Computers were supposed to make us more powerful, not more rude. Maybe it's time to Emily Post our E-mail.

This is a thread of public E-mail messages recently posted on CompuServe. It concerns the quality of Jean-Louis Gasseé's column in MacWEEK and mine here. It inspired me to write about E-mail etiquette.

From: Barry House
To: Tim Fredenburg
I'm with you. Gassee appears to be trying to be a "devil's advocate" who offers a wildly different viewpoint. Unfortunately, he often succeeds only in presenting a half-formed idea with a conclusion that is seldom supported by the bulk of his text.

Instead of Mac celebrities like Gassee in MacWEEK and Kawasaki in MacUser, I'd rather read someone who has something genuine to say and writes well in saying it.

From: Guy Kawasaki
To: Barry House
Are you saying that (a) I have nothing to say or (b) that I don't write well or both? I doubt that the MacUser people will see this comment here in the MacWEEK area. You should contact Jim Bradbury (72511,41) directly to complain about me.

From: Barry House
To: Guy Kawasaki
Actually, I'm saying both. On the other hand, you ARE Guy Kawasaki, so mediocre copy with your byline is more marketable than mediocre copy with my byline. I have the same problem with Monsieur Gassee; I can't think of a column he's written for MacWEEK—or you've written for MacUser—that would have been accepted if it had been submitted by me or some other unknown freelancer.

Here is the "Guy Kawasaki Guide to E-mail Etiquette."

In Your Face

1. Ask yourself, "Would I say this to the person's face?" before you post a public message. I don't know Barry personally, and I feel that meeting him would be right above being Iraq's representative to the United Nations. But I suspect that he's an average Joe like any of us. Electronic mail, however, turns average Joes and Janes into swaggering John Wayne-Steven Seagal-Chuck Norris-Charles Bronson-nutant-ninja-electronic assassins.

Ask yourself this question, and keep editing until the answer is yes. Then your message may accomplish something. Otherwise, your message will probably be ignored, because most people know that E-mail turns normal folks into raging savages. In my case, I don't ignore these messages; I take great joy in them and go so far as to reprint them in a column so that 375,000 people can read them too.

2. Give your E-mail recipients cues about what you really mean. In person-to-person communication, you provide many cues such as your facial expression, voice tone and volume, and body stance. Imagine the difference between reading a message that says You're a lousy writer and a face-to-face conversation in which a person says the same thing and then smiles. It's possible to communicate these cues on E-mail through the use of E-mail symbols and abbreviations.

Here are a few from Ken Schoenberg and the rest of the gang from America Online and from The Unofficial Smile Dictionary, sent to me by someone from Internet:

:-) = Smile
:-) = Wink
:( = Frown
:(O) = Yelling
:-( ) Just won the lottery
:(-:) = Nosehead
:'( = Spitting out tobacco
:D = Laughing
:* = Kiss
:X = Lips are sealed
:| = Wearing a Walkman
:P = Sticking out tongue
]() = Hug
:LOL = Laughing Out Loud
OTF = On The Floor (Laughing)
ROTF = Rolling On The Floor Laughing
W/ = Vulcan greeting
When you get good at using these symbols, you can be rude without being rude. For example, If you think my writing stinks, you should smell your breath sometime. :)

3. When you send mail, think of the easiest way for your recipient to respond. For example, if you're on AppleLink and your recipient is on AppleLink, send your message through AppleLink. Some people send mail via Internet (a worldwide network that links E-mail systems) to an AppleLink
recipient even though they have an AppleLink account, because Internet is free. The problem is that when the recipient responds, he has to type an address like Joe.Blow@tuck.edu@Internet.

If you want an answer, make it easy for the recipient — not cheaper for you. I often incorrectly address Internet responses, and by the time I get the message back, I’ve thrown away the original message. Also, I’m not all that sure how Internet works; I think that Clifford Stoll runs Internet from his house and forwards all the messages in his spare time.

4. Never send file when a message will do. When you send a file, you’re saying to the recipient, “You have lots of time to waste, I want you to download the file. Remember that you downloaded it. Remember where you downloaded it. Remember its name. Decompress it with a utility I assume you have. Open it with an application I assume you have. If you don’t have the decompression utility or application, write back to me to ask me to send it another way.”

After a guy has downloaded and opened a file, he has the privilege of reading a three-paragraph message in a font he doesn’t own. Of course, you could have copied and pasted this file into a message with three clicks of a mouse. Is there any legitimate reason to send a file? Yes: when many people are working with the file. For example, a file should be sent between a writer and an editor or between a desktop publisher and a Linotype operator.

5. If you have to send a file (although I can’t see why you have to, other than the reason I just mentioned), put your E-mail address into the file. Many people send files that don’t contain their E-mail address, so the recipient has to go back on-line and search for the sender’s address. This is the ‘90s equivalent of mailing a letter without a return address on the (dumb) assumption that the envelope stays with the letter.

6. Keep it short. E-mail should save time, not waste it. Rule of Thumb No. 1: No message should be longer than 100 words. Rule of Thumb No. 2: A response should be as long as the inquiry (for example, 100-word inquiry, 20-word response).

E-mail is GIGO: Get in, get out. Ask your question, get your answer. E-mail flattens out corporate and sociological hierarchies. You can write to John Sculley, John Akers, or the Dalai Lama without going through assistants. They respond. It’s as simple as that. Nobody cares who you are. Everybody cares about wasting time.

7. Ignore stylistic and grammatical considerations. Using E-mail saves time because careful editing and proofing is not necessary or appropriate. E-mail is supposed to be fast, tit-for-tat communication. You ask. I answer. You ask. I answer. You’re not supposed to watch the sun set, listen to the surf pound the sun-bleached sand, and sip San Miguel beer as Paco dives for abalone while you craft your E-mail.

Between Me and You

8. Never use receipts and carbon copies. Receipts are messages the E-mail system generates to inform the sender that the recipient has read the mail. You know what carbon copies are. Receipts are insulting. You are saying to the recipient: “You’re a lazy schlub who never reads my E-mail. I received this message so that I know you read it. Now you have no excuse not to answer, because I know you received the message.”

Carbon copies are stupid. For example, I often get carbon copies of messages sent to John Sculley complaining about Apple. People who send these think that John is going to see that I’m carbon-copied and be scared to death that I’ll write about the matter in MacUser. Or that by bringing the matter to my attention, I’ll be so overwhelmed with concern that I’ll intercede and call John to help resolve the problem.

Dream on: John couldn’t care less that I’ve been carbon-copied — assuming that he even notices it — assuming that he reads the message. Dream on: When I get carbon-copied, I usually throw the message away. (E-mail etiquette stipulates that if it ain’t addressed to you, you ain’t got to do anything about it.) I have enough problems being a wife without getting involved in other people’s problems.

A Declaration

This column has been cathartic. It is also a declaration: Ninety-five percent of the people who send me electronic mail will probably read this, so from this point on, if you send me a file, you will not get a response. If you receive files from people, send them a photocopy of this column. If this is too much trouble, contact me, and I’ll send you a file of this column to send to them. :)

Let me know if you’d like a copy of The Unofficial Smile Dictionary, and I’ll send it to you — also as a file.
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Aldus SuperPaint 3.0 combines painting, drawing and image enhancement in one powerful, easy-to-use graphics program. New features include: 1 through 24-bit color, textures, gradients, masking, hot keys, brightness and contrast, color balancing, direct scanner support and support for importing EPS graphics. SuperPaint 3.0 provides access to 16.7 million colors without requiring a 24-bit color board. It's the ideal tool for anything from the simplest business illustrations to sophisticated full-color art.

Quark Xpress 3.1

$518

XPress 3.0 boasts a more intuitive user interface, many new features, plus redesigned and reorganized documentation. New measurement and page palettes provide the user with interactive on-screen access. A library stores frequently-used items and a pasteboard provides work area next to each page. You can group text and graphics as single elements and rotate them a full 360° in 0.001 degree increments. Color trapping ensures precise color printing.
Shiva Net Modem/E

$1720

NetModem/E is a stand-alone Ethernet communications device designed to meet three LAN communications needs. It allows remote workstations to dial in with full access to network services, lets LAN workstations call out to remote information services or hosts, and joins geographically separated networks in a routing connection over ordinary phone lines. #04129

Shiva Shiva Hublet

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The Shiva Hublet is a stand-alone local concentrator for 10BaseT networks allowing multiple nodes to connect to a single network drop. Its four ports provide connection to Macs and PCs, workstations or any 10BaseT device—making it the “power strip for 10BaseT.” #04156

Asante Asante MacCon 3 Cards

$299

Asante’s family of Ethernet solutions gives you all the right connections. MacCon network interface cards plug into your Mac to deliver high-performance connectivity that’s reliable and cost effective. You get full compatibility with EtherTalk allowing MacCon cards to serve in a wide variety of hardware and software environments. #03510

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DoubleUp is the first real-time lossless file compression card for the Macintosh NuBus family. With it you can more than double your hard disk’s effective storage capacity. Data, images and applications can be compressed and decompressed at virtually unnoticeable speeds. It ensures your data is never lost or altered. Bundled with DiskDoubler. #04220

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Save the hassle of creating your own artwork from scratch. This new Clipatures volume gives you 240 exquisitely detailed illustrations of the national and civil flags from all the countries of the world, plus various international organization and code flags. These beautiful illustrations are ready-to-use, and they work with any software program that accepts EPS (Encapsulated PostScript) files. #04282

Prograph 2.5

$299

Adobe

Type-On-Call

$54

Type On Call offers over 800 Adobe Type 1 fonts on a single CD-ROM in a new accessible format. Simply by purchasing access codes over the phone, type users can obtain new fonts from the disk. Type On Call is the quickest and easiest way to buy fonts — once you have the disc, every font is a simple phone call away! #03950

Prograph's powerful Visual Programming Environment is the fast and fun way to program the Mac. Construct stand-alone applications without typing code, create user interfaces as fast as you can draw them! The new database engine lets you create multi-user, multiple table database applications that support multiple indices and arbitrary data types. #04253

Radius

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Pivot B&W Monitor.... $794

Screen Saver Fun!

Berkeley Systems

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Prometheus Products

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The Mac Zone

Established 1986

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<table>
<thead>
<tr>
<th>Application</th>
<th>Version/Feature</th>
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<tr>
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<td>Fireworks</td>
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<td>Windows Live Essentials</td>
<td>2009, 2011</td>
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**Complete Macintosh Always the Latest Versions**

**Accounting and Finance**
- QuickBooks
- Quicken
- Sage Intacct

**Project Management**
- Microsoft Project
- Basecamp

**Automation**
- Process Street

**Business Communications**
- Outlook
- Gmail

**Database Management**
- Microsoft Access
- Microsoft SQL Server
- MongoDB

**Desktop Publishing**
- Adobe InDesign
- InCopy
- Indesign CC

**Developer Tools**
- Xcode
- Android Studio
- Visual Studio

**Document Management**
- Google Drive
- SharePoint
- Box

**Education**
- Google Classroom
- Microsoft Teams
- Canvas

**Email**
- Gmail
- Outlook

**File Transfer**
- Dropbox
- Google Drive
- OneDrive

**Graphics**
- Photoshop
- Illustrator
- Affinity Designer

**Groupware**
- Microsoft Teams
- Google Meet
- Zoom

**Image Editing**
- Photoshop
- GIMP
- Canva

**Internet**
- Internet Explorer
- Chrome
- Firefox

**Kitchen Software**
- iCookbook
- Fooducate

**Learning Management Systems**
- Blackboard
- Canvas
- Moodle

**Licensing**
- Digital Rights Management (DRM)
- License Manager

**Linux**
- Ubuntu
- Fedora
- CentOS

**Networking**
- Wireshark
- IP Scanner
- Nmap

**Operating Systems**
- macOS
- Windows
- Debian

**Productivity**
- Microsoft Office
- Google Workspace
- Zoho Suite

**Productivity Tools**
- Todoist
- Trello
- Asana

**Project Management**
- Asana
- Trello
- Monday.com

**Remote Work**
- Microsoft Teams
- Zoom
- Google Meet

**Retail**
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- Shopify
- WooCommerce

**Search**
- Google Search
- Bing
- Yahoo!

**Server Management**
- Microsoft System Center
- SolarWinds
- Nagios

**Social Media**
- Facebook
- Twitter
- LinkedIn

**Software Development**
- Visual Studio Code
- Xcode
- IntelliJ IDEA

**Spreadsheet**
- Excel
- Google Sheets
- Apache OpenOffice Calc

**Synthesizers**
- Propellerhead Reason
- Ableton Live
- FL Studio

**Tablets**
- iPad
- Samsung Galaxy Tab
- Google Pixel

**Telecommunications**
- Skype
- Zoom
- Google Meet

**Text Editors**
- Sublime Text
- Visual Studio Code
- Atom

**Testing Tools**
- Selenium
- JUnit
- TestComplete

**Time Management**
- Google Calendar
- Outlook
- Todoist

**Translation**
- Google Translate
- SDL Trados
- Moses

**Video Editing**
- Adobe Premiere Pro
- Final Cut Pro
- DaVinci Resolve

**Web Development**
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- HTML5
- JavaScript

**Wireless**
- Wi-Fi
- Bluetooth
- NFC

**Word Processing**
- Microsoft Word
- Google Docs
- Pages

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- Monday.com
- Trello

** Workflow Automation**
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- Integromat
- IFTTT

**WordPress**
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- WooCommerce
- Elementor

**Virtualization**
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- Hyper-V
- VirtualBox

**Virtual Reality**
- Oculus
- HTC Vive
- PlayStation VR

**Voice Recognition**
- Amazon Alexa
- Google Assistant
- Siri

**Web Browsers**
- Chrome
- Firefox
- Safari

**Web Hosting**
- Bluehost
- GoDaddy
- HostGator

**Web Page Builders**
- Squarespace
- Wix
- Weebly

**Web Services**
- Amazon S3
- Google Cloud Storage
- Azure Storage

**Website Performance**
- Cloudflare
- Amazon CloudFront
- Google Cloud CDN

**Website Hosting**
- Bluehost
- SiteGround
- HostGator
**Complete Macintosh Guaranteed Availability**

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<td>Hewlett-Packard</td>
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**Networking & Connectivity**

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**Scanners**

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**Security**

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**Other Accessories**

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**Complete Macintosh Hardware and Software**

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**Contact Information**

- **Address:** 11011111
- **Phone:** 1-800-808-0820
- **Email:** info@maczone.com
- **Website:** www.maczone.com

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Look Who’s Talking

Dave Winer’s latest software brainchild is the only product in its category. The competition is brutal.

The basic idea behind UserLand Frontier was made to order. Order, demand, sometimes even polite request. Mac users have wanted something like this since 1984, whether they called it user scripting, batch files, macros, or command-line programming.

Here’s the idea:
Say you have a sequence of operations that you run through again and again. You update numbers in one spreadsheet, paste the totals into a boilerplate interoffice-memo form, and E-mail the memo to another department. Or you compile all files in a folder and run a program. Or you delete all temporary files, back up all data files, and shut down.

What you need is the ability to specify all these steps and then go to lunch while they happen. And you need the ability to reinvoke this sequence later without having to specify all the steps all over again.

Programs such as QuickKeys let you do this at one level, but there is potentially more power in a script-oriented approach, in which you specify what you want done by using a scripting language. And ideally the scripting language should be able to drive the operating system, so you can delete files and such, as well as drive all your favorite applications.

That’s the idea behind Frontier.

Some version or another of this idea is what made Lotus 1-2-3 the best-selling software product ever and kept the UNIX and DOS operating systems alive all these years. Userland Frontier finally puts the idea to work on the Mac, showing a Mac-like interface and employing the latest system-software gimmicks: IAC (interapplication communication) and Apple events. Sound good? Ah, but before Userland can sell Frontier to users, it has to sell it to developers, because your favorite applications have to become Frontier-friendly. There’s the rub.

For Winer, the road to Frontier began in college with writing UNIX batch commands, took a detour through entrepreneurship in the form of a company named Living Videonext, and led eventually to a series of breakfast meetings with Jean-Louis Gassée in 1988. Knowing that Gassée had been talking up AppleScript, Apple’s much-rumored systemwide user scripting language, Winer pumped him for the status of AppleScript development, saying that he was considering creating products for it. The answer left Winer thinking that there might indeed be an opportunity here for a third-party developer. There really was no development, and there was no Apple scripting language.

Three years later, there’s still no AppleScript but there is a Userland Frontier. In its primary mode, Frontier lets you pop up a narrow window and type a one-line command into it. There are hundreds of these commands, and yes, it’s a programming language, and no, that doesn’t mean that Frontier is a hacker’s tool — unless people who write DOS batch files, spreadsheet macros, or SQL query macros. There are programming languages and programming languages, and Frontier’s is one of the easy ones.

More-complicated scripts can be spun off, optionally, as double-clickable files and shared or downloaded much like HyperCard stacks (but smaller).

A fine idea, perhaps, but it’s a system-software idea, and Macintosh system software is an area about which Apple Computer has proprietary feelings. True, there is no AppleScript in sight and Apple is overtly supportive of Frontier, but what might be going on out of sight is the source of some fear, uncertainty, and doubt among Winer’s developer customers. Frontier developers are hearing hints from Apple about AppleScript. Winer thinks Apple is a long way from releasing a product, but he can’t prove it, and uncertainty is just what he doesn’t need while trying to convince developers to make their products support Frontier.

Frontier already has competition. HyperCard and QuickKeys are both being touted as control panels for application functionality, although HyperCard’s development-environment baggage would probably argue against its usual use for writing the occasional script and QuickKeys operates at a different level from Frontier. Frontier appears to offer advantages that HyperCard and QuickKeys can’t touch, but these are established products with good support networks and defensible claims on some part of the IAC pie.

Frontier also faces competition from a fundamentally different IAC model, that of program-to-program communication. In this model, two vendors may agree to create ways for their applications to work together, with application A adding a menu item that gives the user access to certain capabilities of application B.

At one end, this kind of cooperation is...
We often speak of a program ‘doing this’ or ‘doing that.’ These words are just shorthand for talking about what people can do with the programs.

relatively simple. Any company can open up the functionality of its application to general Apple events or define and publish specifications for its own application-specific Apple events. The company’s application can then be driven by any other application that sends it the appropriate Apple-event message. This opening-up process is called installing the IAC wires.

At the other end, the program sending the message needs some reason to do so, and the best reason is that the user wanted it done. This situation is more complicated, because it requires some sort of user interface—at least a menu item—and because it requires deeper cooperation among vendors to make it work.

In the Frontier model, vendors have to install only the IAC wires. It is the user, through Frontier, who drives the application. If you believe Winer, the choice of models is a simple matter of who is to be in charge: individual users or software companies.

“I don’t believe in applications talking to each other,” he says. “I believe that the user is the orchestra leader. He talks to one application, asks for something, and then passes that off to the other application. I don’t think it’s a trivial difference. A lot of people are trying to . . . get all these conversations going between applications, and it’s an exercise in frustration. It calls for a consensus amongst competitors that . . . is a very unlikely thing, and it removes forever, if we have that kind of consensus, any possibility of competitiveness on the basis of how good your [IAC] wires are. It won’t work that way.”

Hmm.

ACIUS’ 4th Dimension now works with GeoQuery through just the sort of program-to-program communication that Winer opposes. A 4D user can select data and choose a new menu item to launch GeoQuery: transfer the 4D data to it; and jump to GeoQuery, displaying the data graphically in one of a variety of ways.

So Winer is wrong on one count. It will happen, because it is happening. Still, I think that there’s something in what he says. We in the computer press and the software industry often speak of a program “doing this” or “doing that.” It’s easy to forget that these words are just a convenient shorthand for talking about what people can do with the programs. It may be that in the case of interapplication communication, we have taken our shorthand literally, thinking of IAC as something that programs do rather than as a facility that lets people do something with programs.

Which leads me to the following question: Why did Dave Winer name his product Frontier?

Here’s my theory: The concept of the frontier in American culture has something to do with the true importance of the individual. On the frontier, you make your choices in the light of nature, not of some abstraction such as law or government, and you live with the consequences without appeal. On the frontier, you say “somebody” rather than “someone,” because the only ones who count are the ones with bodies.

I suggest that the frontier mentality is a recognition of a simple truth that is often obscured by the artifacts of civilization: that governments, corporations, and the other bodiless ones are collective fictions and that there’s really nothing here but us somebodies.

It’s vastly more convenient, if you aren’t living on the literal frontier, to use the shorthand: it’s easier to speak of a government or corporation or program doing something than to describe what’s really going on. But it’s always possible to do the latter.

When a company (say Userland) announces a release date (say October 1991) for a product (say Frontier), what’s really happening is that Alice has touched up and Judi has sent out copies of a press release that was drafted by Dave, based on promises to Dave from Doug. The situation is more complicated in a company that has more than six employees, naturally. But it’s always somebody.

So when it comes to IAC, I decline toward the Frontier mentality.

A while back, some people at Apple Computer adopted a slogan for their collective efforts: “The individual is at the center of everything we do.” I hope those people are still at Apple. The individual is at the center of everything we all do, but sometimes we forget.
Now—You Can Save While Paying Bills

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**DAILY BUSINESS**

**ACCOUNTING, DATABASES, SPREADSHEETS, WORD PROCESSING**

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<td>BeagleWorks</td>
<td>... 30 day MBG</td>
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<td>BeagleWorks—Integrated word processor, spreadsheet, database, paint, communications &amp; draw modules all in one package. Lets you combine data from other modules &amp; make changes without leaving that document.</td>
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<td>$185.</td>
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<td>ElseWare Corp.</td>
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<td>... 30 day MBG</td>
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<td>Managing Your Money 4.0</td>
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<td>Microlytics</td>
<td>... 60 day MBG</td>
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<td>Inside Macworld Encyclopedia 68.</td>
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need some advice,

Reality Technologies ... 30 day MBG
6929 @WealthBuilder 1.0—Designed for the individual investor and perfect no matter what your level of expertise. Earn more by investing more wisely and saving more effectively with WealthBuilder 1.0. $95.

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PUBLISHING, PRESENTATIONS

Adobe Systems
@Adobe Type Library (Vol. 1-230) call
8957 @Adobe Type Reunion 1.02 ... 41
8794 @Adobe Type On Call ... 47
5750 @Adobe Type Manager 2.02 ... 59
6053 @Adobe Plus Pack ... 118
6166 @Adobe Plus Pack/ATM ... 174
6098 @TypeAlign for ATM 1.04 ... 62
6771 @Adobe TypeSets for Business ea. 95
6961 @Adobe Type Set 1 or 6677 @Set 2 ... 62
7537 @Adobe Type Set 3 ... 125
8042 @Adobe Type Sets 1,2,3 Bundle ... 118
8171 @Adobe Illustrator 3.0(w/ATM) ... 379
6644 @Adobe Photoshop 2.0 ... 549
5001 @Streamline 2.0 ... 122

@Audys ... 30 day MBG
2461 @Audys Gallery Effects 1.0 ... 144
6674 @Audys Personal Press 1.01 ... 211

Altsys
9806 @Metamorphosis Pro 2.0 ... 89
1195 @Fontographer 3.3 ... 265
1983 @EPS Exchange 1.0 ... 89

@Ares Software ... 30 day MBG
8878 @AresFontMonger 1.0 ... 62

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6501 @ColorStudio 1.5—Now System 7 savvy with support for Photoshop plug-ins, a full CMYK viewing and image editing mode and the Shapes annex to incorporate PostScript drawing capabilities. $599.

Broderbund Software
9351 @Kid Pix 1.1 ... 29
1427 @The Print Shop 1.3 ... 35
6281 @TypeStyler 2.0 (w/ATM, Sept. '91) ... 115

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

Custom Applications
8037 @Freedom Press Light 3.01 (17 fonts) ... 55
6571 @Freedom of Press 3.01 (35 fonts) ... 255

CostLab
6095 @DeltaGraph 1.5 ... 125

Aldus Gallyery Effects
Aldus SuperPaint

Aldus ... 30 day MBG
Purchase SuperPaint, Gallery Effects, or Personal Press between 10/1/91 and 1/31/92 and receive a free copy of Electronic Arts’ PGA Colfax. 3596 @Aldus SuperPaint 3.0 ... $144.
2461 @Aldus Gallery Effects 1.0 ... 144
6674 @Aldus Personal Press 1.01 ... 211

Aldus SuperView

5001 @Streamline 2.0 ... 122

Aldus Design Team
8999

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Ares FontMonger

Ares Software ... 30 day MBG
8878 @FontMonger 1.0—Converts type formats between PostScript Type 1 (for use in Adobe Type Manager), Type 3 & TrueType (for System 7.0). Generates customized typefaces & characters such as obliques, fractions & small caps. $52.
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14 Mill Street, Marlboro, NH 03456  603/446-7711  FAX 603/446-7791

Microware's Publishing & Learning

Write-on,.fileName

PrintDocRef.1.0  2396  FAM l-HAM, the Apple menu manager, gives you hierarchical sub-menus and access to recently used items, lets you re-order the Apple menu, and automatically restarts to files open at shutdown.  $49.

Microseds Pub.  30 day MBG

DiskDoubler 3.7—Because no disk is big enough, this latest System 7 Savvy version provides smaller compressed files, increased speed, simplified file backups, & self-expanding files.  Macworld 1991 World Class Award winner.  $49.
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8794 Adobe Type On Call/ATM $47.
9443 Adobe TOC & Porta Drive Bundle $65.

CD Technology
2321 CD-ROM Caddy $11 2533 (S) $49.
8057 Porta Drive CD-ROM $59.
7686 Porta Drive & MS Office CD-ROM $99.

Pixar
1596 MacRenderMan/ShowPlace Bundle — Create photographic-quality images with the most advanced rendering software available as you automatically process scenes into full color pictures. A complete picture creation package $649.

Toshiba
6749 XM 3201 CD-ROM Drive $659.

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MUSIC, MIDI, ANIMATION

Ars Nova ... 30 day MBG
1215 Practica Musica 2.2 $66.
Bogas Productions ... 60 day MBG
9279 Studio Session MIDI Utility 1.0 $59.
6135 Super Studio Session w/Music Library $99.
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8188 MusicProse 2.1 $299.
5604 Finale 2.6.1 $549.
Farallon Computing ... 30 day MBG
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6766 MediaTracks 1.0.1 $205.
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Library Available, call

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8220 Jack Nicklaus Golf $34.

Aldus ... 30 day MBG
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Baseline Publishing ... 30 day MBG
7765 Thinking Mouse $23.

Beacon Technology ... 30 day MBG
1623 HyperBible 2.03 (KJV or NI) ea $125.
and many a fact

Centron Software ... 30 day MBG
*Casino Master (BW&I) ea. 8524 (Color) 45.
2268 @Crystal Quest 2.2x ea. 7495 @Mission 2707 (Pulp) 26.
8275 @Falcon 2.0 (CP) 1907 @PGA Golf ea. 39.
2670 @Reader Rabbit 3.0 (CP) (ages 4-7) 34.
2716 @Word Search Deluxe 35.

Electronic Arts
6716 Pipe Dreams 1.2 ................... $17.
1503 Loom 1.0 ea. 29.
8643 Harpoon 1.0 or 1907 @PGA Golf ea. 39.
F I L/Software Heaven
1555 u JOUS 1.0 .................... 25.
★Great Wave ... 30 day MBG
4334 @Number Maze 26, 8527 (Color) 36.
8044 @NM Decimals & Fractions (Color) 36.
1517 @HeadingMaze 26, 1513 (Color) 36.
★HyperGlot Software ... 30 day MBG
1562 u In Three 1.1 31.
8809 @Tessere or 7622 Damn's Dream 31.
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1893 @Checkmate (Infinite play levels) 31.
★Learning Company ... 30 day MBG
2670 u Reader Rabbit 3.0 (CP) (ages 4-7) 34.
★Leister Productions ... 30 day MBG
7126 u Reunion 2.0 .......................... 115.
★Microsoft ... 30 day MBG
2868 Flight Simulator 4.0 (CP) ............ 43.
★Matrix Software ... 30 day MBG
8257 u PreSchool Pack - Color 1.0 ........ 35.
2716 u Word Search Deluxe 35.
★Penton Overseas ... 30 day MBG
★Carina Software ... 30 day MBG
*Carina Software (BW&I) ea. 8524 (Color) 45.
5726 u Voyager 1.2 .......................... 87.
★Casady & Greene ... 60 day MBG
2268 u Crystal Quest 2.2x, 7495 @Mission
2707 u Puzzle Master 26.
8525 u Casino Master (BW&I) ea. 8524 (Color) 45.

Broderbund Software
4314 u Typel 1.0 ............................ 18.
6516 The Playroom 1.1 (CP) ea. 29.
9804 u RoboSport 1.0 .................... 35.
8195 u BannerMania 1.0 .................. 35.
8266 u SimEarth 1.0 ....................... 40.
4966 u SimCity 1.2 (CP) ................... 29.
5871 u SimCity Supreme 1.2C ........ 47.
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5726 u Voyager 1.2 .......................... 87.
★Casady & Greene ... 60 day MBG
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2707 u Puzzle Master 26.
8525 u Casino Master (BW&I) ea. 8524 (Color) 45.

Electronic Arts
6716 Pipe Dreams 1.2 ................... $17.
1503 Loom 1.0 ea. 29.
8643 Harpoon 1.0 or 1907 @PGA Golf ea. 39.
F I L/Software Heaven
1555 u JOUS 1.0 .................... 25.
★Great Wave ... 30 day MBG
4334 @Number Maze 26, 8527 (Color) 36.
8044 @NM Decimals & Fractions (Color) 36.
1517 @HeadingMaze 26, 1513 (Color) 36.
★HyperGlot Software ... 30 day MBG
1562 u In Three 1.1 31.
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1944 u Swamp Gas 1.0 31.
Interplay Productions
1894 @BattleChess (3D animation) 29.
1893 @Checkmate (Infinite play levels) 31.
★Learning Company ... 30 day MBG
2670 u Reader Rabbit 3.0 (CP) (ages 4-7) 34.
★Leister Productions ... 30 day MBG
7126 u Reunion 2.0 .......................... 115.
★Microsoft ... 30 day MBG
2868 Flight Simulator 4.0 (CP) ............ 43.
★Matrix Software ... 30 day MBG
8257 u PreSchool Pack - Color 1.0 ........ 35.
2716 u Word Search Deluxe 35.
★Penton Overseas ... 30 day MBG
★Carina Software ... 30 day MBG
*Carina Software (BW&I) ea. 8524 (Color) 45.
5726 u Voyager 1.2 .......................... 87.
★Casady & Greene ... 60 day MBG
2268 u Crystal Quest 2.2x, 7495 @Mission
2707 u Puzzle Master 26.
8525 u Casino Master (BW&I) ea. 8524 (Color) 45.
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Orange Micro ... 30 day MBG
Orange386—Run PC programs in Macs. The Orange386 coprocessor runs independently in your Mac providing networking capabilities.
2394 Orange386 (16 MHz) ........................................ $1679.
2392 Orange386 (20 MHz) ........................................ $1839.

**CE Software ... 60 day MBG**
5174 QuickMail 2.5 (5) 249. 5173 (10) 375.
2394 Macintosh Membership Kit 1.03 . 22.
1673 CompuServe Navigator 3.0 ................................. 49.
1674 Membership Kit/Navigator Bundle .......................... 68.

**DataViz ... 60 day MBG**
1823 MacLink plus/PC 5.0 ........................................ 129.
4842 MacLink Plus/Translators 5.0 ............................... 103.

**Dayna ... 60 day MBG**
DaynaPORT E: (10 Base T) ....................................... 209.
DaynaPORT E: SE, SE/30, II, Ill, LC .......................... 229.
DaynaTALK (5 Pack) .................................................. 379.
DaynaTALK (10 Pack) ............................................... 689.
1879 EtherPrint or 9888 (10 Base T) ........................... 349.

**Dove Computer**
6758 DoveFax Desktop 2.0 (Sept. ’91) .......................... 295.
9634 DoveFax + 2.0 (Sept. ’91) ................................... 359.

**Farallon Computing ... 30 day MBG**
9005 Timbuktu 4.0.1 .............................................. 135.
4866 Timbuktu/Remote 2.0.1 .................................... 135.
9961 PhoneNET Card PC .......................................... 209.
6273 PhoneNET StarConnector 10-Pack ...................... 129.
4899 PhoneNET Connector 10-Pk (DINB) ...................... 198.
2206 PhoneNET StarController 300 ............................. 899.
6687 PhoneNET StarConnector-EN 500 ...................... 1739.

**Freesoft ... 60 day MBG**
6115 White Knight 11 .............................................. 85.
2394 Global Village ... 30 day MBG .............................. 85.
8946 Teleport A300 ................................................. 139.
8945 Teleport/FAX ................................................... 185.

**Hayes**
2300 Smartcom II 3.2A ............................................. 84.
8614 Personal Modem 2400 Plus ................................. 149.
7391 ULTRA 96 Modem ........................................... 669.

**Insignia Solutions**
7557 Access PC 1.1 .................................................. 62.
9726 Entry Level SoftPC 2.5 (Sept. ’91) ....................... 135.
4098 Universal SoftPC 2.5 (Sept. ’91) .......................... 245.
3229 Soft2 2.5 (Sept. ’91) ......................................... 329.

**Intel Corporation**
5119 2400EX Modem 179. 6420 (MPN) ........................ 229.

**Kenneth Tech. ... 30 day MBG**
5633 Rapport 1.3.6 ................................................... 195.
5632 Drive 2.4 (3/4") (incl. FastBack II) ...................... 325.

**Microcom ... 30 day MBG**
7459 CarbonCopy Mac 2.0 (single) ............................. 59.
1556 CarbonCopy Mac 2.0 (unlimited) ......................... 179.
8027 MacModem V.32 .............................................. 689.

**Nuvotech ... 60 day MBG**
3000 TurboNet ST (DINB) 30 6751 (12 Pak) $279.
6272 NuVoLink SC .................................................. 389.

**Orange Micro ... 30 day MBG**
2394 Orange386 (16 MHz) ........................................ 1679.
2392 Orange386 (20 MHz) ........................................ 1839.

**Practical Peripherals ... 30 day MBG**
3102 2400 Baud External Modem .............................. 179.
8994 2400 V.42bis Modem ........................................ 209.
7934 PM9600ASA Modern 1.26 ................................ 469.
9849 SmartPack 9600 .............................................. 529.

**Prometheus ... 30 day MBG**
2590 ProModem 2400 Mini Plus ................................. 175.
3232 ProModem 24/96 SR/MiniFax Plus ....................... 269.
8990 ProModem Ultima ............................................. 689.
PSI Integration, Inc.
3143 COMstation 2 .................................................. 285.
3142 COMstation 1 .................................................. 379.

**Shiva ... 30 day MBG**
3444 SerialNet ...................................................... 275.
4347 NetBridge or 4942 TeleBridge ............................. 409.

**Silka/TOPS**
4188 Teleconnector (DINB) 23. 2230 (10) .................... 180.
3720 TOPS Flashcard .............................................. 155.

**Software Ventures ... 30 day MBG**
3455 MicroPhone II 4.0 (Oct. ’91) ............................ 215.

**Synergy ... 30 day MBG**
6618 VersaTerm 4.5 90. 6619 PRO 3.5 177.

**Tactical Software ... 30 day MBG**
2996 Traffic Controller Personal ................................ 65.

**Zoom Telephonics ... 30 day MBG**
1168 MX2400R Modern (w/QuickLink II) .................... 85.
1176 MX2400S Modern (w/SendFax 9600) ................... 95.
2310 Send/receive Fax/Modem FX9624 ....................... 198.
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2311 V.32 Turbo Modem (w/MacPack) ....................... 439.

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Complete disk and file recovery and protection.
3561 111 Utilities 1.2 (includes all below) .................. $89.
4903 Vexx 3.5 ....................................................... 57.
2462 Caudel with Shredder ....................................... 89.
8562 Complete Undelete 1.1 ............................... 48.

**Advanced Gravis ... 30 day MBG**
9963 Gravis Mouse Stick ........................................ 59.
9964 Gravis Super Mouse ........................................ 84.

**American Power**
5856 UPS 1105E .................................................... 209.
6866 UPS 370ci ...................................................... 339.

**Applied Engineering**
9799 Cache-in .................................................... 199.
8124 Typist 1.1 ..................................................... 479.
4476 OmniPage 3.0 .................................................. 495.

**CoStar Corp.**
1884 LabelWriter II (Sept. ’91) ................................ 193.
1413 AddressWriter (Sept. ’91) ................................ 499.
8856 Stringray AOB (Sept. ’91) ................................ 89.
2804 Stringray (stealth black, 10day MBG) ............... 89.

**Datedesk ... 30 day MBG**
9830 MAC101 E Keyboard ....................................... 129.
2384 MAC101 E Keyboard, with QuickKeys2 ............ 149.
6901 Switchboard (modular keyboard) ....................... 159.

**Everex ... 30 day MBG**
1144 Silhouette Trackball ........................................ 82.
6256 PrintLink Collection 4.01 ................................ 59.
6151 JetLink Express 2.1 ......................................... 89.

**Berkeley Systems ... 30 day MBG**
5737 After Dark L2U-Stops screen burn-in .............. 28.
2196 After Dark & M.A.D. Bundle ........................... 42.

**Input/Output**

**Abaton ... 30 day MBG**
7432 Scan 300/GS (reqs. Scan Kit) ......................... 999.
1495 Scan 300/Color (reqs. install, Kit) ................... 1149.
1496 Int. Kit for 300/Color w/Photoshop ................. 479.
1537 LaserScript LX ............................................... 1729.

**Applied Engineering**
8562 Quadralink 1.1.1 (with AE Shadow)—Network Personal LaserWriters, label printers and more with Quadralink. Quadralink adds four serial ports to your Mac. AE Shadow lets you share the ports. Inc. 5-user license... $205.
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Jay Matzke, M.D.
Omaha, NE

MacConnection, 14 Mill Street, Marlow, NH 03456  603/446-7711  FAX 603/446-7791

Just for the record, all the ads in this series feature photographs of real live MacConnection customers and the real live letters they wrote us. Really!
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2238 Macworld Guide to System 7........... $19.

★/O Design .... 30 day MBG
8812 Ultimate Classic Carrying Case .... 64.
6129 Ultimate SE/Ext. Carrying Case .... 79.
1941 Ultimate LC Carrying Case ........... 95.

★ Kensington ... 30 day MBG
4973 Power Tree 20.............. 27.
2573 Tilt/Swivel (platinum) ........... 24.
2589 Apple Security Kit .............. 33.
9303 Keyboard Shell .............. 39.
2101 MacClassic Anti-Glare Filter ...... 45.
6753 SE Radiation/Anti-Glare Filter .... 52.
5064 Apple Color Monitor Polarizing Filter 63.

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8795 Switch Box (2 Pos.) . 32. 8796 (4 Pos.) 49.

★Mousetrak ... 60 day MBG
2694 Mousetrak Pad (7"x9") ........... 8. 2692 (9"x11") 9.
2693 Mousetrak Pad Low Friction (9"x11") 10.
Mouse Glove (various colors) ......... ea. 9.

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★Sopris Softworks ... 60 day MBG
2009 Mac Classic Economy Case .......... 49.

★Targus ... 60 day MBG
4900 Lappac 2 Deluxe (for Mac Portable) 55.
3017 Mac ClassicPlus/SE Case ........... 59.
4015 Mac SE & Ext. Kybd. Carry Case .... 75.

STORAGE MEDIA
★ Fuji ... 60 day MBG
2214 3½" DS Disks (10) .... 11. 2242 (50) 45.
2215 3½" HD Disks (10) .... 17. 2241 (50) 75.
2243 3½" DS Disks Color (10) .... 12.
2239 3½" HD Disks Color (10) .... 19.

★MacConnection ... 60 day MBG
6592 44 MB Cartridge . 74. 9728 (10). 699.

★Sony ... 60 day MBG
3297 3½" DS Disks (10) .... 11. 6148 (30). 29.
3298 3½" HD Disks (10) .... 18. 6375 (30) 49.
8185 QD2040 Tape Cartridge ........ 19.
1603 DG60M .... 18. 2520 DG90M 28.

★3M ... 60 day MBG
3943 DC2000 40 MB Data Cartridge .... 19.

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Mactrack Reader Strip ... 60 day MBG
1982 Mactrack Reader Strip .......... 35.

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7748 Personal LaserWriter Toner Cart ........ 89.
1115 LaserWriter II Toner Cartridge .... 105.
★ Avery ... 60 day MBG
4807 Laser Labels 1" x 25/s" ........... 24.
5392 Disk Labels 3½"-Laser (Qty 630) .... 29.
1600 1st Impression (desktop binder) .... 229.

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CoStar
6901 The Organizer ................... 199. 7453 Jr. .... 82.
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8046 MVP Mouse (MVP-1) ............ 89.
Ergotron
MacTilt (Classic: SE; S00, R) ea. 75.
★Goldstein & Blair ... 30 day MBG
1913 The Mac Bible to System 7 .......... 10.
8374 The Macintosh Bible (with disks) .... 25.

ASD Software ... 30 day MBG
Maccross Card Reader combined with FileGuard 2.7 secures your Mac against unauthorized users. 7085 FileGuard 2.7 (1 user) .......... $139.
9440 Maccross Card Reader (Box) . 399.
9439 Maccross/ FileGuard (1 Bundle) .... 399.

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Nutmeg 20 Color Television Display—Delivers a flicker free 72 dpi image at 78 Hz. Includes 8-bit video interface, tilt/swivel base 1 year warranty. Additional Nutmeg video products available. 8815 20" Television for Mac II, SE/30 & IIsi ea. $295.

★Maxell ... 60 day MBG
2792 3½" DS Disks (10) ........... 13.
2793 3½" HD Disks 1.44 MB (10) .... 21.

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### Nutmeg Systems — 30 day MBG

**Cutting Edge** — 30 day MBG

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CIRCLE 92 ON READER SERVICE CARD.
Defend, ergo sum: Wolfsbane or holy water used to be enough protection from elves, but fighting today’s ELF requires a display filter. The Ergo:Shield line, from Radius ([408] 434-1010), is the most sophisticated display filter available, providing glare reduction and protection from ELF and VLF electric-field emissions by using a conductive ceramic layer in the filter. The Ergo:Shields are designed for Radius monitors and list from $150 to $299. Wolfsbane is definitely cheaper.

By Russell Ito

One size fits all: With one notable exception, integrated packages on the Mac have been anything but stellar successes. The Jazz age passed quietly, leaving budget-conscious users hard at Works. But one-stop software is making a big comeback.

Following closely on the heels of Symantec’s GreatWorks, which we highlighted last month, Claris ([408] 727-8227) has announced its much-awaited integrated package, ClarisWorks ($299). Unlike in GreatWorks, all of ClarisWorks’ five “environments” (word processing, spreadsheet, database, drawing, and telecommunications) are accessible at any time. Users can switch among the tasks simply by clicking on a tool palette that changes the menus accordingly. As you’d expect, the overall look of ClarisWorks is consistent with that of Claris’ other products: MacWrite II (a word processor), Resolve (a spreadsheet program), MacDraw Pro (a drawing program), and FileMaker Pro (a database manager). Color (8-bit, or 256 colors) is supported in all the environments except telecommunications, and the package also includes 20 XTND translators for file compatibility.

Beagle Bros ([619] 452-5500), the original developer of AppleWorks 3.0, has taken a similarly nonmodal approach to BeagleWorks ($299.95). Beagle Works includes seven modules (word processing, database, spreadsheet, charting, drawing, painting, and telecommunications), all of which (except telecommunications) support 8-bit color. The package also offers XTND translators for sharing files. Switching among modules requires a menu choice, but once you’ve created an element, you can return to the originating module by double-clicking on the element. Beagle Works also supports hot links among documents—even for System 6.0.5 users—so you can edit data in either the original or the destination document and the updated information will be carried through appropriately.

With all the collected “works,” ensemble software may yet be the pick to click.

Up to Date . . .

More 3.1 is Symantec’s System 7 upgrade of its outliner/presentation package. Version 3.1 includes support for aliases and TrueType. (408) 253-9600. $395.

4th Dimension 2.2 is ACIUS’ System 7 upgrade to its powerhouse relational-database manager. 4D now supports TrueType and Apple events. (408) 252-4444. $795.

OmniPage 3.0 is the latest version of Caere’s OCR package. In addition to System 7 support, version 3.0 includes a spelling checker and the ability to recognize draft-mode dot-matrix recognition output. (408) 354-2743. $695.
RasterOps: Complete Color

Photo-realistic 24-bit color may look great on-screen, but printing those colors generally produces predictable results: mismatched colors. Not only has it been nearly impossible to reproduce the full range of colors on a desktop system but accurate reproduction has also been truly impossible. With this in mind, RasterOps has introduced the CorrectColor System, which consists of the CorrectPrint 300 continuous-tone color printer, the CorrectScan 300 high-resolution color scanner, and the CorrectColor Calibrator color-calibration unit. The price is less than $25,000, including the cost of a Mac.

The CorrectPrint 300 clearly raises the stakes in desktop color printing. A 300-dpi PostScript-compatible dye-sublimation printer, the CorrectPrint 300 produces photographic-quality letter- or legal-sized prints. These prints are reportedly produced at a rate of five minutes per page or less. RasterOps is seeking to drive prices down to about $2 to $3 per page.

The heart of the CorrectPrint 300 is an LSI 33000 RISC chip, which gives it speed as well as power. RasterOps says that the printer can decompress JPEG-compressed images for printing, so users will be able to reduce their network traffic by sending only compressed files to the printer. And for network versatility, the CorrectPrint 300 includes AppleTalk and EtherTalk ports.

Although the CorrectPrint 300 doesn't have Adobe's PostScript page-description language, RasterOps pledges full PostScript compatibility and has also committed to making the unit fully PostScript Level 2-compatible through a ROM swap.

To keep up with the amount of data it has to process, the CorrectPrint 300 comes loaded with 12 megabytes of RAM, which can be increased to 48 megabytes. Lots of RAM is essential, because a single 24-bit legal-sized print can easily require 36 megabytes.

Because most users who are interested in the CorrectColor System won't end their color endeavors with the CorrectPrint 300, RasterOps also offers software that can calibrate the CorrectPrint 300 to the final output device.

The CorrectScan 300 is a 300-dpi flatbed scanner that uses a three-pass scanning engine that can handle up to 7 bits' worth of data. This SCSI device can scan images as large as 8.5 x 11 inches. As part of the CorrectColor System, it can be calibrated to the monitor and printer to provide accurate color input.

The CorrectColor Calibrator, which was announced in May, ties the whole system together. It's a device-independent unit that can calibrate a color system based on a monitor or on printed media, including transparencies, prints, and photos.

By assuring consistent, accurate color from input to display to output, RasterOps has created a product that promises to take a lot of the cost—and anxiety—out of desktop color work.

RasterOps, 2500 Walsh Avenue, Santa Clara, CA 95051; (408) 562-4200. Individual prices were not set at press time.

SuperPaint, Take Three

Three-point-oh seems to be the magic number in drawing packages. Illustrator, Canvas, and SuperPaint have all attained "threeeness" in the past 12 months. Of the trio, however, only SuperPaint has undergone metamorphosis. The Mac's first combination painting/drawing package, SuperPaint surely needed a major upgrade, and version 3.0 is it.

Unlike version 2.0, which was an 8-color (not 8-bit) package, SuperPaint 3.0 is a 32-bit package, with full support for 16.8 million colors. Users can work in 1-, 8-, 16-, or 24-bit-color modes and can even work on a 24-bit image in 8-bit display mode. Other enhancements include pop-up and tear-away palettes as well as a variety of fill effects, including textures, gradients, colors, and patterns. Although users can specify the direction and type of gradients, they're limited to 256 colors within a gradient.

SuperPaint 3.0 also offers image enhancement, so you can adjust an image's brightness and contrast, alter the color balance, and then apply effects such as masking, smudging, diffusing, lightenning, darkening, and inverting. Black-and-white as well as color TIFF images can be placed and edited in SuperPaint 3.0.

Aleu Corp., 411 First Avenue S., Seattle, WA 98104; (206) 628-2320. $199.
If you really want to turn your hard disk into a "digital videocassette," you can add RasterOps' QuickPak Video Compression daughterboard to MediaTime. With the QuickPak, MediaTime can compress and decompress live video on the fly, at ratios of up to 30:1, using the JPEG compression standard (the QuickPak board uses a dedicated JPEG chip from C-Cube). So with the QuickPak board installed, you can write digital video as well as CD-quality digital stereo audio directly to disk.

RasterOps, 2500 Walsh Avenue, Santa Clara, CA 95051; (408) 562-4200. MediaTime should be available this winter, for less than $3,000.

**Interactive 3-D**

When Virtus WalkThrough debuted, it literally took 3-D in a new direction, letting users create spaces and randomly "walk" through them. Virtus has introduced its second package, Virtus Vision, which takes the Virtus WalkThrough paradigm even further.

Virtus Vision is a 3-D modeling, visualization, and simulation package that supports texture mapping for more-realistic images. Through System 7 and Apple events, Virtus Vision can interact with HyperCard 2.1. With the Apple-events capability, users can interact with 3-D objects, seamlessly enter a HyperCard environment, trigger a HyperTalk script, and then return to Virtus Vision.

Costing $500 more than Virtus WalkThrough, Virtus Vision is intended as a professional tool for architects, graphic designers, and users such as production designers in the film and video industries who need to present 3-D environments.


**MediaTime: Sound+Vision**

By now most users have probably been treated to at least one eye-popping demonstration of digital video on the Mac, but Mac-based CD-quality audio has largely been kept segregated and in the hands of MIDI hackers. RasterOps, however, may change all that with MediaTime, the first single NuBus board that can handle both digital video and 16-bit CD-quality digital stereo sound.

MediaTime can accept video input from any composite or S-video source, digitize it, and display the video in a window as large as 640 x 480 pixels. It can also accept video in NTSC, PAL, and SECAM formats. For those who don't need digital video now, MediaTime works as a video board for an Apple 13-inch RGB display.

On the audio side, MediaTime sports a DSP (digital signal processing) chip that can digitize audio and write the digital audio data directly to a hard disk. RasterOps also supplies software for editing the digital signal.

Virtus Vision is a new type of 3-D tool that lets users interact with 3-D objects. Through System 7 and Apple events, you can seamlessly enter and exit from HyperCard 2.1.
“Schedule+ and Meeting Maker

Workgroups looking for a way to schedule meetings over a network should take a look at these two group-scheduling packages.

Savvy users of E-mail soon recognized its value not only as a means of sending messages electronically but also as a foundation for more-sophisticated workgroup applications. Two such applications have recently emerged in the form of group schedulers. Microsoft Schedule+ and Meeting Maker combine E-mail and calendars, enabling workgroups to schedule events and resources, view each other’s schedules, and propose meetings over a network.

The two programs share a similar goal, but their approaches differ significantly. Microsoft Schedule+ is an easy-to-use, bare-bones scheduler that piggybacks onto the fully featured Microsoft Mail. Meeting Maker, on the other hand, is a package with lots of scheduling features built onto its own basic messaging system. As a result, it provides more scheduling capability, but you can’t enclose files containing proposals or add forms to the system, as you can with Microsoft Schedule+ and Mail.

Schedule+

Schedule+’s most notable strength is its simplicity. Users will take it to quickly and easily. When you log in, the program’s main display shows a monthly calendar, a scrolling daytimer, a list of users on the network, and a notes field. Each of these four interface components is a fixed window into the data it holds, a characteristic that adds to Schedule+’s simplicity but at times detracts from its functionality.

In the daytimer, you can scroll easily through the day’s meetings and view only nine-and-a-half hours of a day at a time. In the monthly calendar, you can click on a button to view months from prior or subsequent years or to view different months in the current year but you can view only one month at a time. Highlighted dates indicate that events are scheduled on that day, but you can’t see how many events are scheduled until you click on the date.

You go to the user lists to select and view calendars of other users on the network. In the Personal and Local listings, you select among the names by scrolling through the entire list and manually checking each user whose schedule you want to view, which is a time-consuming process if you have a large network. However, Microsoft has made it easy for you to create your own Custom lists; you can add users by typing the first one or two characters of their name and pressing Return.

The program’s scrolling notes field is very small, and it doesn’t let you tag notes to any particular meeting. Nor can you view more-detailed notes easily without printing them out.

Yet despite these limitations, we found Schedule+’s minimalist approach a real plus when it came to actual scheduling tasks. The program is a good choice for both group and personal scheduling. As a personal scheduling tool, Schedule+ offers some advantages over single-user scheduling programs. Unlike Alarming Events, from CE Software, for example, Schedule+ doesn’t force you to start with a blank daytimer and fill in times for meetings. Nor do you have to fiddle with a daytimer window that’s separate from your monthly calendar. To its credit, however, Alarming Events does let you view more than one month at a time.

For group scheduling, Schedule+ makes it wonderfully simple to check the unscheduled times of other users on the network. To do so, you simply select names by clicking or dragging in the lists and Schedule+ brings up a single or composite daytimer view that shows one or more schedules. In addition to your own appointments, the daytimer displays the selected users’ booked times by highlighting them in gray. You can then propose a meeting at a free time simply by selecting the hours and using the Mail Request command to send a Microsoft Mail message to the users, asking them to attend the meeting.

Schedule+ also lets you log on to a user’s calendar and view the actual appointments, if you know the user’s password (which can be different from the Mail password). Then you can book meetings right into that user’s calendar. What you can’t do, however, is automatically schedule yourself or anyone else for regular events (such as a weekly 9 A.M. meeting) without manually cutting and pasting it throughout your calendar and the calendars of all the attendees.

Because Schedule+ is integrated with Microsoft Mail, it benefits from some of Mail’s capabilities. For instance, you can enclose an unlimited number of documents and send them along with your Meeting Requests. Mail also lets you use Schedule+ to create specialized forms for booking rooms and resources.

But the integration with Mail also has some limitations. Schedule+’s data is stored on the Mail server, so you can’t access it unless you’re connected to the Mail system, which makes remote access a problem. Plus, if the Mail server crashes, you don’t have the security of a locally stored copy of your schedule.

Schedule+ is a bare-bones workgroup scheduler that borrows some features from Microsoft Mail, which is its foundation. A single screen provides access to most of Schedule+’s functions.
Meeting Maker

Schedule+ is a decidedly lean scheduling application, whereas Meeting Maker is fully featured. As a result, the program’s performance is more sluggish than that of Schedule+. Moreover, users must cope with significantly more visual information than Schedule+ provides. Meeting Maker uses many pull-down menus, windows, and dialog boxes, and its interface isn’t always predictable.

For starters, when you log in, you get a graphical representation of a week’s schedule that’s expandable to two weeks. You can manipulate the calendar’s graphic elements, but when you narrow the daily columns, the text that describes scheduled events divides in strange ways.

Meeting Maker also has a monthly calendar that graphically shows you the number of appointments scheduled for a particular day. But you can see only a month at a time, even though the calendar’s window expands, leading you to think you can view more months. You can group the meeting-related messages you receive into active ones (those you haven’t responded to), proposals, CCs, and refusals, but Meeting Maker doesn’t let you view all your messages at once.

You can order Meeting Maker’s to-do list by priorities and subtasks, but you can’t promote or demote items by clicking and dragging them to a new place on the list. Instead, you must order them alpha-numerically, which gets tedious and time-consuming.

These idiosyncrasies aside, Meeting Maker is still impressive. But the flip side to its rich feature set is a steeper learning curve than that of Schedule+, which can be a problem if you’re looking to convert your entire office to electronic scheduling. For example, you begin most Meeting Maker actions in one window and finish them in another. You click on a proposal or a time for a meeting, and another window pops up with buttons that require you to specify the meeting topic, location, attendees, schedule, and agenda. Yet another window is required for entering this information.

This complex approach can have decided advantages, however. Meeting Maker can supply a tremendous amount of detailed scheduling information based on the data you enter. For example, you can decide how each person is to be listed in your meeting proposal: Are they required or optional, or are you just sending them a carbon or blind copy? Meeting Maker can also show you a visual breakdown of the number of required and/or optional attendees of a particular meeting. The end result is a tool that lets you fine-tune your scheduling in ways that Schedule+ can’t.

Meeting Maker is even capable of selecting the earliest time that a group of users is free for a meeting. It lets you designate proxies who can schedule meetings for you. Unlike Schedule+, you can also easily schedule recurring meetings on a daily, weekly, monthly, quarterly, or annual basis.

Last but not least, Meeting Maker provides more flexibility for printing schedules than does Schedule+. You can print output that is customized for use with daytimers, and you have complete control over the data that’s printed.

We did encounter one flaw with Meeting Maker. Although it lets you search for titles, agendas, comments, or notes, starting on a date you specify, it searches indefinitely if it can’t find your selection. You must stop it manually.

Overall, we found Meeting Maker superior to Schedule+ for long-range planning. Not only can you view daily schedules for as many as two weeks, compared with one week for Schedule+, but you can also easily schedule meetings. It’s also easier to spot clusters of heavily scheduled time frames on Meeting Maker’s calendar, because the program uses special symbols that indicate how much of a particular day is booked.

The Bottom Line

Both Schedule+ and Meeting Maker are easy to set up and maintain. Each program lets you distribute calendar information among servers and purge old data from the system. But there’s a clear trade-off between the two packages. Schedule+ is a basic scheduler constructed for use on the full-featured Microsoft Mail E-mail package. Looking ahead, it’s safe to say that Schedule+ is likely to become a single module in a groupware family that will share the same Mail server as Microsoft Mail.

Meeting Maker, on the other hand, is a powerful scheduler that contains many more controls and features than Schedule+ does. But it’s also more difficult to use, somewhat sluggish, and integrated with a messaging system that’s under-powered. Moreover, it’s not even integrated with its sister product, Instant Update, a groupware document editor. As a result, if you want to add an E-mail package or more groupware to your network, you’ll have additional name lists and servers to maintain.

— Michael Miley

Get Info

Meeting Maker

AAAA

Published by: ON Technology, Inc., 155 Second Street, Cambridge, MA 02141; (617) 876-0900.
Version: 1.0.
List Price: 5 nodes, $495; 10 nodes, $895.

Schedule+

AAAA

Published by: Microsoft Corp., One Microsoft Way, Redmond, WA 98052; (206) 892-8039.
Version: 1.0a.
List Price: 5 nodes, $195; 20 nodes, $775 (doesn't include Microsoft Mail).
MacDraw Pro

MacDraw's modern descendent is considerably more powerful than its ancestor, but the new features in MacDraw Pro exact a performance price.

If you expect MacDraw Pro to be similar to its grandparent, the original MacDraw, you’re in for a surprise—a pleasant surprise. Although its interface continues to be a paragon of ease of use, the new version features improved text handling; a wide range of import capabilities; a new Bezier tool; and 32-bit-color support, including gradient shading. MacDraw Pro has grown into a solid illustration program that may not be as “pro” as Freehand or Illustrator, but it’s an excellent, all-purpose tool for simple page layouts and complex charts.

No More Mass Appeal

Of course, as a drawing program, MacDraw continues to offer precision in drawing, measuring, and object placement. The latest version, however, is not a drawing program for the masses, despite its ancestry and ease of use. At $399, with a total of more than 2 megabytes of files in the package (including all support files) and requiring 4 megabytes of memory, MacDraw Pro is not for beginners or dilettantes. But if you need a simple way to get at sophisticated tools and a versatile package that can handle many tasks, MacDraw Pro fills the bill.

MacDraw’s strength has always been its interface, and the new version is no exception. MacDraw Pro’s overall design and its attention to detail add up to an elegant, uncluttered, and intuitive interface that easily incorporates new features and functions. Claris has made sure that there’s a shortcut available for almost every function and that there’s almost always more than one way to accomplish tasks.

Users of previous MacDraw versions will feel right at home with MacDraw Pro. The Tool palette is still conveniently nestled along the left edge of the document window. You can use the Enter key to toggle between the palette’s Selection arrow and the most recently used tool and can use the Tab key to toggle between the Selection arrow and the new eyedropper tool. You can also choose an option that lets you select any tool simply by typing the first letter of its name. A fractional zoom control (from 3 to 3,200 percent), which lets you zoom in on specific areas of drawings by selecting an area on-screen, is also new. A well-designed shortcut lets you change zoom levels simply by pressing a corresponding number key.

Major Enhancements

Major enhancements to MacDraw in this version are the new Bezier tool, the convenient tear-off palettes, extended color and file-exchange support, and improved text handling.

Using the new Bezier tool (that’s Bezier combined with polygon) is simplicity itself, once you’ve figured out the basics of Bezier curves. You click on the points through which the curve is to pass and use handles attached to the points to adjust the curve’s shape and size. Although you can use the Reshape command later to add and delete points and adjust curves, you can actually do much of the editing while you’re drawing the object. Dragging a new point rather than clicking on it, for example, allows you to alter the curve as you’re drawing it. If you want a straight-line segment, you can just press Option and click on the line’s endpoints.

The familiar style bar that runs across the top of the drawing window now accommodates the addition of many more colors and gradients as well as a variety of standard patterns. Rearranging the order of items in the scrolling style bar is as easy as dragging an item from one spot to another. For a major overhaul, you can work from within expanded tear-off palettes. The palettes drop down to display colors, patterns, and gradients, or they tear off into floating windows for more convenient access to their contents.

Tear-off palettes also have an extra control located in their title bars that lets you toggle between reduced and full views. In reduced view, you simply click on the value you want. In full view, the palette provides scroll bars and lets you rearrange the samples and menus within it. The menus let you create, name, save, and retrieve custom palettes of colors, patterns, and gradients. You can also cut and copy samples and paste them into palettes, and you can even view them in larger blocks or by name.

The palettes are quintessential MacDraw. They provide a tiered approach to powerful features by letting you control how many selections you want to view and where. For quick color selection, you can choose from a pull-down menu. For
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The new QMS-PS® 815 MR™ print system gives you 300 x 300 dpi and true 600 x 600 dpi Adobe® PostScript® printing at your fingertips. Extremely sharp, crisp characters, fine line detail and clear halftones make this the reliable, affordable eight-page-per-minute printer you’re after. See how the following features plus QMS National Service and free technical support will keep your 815 MR (and you) looking sharp.

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more frequent color choices, you can tear off a palette. To rearrange or create colors, you can switch to the full palette.

With its incorporation of Claris XTND file-exchange architecture, MacDraw Pro supports more file formats than previous versions of MacDraw did. It supports files from MacPaint, MacWrite, and Word 4.0; ASCII text files; and PICT, TIFF, and EPS files. You can open foreign files as documents or as objects to be placed within MacDraw documents.

Also new in MacDraw Pro are text enhancements that add up to a pared-down, MacWrite-like word processor that's integrated with the drawing program. A text ruler not only provides margin and indent markers but also four types of tabs, different line spacings, and four justifications — just the basics for a word processor but quite amazing in a drawing program.

MacDraw Pro's ruler, however, would be more convenient if it were attached to text boxes instead of to documents. As it is, when you set tab at certain intervals and then move the text box, the tab spots are still at specific points on the page rather than in the block itself.

Imported text and word-processor files are fully editable within MacDraw Pro, and they maintain their original formatting, including font type, font size, tabs, and alignment. When you import a word-processor file with embedded graphics, the graphics arrive as separate objects in MacDraw Pro.

Claris has done an outstanding job with the interface when it comes to text creation. You don't even have to specifically select the text tool and define text boxes. Typing while any text object is selected automatically creates a text box of the same height and width as the selection. You can't fill or surround irregular shapes with text or bind text to a curve, but you can rotate text to any angle, assign it a color, and adjust its horizontal spacing to fill specific widths. You even get a spelling checker that can monitor your efforts in real time, or you can choose to activate it when you've completed your text entry. Because MacDraw Pro is a Claris product, it lets you use the user dictionary from other Claris applications, such as MacWrite.

Fine-Tuning

Although its major enhancements have changed MacDraw for the better, there are dozens of smaller changes that also add to the program's power and ease of use. The new eyedropper tool lets you pick up line or fill colors and patterns (including gradients) in any object in a document and apply them to other objects.

MacDraw's slide-show features have been improved, although MacDraw Pro still doesn't supply special effects for transitions. However, the new version makes it easier to rearrange the order of slides, and you can cut and paste multiple slides between documents. There's also support for remote-control devices.

Among the many preferences you can set for your work environment is one that's terrific. MacDraw Pro provides a smart-interface feature that lets you set constraining angles when you draw. The Shift constraint that normally draws a line in horizontal, vertical, or 45-degree directions can be redefined to any angle. Another handy new feature is the note tool, which lets you attach electronic notes to documents. You can choose to display or hide notes and print documents with or without them. This feature is very useful when you're creating presentations.

Despite its considerable strengths, MacDraw Pro suffers from a few significant problems. Foremost among them is the performance hit the program has taken as a result of its beefed-up functionality. It's incredibly slow when you're working with gradients — circular ones in particular. On a Mac IIX, opening one of the program's sample files took 35 seconds and switching from one level of magnification to another within the document took 25 seconds. A document setting (Fast display of Gradients) can mitigate this problem somewhat by representing gradients with bands of fewer colors. With the option activated, it took 4 seconds to change magnification levels in the same document. Of course, this option doesn't help with slide shows, in which you want the true gradient displayed on-screen at all times.

In addition, just as System 7-savvy applications are becoming the hottest thing since sliced bread, MacDraw Pro's lack of System 7 expertise is somewhat of a shock. Although it behaves under System 7, it lacks basic System 7 features such as balloon help and support for publish-and-subscribe.

The Bottom Line

Offered at the same price as the previous version of MacDraw — MacDraw II — MacDraw Pro is an excellent value. Although it suffers from sluggish performance for some tasks and its lack of System 7 savvy is disappointing, MacDraw Pro is a versatile tool that's adept at drawing, text handling, and presentation building.

MacDraw Pro doesn't threaten Illustrator nor does it have all of Canvas 3.0's bells and whistles, but most users will probably find it easier to learn and use than either Illustrator or Canvas. As with previous versions of MacDraw, MacDraw Pro's key strength is its well-designed interface. If you're already familiar with MacDraw, the new version will feel like an old friend, albeit with many more talents.

— Sharon Zaridello Aker

Get Info

MacDraw Pro

Published by: Claris Corp., 5201 Patrick Henry Drive, Box 56168, Santa Clara, CA 95052; (408) 727-8227.

Version: 1.0v1.

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Kodak EktaPlus 7016

Kodak's latest offering does double duty as a network printer and a copier.

The switch-hitting EktaPlus 7016 is a 16-ppm (page per minute) printer that's also a plain-paper copier. Designed for small workgroups equipped with Macs and PCs, the printer sports an impressive four ports, six emulation modes, live emulation switching, and superior output quality. Unfortunately, the EktaPlus 7016 struck out in print performance for one of our composite PostScript test files and batted only average in overall performance.

First Impressions

Installing the EktaPlus 7016 is a breeze. We had the hefty, 85-pound printer running in only 30 minutes. Step-by-step illustrations detail the entire setup, including installation of the printer's consumable components.

The toner cartridge, which is good for approximately 4,000 impressions, is easily accessible and pops in with no mess, although you risk spilling toner if you remove the cartridge before it's completely empty. You can replace the cartridge independently of the developer unit.

The EktaPlus 7016 uses an LED (light-emitting diode) imaging array and a unique photoreceptor drum for up to 50,000 images before requiring replacement.

The printer incorporates Kodak's "small-particle developer" technology. The fine particles produce crisp images and high-density solids. As a result, the EktaPlus 7016 produces excellent output with consistent dark blacks, sharp hairlines, even gray ramps, and fine type at small point sizes.

The printer's 512K ROM contains four Bitstream typefaces — Courier, Line Printer, and Helvetica and Times lookalikes — in various sizes and styles. Kodak also offers 17 proprietary font cartridges that plug in to the side of the printer, and you can download fonts using the device's LaserJet-emulation mode. An optional $1,995 PostScript board comes with the standard 35 Adobe outline fonts and accepts downloaded fonts as well. Unfortunately, there is no way to attach a hard-disk drive for font caching.

Performance

Installation was somewhat slow, but the speed of printing composite documents was a bit below average, though not as slow as expected. The EktaPlus 7016 handles large files well, but doesn't let you copy large files.
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recommended duty cycle, 750 sheets a day is the practical limit.

The Ektaplus 7016 can accept data from up to four sources simultaneously, but once its buffers are full, other port
must wait until the job in progress has been completed. Of course, if you’re using a local print spooler or a dedicated print server, you can continue working at your computer. A server is also a good idea if you want more-sophisticated queue handling. Print order is based on who gets to
the queue first and not on which job is completely transmitted first.

The Ektaplus 7016 can handle print requests from a variety of sources, thanks to its page-description-language emulators: Hewlett-Packard LaserJet II (HP-PCL), HP7475A plotter (HP-GL), Diablo 630, IBM Proprinter, and Epson FX-80. The optional PostScript board adds Adobe PostScript emulation, a necessity for Macs connected with AppleTalk.

Once Kodak’s Chooser-level printer driver has been installed, Mac users needn’t worry about print modes. You send either QuickDraw or PostScript commands via AppleTalk, and that’s all there is to it. DOS users, however, must make sure the printer’s emulation mode matches the printer driver that’s used with their application. They can do this either by manually changing the mode via the LCD panel on the front of the printer or remotely with the supplied DOS command-line utility EPLUS.EXE.

Performance Hitch

The Ektaplus 7016’s 10-megahertz Motorola 68010 manages all the RIP functions, including communicating with the host, polling ports, buffering jobs, and interpreting the emulated page-description languages.

The printer comes standard with 2 megabytes of memory. Of that, 1.25 megabytes is allocated to page imaging, so the device can hold a full 8.5-x-11-inch page of 300-dpi graphics in memory. The extra 750K of memory is available for downloaded fonts and input buffers. You can add to this with an optional 2-megabyte upgrade, provided you haven’t already filled the printer’s one internal expansion slot with the optional PostScript board.

The PostScript board sports a 16-megahertz 68020 processor implementation of true Adobe PostScript version 52.3 with 4 megabytes of RAM. While the processor is chewing on PostScript commands, the main RIP board is free to address other print jobs.

To evaluate the speed of the Ektaplus 7016, we put it through our standard suite of tests (the Ektaplus 7016 came in too late to be included in our September ‘91 printer lab report [see “Getting Down to Business: Workgroup Printers,” page 128]). Our 10-page Microsoft Word text document took an average of 1 minute, 6 seconds to print completely on the Ektaplus 7016, only 2.5 seconds behind the best-performing 22-ppm QMS-FS 2210.
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The Kodak device also turned in respectable results when printing our complex Illustrator PostScript file: 3 minutes, 25 seconds, an above-average speed but nearly half as fast as a LaserWriter with a RISC-based Xanté Accel-a-Writer II upgrade board.

Our composite Illustrator file, however, really taxed the Ektaplus 7016, requiring 3 minutes, 38 seconds, which was far and away the worst time of any PostScript printer we tested. Technicians at Kodak pinpointed the culprit as inefficient communications between the PostScript processor and the main RIP. As we went to press, Kodak claimed to have implemented a fix for this problem that cut the printer’s processing time by half. However, even with that boost in speed, the printer continues to offer lackluster performance for composite files.

The Ektaplus 7016’s paper handling is versatile. It comes with two letter-sized paper trays, each of which holds 250 sheets. The printer can automatically switch trays when one is empty. You can also place plain paper in one tray and transparencies in the other and then choose between the two via the Print dialog box. There’s even an option that automatically prints the first page of a document on letterhead and subsequent pages on plain sheets. You can configure the paper output tray for faceup or facedown printing.

Envelope printing is another story. The printer’s envelope slot is wide enough to accommodate only standard #10 business-sized envelopes. We prefer an adjustable, center-feed envelope slot that handles envelopes of any size. Also disappointing is the printer’s handling of textured stock, which tends to smear. Envelopes can get skewed, because when you place an envelope or a manual-feed sheet in the appropriate slot, the printer inhales the paper automatically, often misaligning it. This is really a problem when you’re bar-coding envelopes.

The Ektaplus can juggle printing and copying. The device continues to receive and process digital data while the 6-ppm copier is in use. Jobs in the print queue are put on hold until you’ve finished making copies, and then printing resumes automatically. Very slick.

The top-loading copier is convenient, but it’s not as versatile as it should be. It can handle only 8.5-x-11-inch sheets that are manually inserted one at a time. Automated batch copying we can live without, but if the printer can accept legal and A4 paper, why can’t the copier? Also, the copier has no magnification or reduction options. On the plus side, the copier cover is double-hinged to make it easy to place bound material flat on the platen glass.

The Bottom Line
At $7,190 for Kodak’s PostScript model, the Ektaplus 7016PS, equipped with an optional AppleTalk board, you get both a printer and a photocopier. But be aware that at 3.4e per page, the Ektaplus uses the least economical consumables of all the PostScript printers we tested.

For overall performance, the Ektaplus gets a mediocre rating. Its speedy performance with text may attract number crunchers and wordsmiths, but the communications problem revealed by our composite-page tests means that the Ektaplus 7016 is not a good choice for complex DTP work. And even assuming that Kodak has resolved the PostScript problem, the Ektaplus 7016 would still earn only average performance ratings.

We’re encouraged by the trend toward emulation- and port-switching network printers for mixed computing environments, and the idea of a printer with a built-in copier is one we’ve been espousing for years. Unfortunately, although we commend Kodak for taking the innovative first step, the Ektaplus 7016 needs some refinement before it earns our unqualified recommendation.

— Owen W. Linzmayer

Kodak Ektaplus 7016

Manufactured by: Eastman Kodak Co., Printer Products Division, 343 State Street, Rochester, NY 14650; (800) 344-0006 or (716) 253-0740.

Version: 1.4.3.

List Price: $5,495; 2-megabyte expansion board, $500; PostScript board, $1,995; AppleTalk board, $195; serial board, $95; parallel board, $95; font cards, $150 - $250; photoconductor kit, $65; toner kit, $130; legal-paper tray, $80; A4-paper tray, $75.
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Animation Works
Gold Disk’s package makes it easy to create impressive animations.

Animation Works is a suite of powerful, affordable tools that simplifies the creation of Mac-based animations. Designed for use in presentations, Animation Works’ animations can incorporate sounds and special effects such as wipes, mattes, and color cycling.

Animation Works is similar in price and abilities to Motion Works’ ADDmotion, a $295 HyperCard add-in that requires HyperCard for producing and viewing animations. Animation Works doesn’t require HyperCard, however, and the animations you create can be distributed and played back with the package’s free Movie Player. You can also play Animation Works movies from within HyperCard, using an XCMD included with the package.

For broader distribution, you can output animations to videotape. To do so, however, you need to equip your Mac with additional hardware that converts Mac video into NTSC video and additional software to integrate the process.

Animation Works consists of three integrated working environments: The Background Editor is a 1-to-8-bit painting module for creating and editing backgrounds; the Cel Editor provides tools for creating foreground elements, called actors; and the Movie Editor is an environment for assembling animations from components and setting them in motion.

Background Editor tools comprise a basic selection of painting tools, including a brush, pencil, eraser, fill bucket, and definable airbrush. The module can also load and save PICT files.

The real power of the program, however, is in the Cel Editor’s special tools and functions, which let you animate actors quickly and easily. Actors can consist of a single frame or a series of frames that make up a motion cycle — for example, one of the sample actors included

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Animation Works is an easy-to-use set of painting and animation tools that automate much of the animation process. The Cel Editor, shown here, lets you compile a series of frames into animated actors. The ghost image behind the dog is an “onionskin” view of its position in the previous frame.

This red ball was rendered in a 3-D program and imported into Animation Works as a PICT file. The gravity tool in the pop-out menu automatically plots the path of the bouncing ball, although some manual tweaking is necessary.

with the package consists of 12 frames that comprise one full cycle of walking motion. You can play the actor at varying speeds, moving forward, backward, or in Ping-Pong motion.

Another useful Cel Editor option is the “onionskin” technique, which displays the current cell with a ghosted image of its previous or following cell.

Several tools automate entire motions such as zooming and rotating. For example, simply by setting a few options in two dialog boxes, you can create a block of text that zooms in, comes to a stop, and rotates. These complex motions are attributes of actors themselves, and you can create them without the Movie Editor.

Shortcuts

Several cleverly designed shortcuts and power tools within the Movie Editor further simplify the task of creating animated movies. To create animated text for a presentation, for example, you don’t need to use the Background and Cel Editors. From within the Movie Editor, you can select a background item from the module’s Events menu, load a PICT file, or create solid or gradient backgrounds.

You can also select font, size, style, and color, and then you can use the Movie Editor’s text tool to create the text.

When you’re ready to define the text’s motion, you can use the Movie Editor’s registered-motion and path tools. The registered-motion tool is intended for use with multiple-cell actors. The path tools include straight-line, curved, freehand, and polygon paths plus two powerful tools called auto-path and gravity path.

When you select an actor and one of the standard path tools, the actor attaches itself to the cursor and you simply draw the path. When the path is complete, you tell Animation Works how many frames to use for it and whether the actor should accelerate or decelerate over a particular number of frames. Animation Works then draws the path for you.

The auto-path tool offers a variety of preanimated motions such as scrolls, spirals, bounces, and rebounds. And Animation Works’ gravity path lets you define a direction for a path and then affect it with gravity (force, speed, and damping (air resistance)).

You can also set up complex paths hierarchically, with objects “magnetized” to other objects. One of the supplied examples shows a rotating moon orbiting a rotating earth while both objects orbit an animated sun. Although this appears to be
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a complex set of motions. Animation Works' automated tools go a long way toward simplifying its creation.

Animation Works also lets you enter pauses and loops at key frames to allow a basic level of interactive control.

Although it's an impressive first effort, Animation Works is not without shortcomings. We experienced several bugs and system crashes, and a few features didn't work properly. When we attempted to load a sound file, for example, Animation Works went into an endless loop that required us to reboot. As Gold Disk technical support suggested, we discovered that the conflict was with the Findswell INIT, a dialog-box extension. And although Animation Works functions with Adobe Type Manager, the letterspacing with large fonts needs improvement and kerning of text in presentation animations is decidedly odd.

The package does, however, come with an excellent manual that includes instructive tutorial sections, a well-written reference section, a complete index, and a quick-reference card. It also includes a videocassette that offers an introduction to the program's features and functions.

The Bottom Line
Given the breadth and depth of the Animation Works functions that worked flawlessly, we're confident that the few bugs we found in version 1.0 will be eliminated in subsequent releases. Overall, we were impressed with the thought that went into its design. Although Animation Works lacks the power of the $895 MacroMind Director package, which provides such high-end features as a scripting language and interactive control over playback, it's much easier to learn and use. Moreover, Animation Works is not only a useful tool for education and business applications but it's also a lot of fun!

— Lon McQuillin

Get Info

Animation Works

Published by: Gold Disk, Inc., P.O. Box 789, Streetsville, Mississauga, Ontario L5M 2C2, Canada; (416) 602-4000.

Version: 1.0.

List Price: $199.95.
If you’re a HyperCard-stack developer, HyperBundle and Peacock will keep you busy for hours on end. Each package offers valuable alternatives and extensions to HyperCard 2.0’s use of palettes, icons, and text import and export.

HyperBundle
HyperBundle is a set of five utilities sold in a single package; you can also purchase each utility separately. Each is either new or upgraded for HyperCard 2.0. Although it’s unlikely you’ll be able to take advantage of every one of HyperBundle’s components, the price nonetheless makes the package a good value.

The most promising HyperBundle utility is SuperPalette, authored by James L. Paul. Palette is a new feature of HyperCard 2.0 that provides floating windows for navigation and handy access to buttons. SuperPalette goes well beyond the capabilities of Claris’ Palette XCMD by offering check boxes, radio buttons, pop-up and drop-down menus, locked fields, scrolling lists, a zoom box, and script control.

The utility consists of the SuperPaletteBuilder stack, a run-time XCMD, a HyperBundle Tools stack with useful prebuilt palettes, and documentation describing the palette-control properties. SuperPalette will delight developers looking for a way to add a touch of elegance and individuality to their stacks.

Another HyperBundle utility that excels at creating distinctive-looking stacks is Icon Factory, also by James L. Paul. Although HyperCard 2.0 provides a quite serviceable icon editor, Icon Factory offers additional graphics tools, including nudging, reverse-imaging, and mirroring. To help you create icons from preexisting art, the nifty Snapshot feature captures small bit-mapped images. Better yet, Icon Factory comes with a library of 2,000 exquisite art images.

A third HyperBundle utility is Dan Shafer’s ScriptExpert, a learning tool that helps HyperCard novices get comfortable...
with HyperTalk scripting without the daunting experience of writing code in a blank script window. ScriptExpert lets you choose your vocabulary from on-screen buttons and provides guidance in the form of dialog boxes. This stack is ambitious, strangely interesting, and handsomely designed.

Rounding out the HyperBundle package are StepAhead and ScriptLibrary. StepAhead, a Home-stack alternative, is intended to make HyperCard more convenient by letting you open stacks, applications, documents, DAs, and notes from a single card. The stack lets you rename, copy, delete, and move files and folders as well as access sounds.

ScriptLibrary is a stack that serves as a repository for scripts. Because most HyperCard programmers' scripts tend to get strewn throughout their stacks, the idea of keeping an organized library makes sense. Unfortunately, both StepAhead and ScriptLibrary are likely to benefit only those who are meticulously careful in organizing and cataloging their work projects. Others may find that the demands of setup and maintenance aren't worth the effort.

Overall, SuperPalette and Icon Factory stand out in this package. The remaining HyperBundle utilities are a bit amateurish and don't always work the way you want them to.

Peacock
Peacock is a single HyperCard 2.0 utility for importing and exporting text. Published by Cyan, creator of the remarkable Manhole and Cosmic Osmo entertainment stacks, Peacock offers a clever interface to assist users in transferring text between HyperCard fields and text files.

In addition to the actual text transfer, Peacock performs several auxiliary tasks. It lets you modify the delimiters that separate fields and items of fields, perform conditional operations that limit the transfer of text according to comparisons you've defined, strip out imported quote marks, and execute "posting" scripts that customize fields during the transfer.

Designed for people who are uncomfortable writing scripts, the utility comes with a clearly written manual that guides you through on-screen examples. It includes several elegant touches such as a layout list in which you simply click and drag background field names to match an imported text file or to position an exported text file. You can specify commas, tabs,
Peacock is a HyperCard utility that provides precise control over the import and export of background fields.

and other text delimiters or have Peacock automatically determine them for you.

Peacock performs its stated tasks well, although this first release of the product does have one limitation: It can export only background fields that have been named; it offers no means to export text stored on card fields, and if your background fields are unnamed, it will notify you via a dialog box that it has ignored such fields. A spokesperson for Cyan claims that this restriction makes the program easier for the majority of users to use, yet the company is considering an option for expanded export abilities in an upcoming release.

Peacock’s smooth operation and ease of use may be just the ticket for heavy-duty HyperCard users managing large databases, word-processing files, or non-Mac file transfers. If your needs entail strictly text export, however, you may find the text-export utility in Claris’ HyperCard Power Tools stack satisfactory. The Power Tools stack exports all background fields into a text file. As a third option, the HyperTalk language offers fairly straightforward import and export commands.

The Bottom Line
One of the benefits of using a popular programming environment such as HyperCard is the proliferation of utility programs available for enhancing its functions. Although many utilities are currently available in the public domain or as shareware, commercial products such as HyperBundle and Peacock offer special talents unavailable through shareware or HyperCard itself. The availability of products such as these keeps HyperCard accessible even to users who aren’t ordinarily programmers. As all good programmers know, the best way to save development time is to use something that someone else has already created. If you need those special talents, HyperBundle and Peacock are well worth their cost.

— Scott Kronick

Get Info

HyperBundle

Published by: Hyperpress
Publishing Corp., P.O. Box 8243,
Foster City, CA 94404; (800) 633-4252 or (415) 345-4620.
Version: 2.0.
List Price: $249; introductory offer, $134.50.

Peacock

Published by: Cyan, P.O. Box 28086, Spokane, WA 99228;
(509) 238-6789.
Version: 2.0.
List Price: $69.
FontMonger and Metamorphosis Professional

Two font-conversion programs can take PostScript Type 1 fonts to TrueType format and back again.

If you've invested in a library of PostScript Type 1 fonts, you may be understandably reluctant to purchase typefaces in Apple’s new TrueType format. An economical alternative is a font-conversion utility, which can convert typefaces among the PostScript Type 1, PostScript Type 3, and TrueType formats.

Ares Software's FontMonger and Altsys' Metamorphosis Professional perform such font conversions, including full hinting for Type I and TrueType faces and preserving font-family relationships. Both System 7-compatible programs also create editable character outlines in EPS or PICT formats.

FontMonger is a robust font tool with a slender price tag whose real strength lies in font alteration, and Metamorphosis Professional is a dedicated conversion utility that's ideal for users with heavy-duty font-conversion needs.

FontMonger

FontMonger includes four built-in font alterations: small caps, inferior, superior, and slant. You can also add custom alterations such as slanted small caps. Double-clicking on a character brings up the Alter Character dialog box, which lets you adjust a character's height, width, and/or slant.

To create composite characters, including horizontal and diagonal fractions, you must type in the desired components in a dialog box. The ability to create fractions is a real boon, although you have to construct them individually.

FontMonger lets you copy and paste characters within a font or combine...
One of FontMonger’s best features is its Alter Character dialog box, which lets you adjust characters by typing in numbers or moving elements. Here, a composite character is under construction, with 7 being used for context.

characters from different fonts. The latter capability is extremely useful if you frequently need a few characters from Zapf Dingbats, for example. You can assign specific characters to keyboard positions, and you can import black-and-white EPS graphics (such as logos) and assign them to keys. But be forewarned: Imported artwork can contain only black fills or outlines, not strokes.

After you’ve manipulated a font, you can save it in its original format or convert it to a different one (from Type 1 to TrueType, for example). For changing the format of several fonts at once, FontMonger has a Convert Batch option. Unfortunately, the batch-conversion process is clunky and confusing, a marked contrast to the program’s other well-designed dialog boxes.

Instead of treating each font within a suitecase as a single entity, FontMonger sees each font as a family. For example, open the Bernhard Modern Roman font, and you see four font-family members: roman, bold, italic, and bold italic. Each style is also a separate font within the suitecase. For a basic four-style family, you generally convert the styles from the roman (or plain) font. Typefaces with more weights (such as Minton or Stone Sans) must be converted as several families. This process is incredibly confusing, and very little of it is explained in FontMonger’s manual, which is woefully incomplete. The program does have context-sensitive help and technical support is excellent, which is partial compensation.

FontMonger can also export font characters as editable outlines, in either PostScript or PICT format. FontMonger’s PostScript outlines are faithful renditions of the original characters. The program does an abysmal job of converting PICT characters, however, and frequently produces character shapes that are unusable, because of their severe distortions and an overwhelming number of control points.

How to be social.

Think how much more effective your people would be if they could communicate better. That’s the idea behind WordPerfect Office 3.0 for the Macintosh.

It’s actually several programs in one. WordPerfect Office comes with a very versatile E-mail package (WordPerfect Office Mail*), that makes it easy for people on a Macintosh network to keep in touch. The mail screen shows you everything you need to compose and circulate messages to an individual, to a group, or to the entire corporation.

With Mail, not only can you send and receive messages, but you can also attach up to 100 files of any format. Beyond that, you can add sound or voice annotation, broadcast a message to anyone logged onto your network, or send carbon and blind copies.

Ever wish you could take back your words? Mail’s unique status tracking capabilities let you know when a message has been delivered or opened. So if a message hasn’t been read yet, you can retract and edit it.
Metamorphosis Professional

Metamorphosis Professional is a substantial upgrade to Metamorphosis, the Mac's first font-conversion utility. This version is an industrial-strength converter, capable of converting fonts among all Mac formats. The software also produces PostScript fonts for the PC and NeXT platforms. TrueType for the PC, and font databases for use in Fontographer (Altsys' font-creation program).

All the program's operations occur in a single window that has two modes, Convert Text and Convert Font. Compared with FontMonger's, Metamorphosis Pro's font-conversion dialog box is a model of streamlined simplicity. You simply open font suitcases or Fontographer font databases, add typefaces to the batch-conversion list (Bernhard Modern Roman is a single font here), choose the output format(s), and click on the Convert button. Metamorphosis Professional asks where you want to store the converted fonts (there's a handy New Folder button) and begins processing fonts. You can convert fonts into multiple formats in a single conversion operation, and the program can locate and convert PostScript fonts no matter where they're located — even if they're inside a PostScript printer's ROM.

Metamorphosis Professional normally creates one suitcase for each four-font family, but you can also create a separate suitcase for each font (handy if you use Adobe Type Reunion). For those who prefer a nontraditional font family, a bundled utility called Style Merger lets you merge four styles of a typeface into a single family. Metamorphosis Professional provides some control over its automatic hinting process, particularly for conversions to TrueType. For Type 1 conversions, you can only turn hinting on or off; for TrueType, however, you can independently select vertical/horizontal hints, diagonal hints, and three degrees of dropout control.

Despite Metamorphosis Professional's single-minded focus on font conversions, we experienced a few problems. The program doesn't generate bit-mapped fonts during TrueType-to-Type-1 conversions, so if your TrueType originals didn't come with bit maps, you wind up with Type 1

How to get a date.

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

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

Want to know more about WordPerfect Office 3.0 for the Macintosh? That's easy, too. Just call us at (800) 526-2260. It could be the start of a very productive relationship.

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CIRCLE 90 ON READER SERVICE CARD.
Both FontMonger and Metamorphosis Professional produce faithful renditions when converting PostScript fonts to TrueType format. There are occasional irregularities, however, such as the loss of the cupped serifs in this Bernhard Modern font converted by FontMonger.

printer fonts and no way to install or use them. Because most vendors, including Bitstream and Monotype, are shipping TrueType fonts without bit maps, this is a major problem that requires fast fixing. We discovered that converting fonts in Adobe's Expert series confounded the program: A TrueType version of Minion Expert was missing more than half the character set, including fractions, superscripts, subscripts, and special characters.

Metamorphosis Professional can convert font characters into EPS or PICT outlines. However, it offers more control than FontMonger does over which characters are converted. It can create outlines for characters that FontMonger misses, such as fractions. Metamorphosis' EPS outlines closely match those of FontMonger, with a similar number of control points, but its PICT-conversion process is vastly superior.

The Bottom Line
Both FontMonger and Metamorphosis Professional produce surprisingly good conversions, although converted fonts never look quite as good as the originals, either on-screen or on paper. Changes in character appearance were particularly noticeable at small point sizes on 300-dpi output. Metamorphosis Professional did a somewhat better job of preserving a font's character shapes and overall "color." FontMonger's TrueType conversions often looked lighter than the originals, and the program sometimes removed character features (the cupped serifs on Bernhard Modern, for example).

In addition, the leading and font widths of the converted fonts in both programs rarely matched their originals, causing document lengths and line breaks to change. Some of the changes are caused by differences in the Type I and TrueType formats, but FontMonger is also guilty of overleading its fonts, a problem that's magnified by the auto-leading in Word. When test pages were printed from Page-Maker, however, both programs' TrueType fonts had leading and character spacing that were nearly identical to those of the Type I originals.

For those who need a Swiss-army knife for fonts, FontMonger delivers an unbeatable combination of price and features. It produces good-looking font alterations with a minimum of effort, but it's hampered by an awkward conversion interface and an inadequate manual. Metamorphosis Professional is the program of choice

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if you want a truly painless way to convert lots of typefaces.
— Aileen Abernathy

Get Info

FontMonger

Published by: Ares Software, 561 Pilgrim Drive, Suite D, Foster City, CA 94404; (415) 578-9090.
Version: 1.0.3.
List Price: $99.95.

Metamorphosis Professional

Published by: Altsys, 269 W. Renner Road, Richardson, TX 75080; (214) 680-2060.
Version: 2.01.
List Price: $149; upgrade, $45.

MathWriter

An equation writer plus a word processor should add up to a winner, but MathWriter’s sum misses the mark.

Creating properly formatted mathematical expressions and scientific expressions is challenging, even with the help of a Mac. MathWriter 2.0, a full-featured word processor that’s integrated with a specialized set of mathematical-writing tools, addresses that challenge.

Mixing Words and Equations

Current alternatives to MathWriter are such equation-writing utilities as Expressionist or MathType. After you’ve created an equation with these programs, you must paste the results into a word-processing document as a graphic. Mathematical expressions created in MathWriter, on the other hand, already exist as actual text in a document and can be edited directly in the document. A decidedly less attractive alternative to MathWriter also exists in the form of word processors such as Microsoft Word that supply built-in equation-writing capabilities. MathWriter’s mathematical functions are significantly easier to use.

Aside from its mathematical writing abilities, MathWriter’s features are competitive with those of high-end packages as a general-purpose word processor. Its talents include column formatting, table formatting, and border drawing. In addition, it provides style sheets, a search-and-replace function based on any style attribute, a revision-tracking feature (similar to the one in DocuComp), pop-up memo notes, sidebars, a spelling checker, and a thesaurus.

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CIRCLE 135 ON READER SERVICE CARD.
your word processor with MathWriter for all your technical documents, be forewarned. With all the specialized overhead devoted to mathematical-expression processing, you won't want to use MathWriter to dash off a memo or write a business letter. Two of the program's menu items are devoted to mathematical operations, as are many functions in the remaining menus. Line-spacing decisions require a separate dialog box in order to accommodate the complexities of equation formatting. There are three palette windows for accessing mathematical functions and symbols.

In addition, perhaps as a result of MathWriter's mathematical-formatting emphasis, the implementation of some nonmathematical functions is decidedly clumsy. For example, to create a footnote, you must select the correct option from 15 choices in the Variables row of the nine-row Palettes menu. Changing footnote formatting requires that you locate the correct option in another daunting scrolling list of options. MathWriter also has a Library function that uses an entire submenu and several commands, yet it accomplishes little more than the Glossary function in programs such as Word.

In the end, the success of MathWriter boils down to whether its advantages as an integrated word processor and equation writer outweigh those of a general word processor combined with an equation-processing DA. The answer for most users is probably not.

MathWriter's primary advantage is that it allows direct editing of equations within a document while providing true WYSIWYG formatting that doesn't require any special commands or codes. MathWriter also offers a convenient way to move between the subscript and the superscript.
superscript levels. Its intelligent auto-
formatting feature correctly adjusts spac-
ing, font size, and italics for most equa-
tions. It can also automatically number
sequential equations within a document.
And last but not least, it offers a rich range
of easily accessible mathematical sym-
bols and functions.

Editing Snafus

Unfortunately, however, MathWriter's
equation processing comes up short in
some important areas. Most significantly,
its editing capabilities are limited. Simple
changes, such as adding denominators to
existing expressions, require you to delete
the entire expression and start over. In
contrast, the Expressionist equation-writ-
ing utility accomplishes this task easily
with a single mouse click. Other functions
in MathWriter, such as adding auto-sized
brackets, often require many more mouse
clicks and menu selections than seem
necessary. Cutting and pasting equations
occasionally results in a loss of format-
ing, and in some cases we lost an entire
section of the equation. As a result, we
found that creating and editing equations
was far less convenient in MathWriter
than it was in Expressionist.

MathWriter was also slow at updating
screens. Editing documents that contained
several mathematical expressions resulted
in frustratingly slow screen redraws, even
with a Mac Ici. It was even necessary to
occasionally scroll the current screen out
of view and back again in order to update
the screen correctly.

MathWriter's two versions, professional
and educational, are nearly identical, ex-
cept that several features are omitted or
restricted in the educational version. These
features include the Thesaurus, the Library,
Memo notes, and Sidebars. The educa-
tional version is, of course, significantly
less expensive, but it is the required
version for 68000-family machines.

The Bottom Line

MathWriter turns out to be somewhat
less than the sum of its parts. Although it's
a general-purpose word processor as well
as an equation processor, it does neither
function well enough to make it an attrac-
tive alternative to other products on the
market.

Most users who require mathematical
processing will likely find better value and
performance by combining an equation-
writing utility with their current word
processor.

— Ted Landau

Get Info

MathWriter

Published by: Brooks/Cole
Published Co., 511 Forest Lodge
Road, Pacific Grove, CA 93950;
(408) 373-0728.
Version: 2.0.
List Price: Professional version,
$395; educational version,
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**DiskTwin**

You’re at work, and the clock is about to strike midnight. As you prepare to back up your 1-gigabyte hard-disk drive, a flash of lightning and a crash of thunder startle you. You jump and accidentally knock the drive off your desk. As it falls to the floor, your own scream wakes you.

Maybe your backup nightmares aren’t this bad, but if they are, we prescribe a dose of DiskTwin, from Golden Triangle. DiskTwin is available either as a NuBus or a PDS (processor-direct slot) card, with software, for 111’s, SE/30s, and NuBus machines that provides a special SCSI port. Your primary hard drive plugs in to the standard DB-25 SCSI connector on the back of a Mac. You plug an identical or larger drive, destined to become a twin of the primary drive, in to the DiskTwin SCSI slot. Using the DiskTwin control panel, you then create a link between the two drives, and DiskTwin matches the drives according to their SCSI IDs.

Activating the link causes the contents of a primary drive to be copied to its twin drive, an operation Golden Triangle calls synchronizing. Henceforth, any operation that writes data to a primary drive is duplicated on its twin. No more cold sweats in the middle of the night — your data is backed up the moment it’s written. A critical item to note about DiskTwin is that it does not slow the computer down. The hardware operates independently of the Mac’s built-in SCSI.

But don’t run out and buy DiskTwin if you believe that it can protect your data from every problem. DiskTwin protects you from hardware problems only in your primary drives. It cannot shield you from viruses, power surges, or pilot error. For example, if someone throws all your files into the Trash, all the files on the twin drive will also be thrown into the Trash (DiskTwin is an obedient servant).

To protect yourself against theft or acts of God, use a removable-cartridge drive for your twin. This way you can use two cartridges, resynchronizing the older cartridge and taking the current one home for off-site backup.

You also won’t be protected from software bombs that take the hard disk with them. Get the idea? The point with DiskTwin is that when you do have a hardware crash (bad block, head crash, controller or power-supply failure), DiskTwin senses the loss of the primary drive and automatically switches over to the twin without a hiccup. You can set DiskTwin either to alert you with a dialog box when something goes wrong or to politely send you an E-mail message if you’re near Microsoft Mail (Golden Triangle is developing a CE Software QuickMail notification that should be available soon).

A companion software product, PartitionTwin, is included in the DiskTwin package. PartitionTwin uses the same hardware but lets you back up multiple partitions from multiple drives to a single twin drive. This way you can keep only important data backed up, so you don’t have to keep a twin drive that exactly matches the size of your primary drive.

DiskTwin is easy to install and set up, and it’s also fast and absolutely transparent in operation. Thank goodness, because we can’t afford to lose any more sleep.

— Ron Hipshman

**Easy Color Paint**

Easy Color Paint is exactly what it claims to be: an inexpensive 8-bit (256 color) painting program that operates with the simplicity of our old friend MacPaint. Although Easy Color Paint lacks some of the high-end features (and the price tag) of programs such as Studio/8, it has enough little tricks — such as user-editable colors and patterns, coloring modes (how one color applied over another affects the blend), color printing on the ImageWriter and color QuickDraw printers, support for the WACOM line of pressure-sensitive tablets, and gradient fills — to bring out the digital Degas in all of us.

You can configure Easy Color Paint to suit your artistic capabilities. Children can double-click on the Junior Preference file to bring up a 16-color palette with locked windows. Or you might slap on a beret and try Artist, where all 256 colors are displayed at once and you can access a limited variety of special effects. You can customize your favorite options and save them in their own Preference file.

Creative Software’s program is more than a colorized version of MacPaint. Yes,
“Dubl-Click, Inc. is a veteran marketer of Macintosh productivity tools and utilities.

“When we run an ad in MacUser we get noticeable results. We’re reaching a lot of corporate buyers. A lot of people within the right companies.

“It’s just ridiculous to expect that you can sell a product without advertising it. We decided not to run one month with MacUser, and our sales plummeted. It was the worst month we’ve had in three years. It taught us a lesson: don’t do that again.

“I think it’s safe to say that without advertising in MacUser, we wouldn’t have a company.”

ANOTHER MACUSER SUCCESS STORY

you’ll feel right at home with the MacPaint-like tools, but a closer look at Easy Color Paint reveals some special enhancements. Most tools produce their own menus when you select them. The Lasso menu, for example, supplies blend options for selected objects, as well as a choice between a tight lasso and a loose one. To match colors, you can hold down Shift-Option to reveal an eyedropper tool. The space-conscious tool can remove the title bar and invoke Skinny Tools, a slender tool palette that fits neatly along the left side of your screen. You can also remove scroll bars to gain even more painting area (simply Shift-Option-drag at the corner and sides to move window boundaries).

Easy Color Paint comes with a few minor annoyances. When you’re working in Fastbits, you can use only the pencil tool. Also, the painting size is determined when you launch the application, which causes any painting larger than the size you initially set to be cut off (you select where) and the cropped portions to become inaccessible. To view and edit the larger painting, you must quit, relaunch, and specify new dimensions for the painting window.

In a more expensive program, these complaints would be more than minor, but let’s face it: Easy Color Paint is cheap, cheap, cheap. And not only that—it’s also fast, reliable, and fun to use. If you need a bargain-priced set of electronic crayons around the home or office, Easy Color Paint is hard to beat.

Creative Software, 3213 Annandale Road, Durham, NC 27705; (800) 367-6899 or (919) 493-9503. Version 2.003, $89.

— Christopher Breen

FlexiTrace automates the process of digitizing line, column, area, and scatter charts. All you have to do is prepare the graph for digitizing. To do this, you first scan your graph, if it’s on paper, or cut and paste it into FlexiTrace from another application (FlexiTrace reads PICT files).

The key to getting accurate results with FlexiTrace is to make sure that the chart is aligned correctly with the screen. This is a simple task with FlexiTrace’s Plumb Bob tool. You simply draw a vertical line down the y-axis of a graph with the tool, and the program rotates the graph until the line is positioned correctly.

Next, with a dimension tool, you drag define the area that you want digitized. A dialog box lets you enter the numerical x and y coordinates of the specified area. You can also specify the number of evenly spaced x-axis samples or minimum and maximum values along a curve.

You must now clean your chart to get rid of all extraneous labels, grid lines, and miscellaneous garbage. FlexiTrace provides a noise filter that erases lonely pixels, a grid filter that erases horizontal and vertical lines, and a spike filter that smooths curves.

Once your chart is clean, FlexiTrace goes about tracing it, mapping data points automatically. The resulting data is placed in a window that lets you see and edit the numbers. Saving this window creates a standard tab-delimited file that virtually any spreadsheet, charting, or data analysis program can read.

FlexiTrace also provides tools for measuring the distance between points (with the ruler tool), the slope of a traced line (with the protractor tool), and the area enclosed by the lasso tool (with a menu choice). You can digitize individual points by clicking on them with the ruler tool.

In contrast to FlexiTrace, digiMatic is a DA that’s designed to work with other programs. Consequently, you must use another application to open the graph you want digitized. digiMatic’s maker claims that you can also tape a transparency of a chart to the screen and digitize it against a white background, or you can use a digitizing tablet. digiMatic doesn’t provide tools for cleaning your graph prior to digitizing, but any painting program can do the job.

The process of turning your graph into numbers is simple, although unlike with FlexiTrace, it’s not automatic. Once your graph has been displayed, you set the x and y scaling by clicking on and entering the
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maximum values for both axes. You can specify that the axes be linear or logarithmic. You can also digitize by using a line and chart (line, column, or scatter) on-screen so you can verify your points before you complete the digitizing process.

Once digiMatic has come up with numerical values for the points you’ve defined, you can edit the values and save them as a tab-delimited file.

If you’re not interested in digitizing many points per chart, digiMatic is faster and easier to use than FlexiTrace. On the other hand, if you do need to digitize many points, FlexiTrace, with its automated process and extra tools, is a better choice.

Famous Engineer Brand Software: 4855 Finlay Street, Richmond, VA 23231; (804) 222-2215. Version 1.02. $249.

Tree Star, Inc., 116 Memory Lane, Campbell, CA 95008; (800) 366-0045 or (408) 371-8343. Version 1.01. $249.

— Ron Hipshelman

MacEKG

Aimed at power users and computer-repair specialists, MacEKG is an INIT that administers a suite of diagnostic tests to the Mac on startup. The program compares current system performance with a log of previous test results, pinpointing significant changes that are symptomatic of underlying viruses, misbehaving INITs, and other problems.

MacEKG can’t define specific causes of performance degradation or operate on physically defective hardware. Its primary role is to alert you to symptoms, not to provide a diagnosis. Once MacEKG has identified a problem, it refers you to the package’s well-written documentation for possible explanations.

After all your other INITs are loaded, MacEKG performs 35 benchmark tests on the Mac’s logic-board operation, SCSI performance, and QuickDraw speed. Parameters such as processor type, RAM amount, ROM revision, heap size, and boot-block information are displayed and logged to disk. Once the tests have been completed, a digitized voice announces the results. MacEKG removes itself from memory, and the Finder appears.

Using a control panel, you can specify MacEKG options such as the frequency of tests (for example, every startup, daily, or weekly) and the type and volume of voice alerts. More importantly, you can analyze your Mac’s performance over time by viewing the test-result logs. Results are for historical reference only and can’t be used to compare one system with another. Three logs cover general system parameters, SCSI-device information, and performance-benchmark-test results. You can view the alphanumeric data or export the logs for further analysis in other applications.

With its companion utility, Restarter, MacEKG can quickly run many tests on an unattended machine. Whenever MacEKG completes its diagnostics, Restarter initiates the startup process again for another iteration of all the tests. This feature is particularly useful for service technicians attempting to diagnose Macintoshes with intermittent problems. Computer resellers and peripheral manufacturers can also use this feature as a quality-control measure to break in equipment prior to shipment.

Currently, most of MacEKG’s functions can be emulated, albeit incompletely, by Ken McLeod’s MacEnvy (public domain) and Scott Berfield’s Speedometer (shareware, $25). However, by the time you read this, MicroMat intends to have bundled Periscope with MacEKG. Periscope is a utility that graphs MacEKG data and makes it easy to correlate performance deviations with milestones such as installing a new INIT or removing an accelerator. Using MacEKG in conjunction with Periscope will make it much easier to accurately diagnose the root of performance problems once MacEKG has flagged them. If Periscope lives up to its advance billing, the team of MacEKG and Periscope will be an indispensable addition to every power user’s hard disk. In its 1.0 version, however, MacEKG’s appeal is limited primarily to knowledgeable service personnel.


— Owen W. Linzmayer
Everyone knows that in order to do a job right, you need the right tool. For precision drawing and drafting, you need a powerful, easy-to-use program well-suited to the project at hand. Like MocDraft® or Dreams. Each a serious, no-nonsense tool for architectural and engineering design & drafting, as well as technical illustration. Designed to respond quickly and accurately to the way you think and work.

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CIRCLE 55 ON READER SERVICE CARD.
Apple’s LaserWriter II and IIg printers bring power printing to the desktop, and the new OneScanner includes astonishing software.

BY HENRY BORTMAN

The phone rings. “We want to tell you about two new printers and a scanner,” Kathy, an Apple spokesperson, says over the phone.

Two new printers, I muse. Apple’s about due for some new entries on the high end; they’re probably PostScript Level 2, have a 68030 chip on the controller, and maybe include Ethernet connectivity. Could be interesting. But another scanner?

I go for the jugular. “So tell me about the scanner. No. Let me guess. It has the most incredible software ever. It’s so easy to use that everyone will want one the day it ships. Don’t you people ever learn? The only software you need is a Photoshop plug-in. It does come with a Photoshop plug-in, doesn’t it?”

“Well, no . . . .” Kathy confesses.
Image Makers

My fingers take on a life of their own and start tapping on my desk in six-eight time.

"We concentrated on making scanning easy..." she continues. "If we could show you true one-button scanning—software that would guarantee you an image that matches your original, on any printer, at any resolution, automatically—what would you think?"

"I'll try to keep an open mind," I reply, "so when do you want to show me the printers?"

"Two printers and a scanner," Kathy reminds me.

Since Apple launched the desktop-publishing era with its 1985 introduction of the LaserWriter, it has consistently pushed the high-end envelope for desktop printing even higher. Now it has done it again with the LaserWriter Ilg. There is also the LaserWriter III. The IINT and IINTX will be discontinued. Here are the results of MacUser Labs' first look at beta units of these two new printers... and a scanner.

Two Printers...

The LaserWriter III and the LaserWriter Ilg are Adobe PostScript Level 2 printers. Each is powered by a 68030 chip—the Ilg's 68030 runs at 25 megahertz, and the III's runs at 20 megahertz. The Ilg comes with 5 megabytes of RAM, which is upgradable to 32 megabytes (with 4-megabyte SIMMs); the III comes with 2 megabytes of RAM and is also upgradable to 32 megabytes. Each provides a SCSI port for attaching a font disk, and each incorporates two new Apple technologies—FinePrint and PhotoGrade—to improve print quality (see the “FinePrint and PhotoGrade” sidebar for details). (The III requires a 4-megabyte RAM upgrade to use PhotoGrade.)

The Ilg provides an Apple EtherTalk port, for connection to EtherTalk networks, as well as the standard LocalTalk port and serial port. With a feature Apple calls All Ports Active, the Ilg can be connected simultaneously to a LocalTalk and an EtherTalk network as well as to a PC via the serial port, and it can switch automatically among jobs arriving at any of the three ports. The III can switch automatically between its LocalTalk port and its serial port. Neither printer offers automatic emulation switching between PostScript and HP PCL jobs, although the LaserWriterFont Utility that ships with the printers does allow switching via software control—and there's always the button on the printer's front panel, which lets you do the same thing manually.

Each printer contains a built-in rasterizer for TrueType fonts, which means that your Mac doesn't have to download special software whenever you want to print TrueType fonts on Apple's PostScript printers. Both printers also come with TrueType versions of “the rest” of the 35 LaserWriter Plus fonts. System 7 includes TrueType equivalents for only the Times, Helvetica, Courier, and Symbol fonts. However, most PostScript printers also include Palatino, Bookman, New Century Schoolbook, Avant Garde, and the ever-exciting Helvetica Narrow—in TrueType
PhotoGrade is extremely impressive. Using the same Canon SX engine as in the IINT and the IINTX, Apple has doubled the LaserWriter II’s default screen frequency from 53 to 106 lines per inch, which is squarely within the frequency range used in much of commercial printing. It has also increased the achievable shades of gray from 33 to 67, which is twice the number of gray shades that a 600-dpi printer can image at the same 106-line-per-inch frequency. PhotoGrade’s magic is accomplished in 4 megabytes of RAM; a 600-dpi printer requires 8 megabytes to image the same page.

The results are stunning. One question that remained unanswered at press time was how well PhotoGrade images would reproduce on a commercial press. Take a look at Figure A for the answer.

FinePrint’s text-smoothing effect is subtle. Although FinePrint output looks better than IINTX output, FinePrint doesn’t improve text legibility at small point sizes. Xante’s 600-dpi Accel-a-Writer controller does a better job with tiny type than does FinePrint, and Hewlett-Packard’s RET (Resolution Enhancement Technology) on its IISi outdoes both.

**Surprising Speed**

In our tests, the II clocked in slightly behind the former top-of-the-line printer, the IINTX, when printing text-intensive documents and was 20 to 25 percent faster when imaging graphics-intensive pages (see Figure 1). Even though it delivers IINTX performance, it lists for $3,599, which is $400 less than the price of the IINT.

Apple’s new performance leader, the IIg, is also priced aggressively, at $4,599. This printer delivers a curiously mixed performance, though. When printing a 30-page Word document, it ran neck and neck with the IINTX—a disappointment. When printing a two-page Excel spreadsheet containing one chart on each page, it gained on the IINTX by roughly 15 percent. It shone most brightly on processor-intensive PostScript graphics (we used Illustrator for this test), beating the IINTX by 25 percent over a LocalTalk connection and by a whopping 35 percent over EtherTalk.

Yet in printing a page containing a large bit-mapped image and many different fonts, which required a lot of data to be shoveled across the network, the IIg on LocalTalk was 15 percent slower than the IINTX and slightly slower than even the II. This was as much a mystery to Apple as it was to us. We offered several plausible theories, yet although Apple rejected all of ours, it couldn’t come up with anything better. Because we used beta hardware and software, we can only attribute the problem to the prerelease nature of the equipment and assume that Apple will have addressed the issue by the time you read this.

Owners of previous LaserWriter printers (specifically, the IIISC, IINT, and IINTX) are in luck. The II and IIg controller boards fit in the same LaserWriter II shell as their predecessors do. No muss, no fuss. Unscrew two thumbscrews, pull out the old controller board, insert the new one, and tighten the new thumbscrews. Your printer’s upgraded. The upgrade prices are as aggressive as the printer prices: $1,399 for the II upgrade board and $2,399 for the IIg upgrade board.

And for those of you who’ve been waiting and waiting for PostScript Level 2 printers, the wait is over. The trouble is — for now, at least — their arrival won’t do much for you.
FinePrint and PhotoGrade are Apple's solution to a nagging problem: 300-dpi printers come up short in producing two types of images. One type is text and black-and-white line art (text, after all, is really nothing more than a specialized form of line art). The other is gray-scale images (see Figure A). These two broad categories comprise 100 percent of a monochrome printer's output. At 300 dpi, there aren't enough dots to form crisp, smooth outlines for detailed text or line art. This is particularly evident when you examine text at small point sizes (see Figure B). Nor does a 300-x-300-dpi grid provide enough dots for good gray-scale images.

Gray-scale images are output on a monochrome printer by a method known as halftoning. On a laser printer, halftoning involves grouping individual dots into "cells" and varying the number of dots printed in the cells, which produces the illusion of differing shades of gray. For halftone images to look good, a printer needs to have enough dots to produce a relatively high number of cells per inch and to have a relatively high number of dots in each cell. But 300-dpi printers offer neither. They produce gray-scale images with a 53-line screen (53 cells per inch), which looks grainy, and they provide only 33 levels of gray, which can cause banding — noticeable sudden jumps in gray shading — in some images.

High-resolution imagesetters (1,200 to 3,000 dpi) have enough
Figure B: Apple's FinePrint smooths the edges of black type (and line art) but doesn't make text more legible at small point sizes. Notice how the ampersand on both the IINTX (no FinePrint) and the Ilg (with FinePrint) output is plugged up on top. Xante's 600-dpi controller for the LaserWriter II yields more-legible type, and HP's IISi (with RET) does astonishingly well. The large ampersand in each case is 8-point type enlarged 400 percent.

Apple LaserWriter IINTX  
Apple LaserWriter Ilg  
Apple LaserWriter II with Xante Accel-a-Writer controller  
Hewlett-Packard IISi

dots to increase both the screen frequency and the number of gray levels, and users today are looking for imagesetter quality on the desktop — at desktop prices. Unfortunately, it's not likely to happen any time soon, because current laser and toner technologies simply aren’t capable of doing the job.

Some vendors, such as Xante, have developed print-engine controllers that squeeze higher resolution (600 dpi) out of the Canon SX laser engine, which typically outputs 300 dpi. Xante boards can be installed in the LaserWriter, the LaserWriter Plus, and the LaserWriter II. Other vendors, such as Varityper and NewGen, have built printers around high-resolution engines that are designed for 400- to 600-dpi output. And still others, such as Hewlett-Packard, with its RET (Resolution Enhancement Technology), stick to 300 dpi but alter the size of individual dots to achieve an effect that is similar to that of increased resolution. In addition, the HP IISi uses a Canon SX Model P170 engine and a finer toner than that commonly used in 300-dpi printers. Apple's solution also works by varying dot size, although in a different way from that of HP. PhotoGrade is a preprocessor that works with PostScript's halftoning technology. It operates on the gray-scale portions of the image, leaving the black-and-white areas alone and elongating or shortening certain dots to provide a significantly higher number of simulated gray shades.

FinePrint, a postprocessor that operates on a page's bit-mapped image after PostScript has rendered it, works on portions of the image in which black-and-white transitions occur, avoiding areas with intermediate gray shades. FinePrint also resizes selected dots to fill in and smooth out the edges of type and line art (see Figure C). Both FinePrint and PhotoGrade are implemented in custom coprocessor chips on the IIf and Ilg printer-controller boards, but PhotoGrade requires a 4-megabyte RAM upgrade to work on the IIf.

Figure C: In the sample on the left, which illustrates conventional laser-printing technology, some dots extend past the letter’s outline. Other dots don’t extend as far as the character’s outline, producing white gaps. By contracting dots that stick out and extending dots that fall near white gaps, FinePrint can match the character’s outline more closely. Because it can extend and contract dots in a horizontal direction only, however, FinePrint can’t solve all text-smoothing problems.
Image Makers

Apple hasn’t revved its LaserWriter printer driver to take advantage of any Level 2 features. Adobe’s driver won’t be available until close to the end of the year, and application developers aren’t yet taking advantage of the ability of Level 2 printers to do such things as rasterize compressed images.

... And a Scanner

It’s always difficult for a journalist to admit that a public-relations person is right. But when Kathy told me that Apple’s new scanner would ship with the most incredible scanning software ever, she wasn’t kidding. The scanner, known as the OneScanner ($1,299), is an 8-bit gray-scale scanner. Actually, it captures only 6 bits per pixel of usable data, but that’s still a significant step up from the less-than-spectacular $1,799 4-bit scanner Apple has been peddling until now. What makes this package so impressive, however, isn’t the scanner—it’s Ofoto, the software that comes bundled with it.

Ofoto is so impressive, I’ll even forgive nasty cracks about the name. Written by Robert Cook, of LightSource, whose previous accomplishments include Pixar’s RenderMan, Ofoto lets users create quality scans with minimal effort. With Ofoto, one-button scanning has truly arrived.

It’s important to make one thing clear about Ofoto: It is not an image-processing application. It doesn’t provide 57 filters, a gray-scale-transfer curve-editing dialog box, and the like. Its goal is to produce an image that, when output on a specific printer, looks as much like the original as possible and to make the process of capturing that image as simple as possible. You still need Photoshop, ColorStudio, or Digital Darkroom for any image manipulation, but whether you start with a signed Ansel Adams original or a faded page from an old Life magazine, Ofoto will reproduce it faithfully.

Printer Calibration

The first step in this process is to calibrate the OneScanner to your printer or imagesetter. Ofoto comes with configurations for all of Apple’s printers, a couple of HP’s, the Linotronic 300, and a few others. These configurations contain information about what resolution and bit depth to scan at and so on. You can create custom calibrations, but Ofoto is designed to figure out all that nasty stuff for you and to keep it hidden unless you want to roll up your sleeves and get into it.

To calibrate the OneScanner for a specific printer, you have to print a gray-scale calibration page from Ofoto or from another application, such as PageMaker or QuarkXPress—whatever you will be using for your final output. You then scan the calibration page with the OneScanner and give the calibration setup a name, such as Gandalf’s Ilg. Note that this process does not include calibrating your monitor. You can, of course, use other software to do that. But Ofoto’s emphasis is on original-to-printer fidelity. What you see is what you get, but what you see on-screen may not accurately reflect your final printed output.

After you’ve calibrated the scanner, there’s really not much more you need to do than slap an image down on the scanner bed—don’t worry about getting it exactly straight—and click on the Autoscan button. Ofoto does the rest (see Figure 2). It may sound as though I’m quoting Kathy’s marketing hype, but believe me, it’s true.

From Mouse Click to Halftone

The first thing Ofoto does is a quick prescan of your image. It looks for several things when it does this. First, it determines where the image is on the scanner bed (it even alerts you if you’ve forgotten to put an image there!). It decides whether the image is line art or gray scale. And if it’s a gray-scale image, it figures out whether it’s a continuous-tone image (an original photograph) or a halftone (an image that has been printed in a book or magazine) that requires rescreening.

Ofoto then does a high-resolution scan of only that portion of the scanner bed where it’s ascertained that there is something worth scanning. You don’t have to worry about whether to scan at 75, 150, or 300 dpi. Ofoto figures it out for you, based on the characteristics of the printer you’ve selected as the output device.

If your image is an already screened halftone, Ofoto will automatically scan at a high-enough resolution to descreen the image. This process gets rid of the dots in the halftone and eliminates the moiré patterns that often appear in halftone scanning. Descreening is a very difficult task, and most scanner software doesn’t even attempt it. We tried

RIP TrueType?

Apple may be putting the TrueType rasterizer into the LaserWriter Ill and Ilg printers, but it will be putting Adobe’s ATM technology into the Mac OS. A "future feature-enhanced release" of System 7 will incorporate Adobe’s Type 1 font rasterizing technology. Users will be able to use either TrueType or PostScript Type 1 outline fonts for Mac screen displays, without having to purchase ATM. The ATM technology will be available as an upgrade package before it shows up later as an integral part of the Mac’s system software. Too bad Adobe and Apple didn’t do this in the first place and save us all a lot of headaches.

The upgrade and the future system software will include some Type 1 fonts, but no one’s yet saying which fonts. Some other unanswered questions: What will the upgrade cost? How will it be distributed? Will users be able to drag Type 1 fonts into their System file the way they do bit-mapped and TrueType fonts now? Will Type 1 fonts still need bit maps? Will there be a new Type 1 font-file format (will users have to completely upgrade their Type 1 libraries)? Will the new software support Adobe’s Multiple Master font technology? Will the new system software also include Adobe’s printer driver for PostScript printers?

And, of course: Is this the end of TrueType? Apple says no. Adobe says no. We say we’re not so sure.
scanning an 85-line and a 110-line halftone image, and Ofoto did an excellent job of descreening both, with only minimal moiré on the 85-liner.

Then — this is my favorite part — Ofoto automatically rotates the image to get it straight. How does it know what straight is? It looks for a straight, nearly horizontal edge, either on the page in the scanner or within the image itself. As with all the other tasks Ofoto automates, if you don’t like the way it does something — let’s say it picks the wrong edge and rotates your image incorrectly — you can tweak it manually. But rather than making you guess whether you need to rotate it 12.3 degrees or 12.4 degrees and then making you enter your guess in a dialog box, Ofoto gives you a grid on-screen that you drag until it lines up with what you want to become a horizontal line in the image (see Figure 3). When you release the mouse button, the image rotates — fast.

Finally, Ofoto reexamines the image to see if there’s a bunch of white space around the edge that it can crop off to save precious hard-disk space. Again, if you want to take matters into your own hands, there’s a simple-to-use manual cropping tool. When Ofoto finally saves the image, it saves a calibrated halftone that is correctly oriented. This saved image has precisely the amount of pixel data needed to produce the desired image on the printer you selected before you started scanning. All this happens in a couple of minutes, Oh, and in case you’re wondering, it can save TIFF and EPS images. Apple is learning. Of course, the default format is PICT.

There’s one more feature of Ofoto worth mentioning. Suppose, after making your original scan, you decide to use only a portion of your image. Let’s say you’re running System 7 and you’ve saved a scanned file, moused over to QuarkXPress, placed your image in a document, and determined that you wanted to fit the graphic into a 4 x 6-inch space. If your original is still in the scanner (and you have enough RAM to keep both Ofoto and QuarkXPress active), you can use Ofoto’s Selection Controls to lock the image’s height, width, and/or scale. When you go to select the portion of the image you want to rescanning, Ofoto ensures that it will fit within the desired space in your QuarkXPRESS document. It automatically rescales at the proper resolution for the enlarged or reduced image size you selected, and it remembers the proper rotation from the previous scan. All you have to do is click on the Scan button.

So maybe now you’re worrying about how much you’re going to have to shell out for RAM to take advantage of all this cool stuff. Don’t panic. Ofoto runs and performs quite admirably with 2 megabytes.

Here and Hereafter

You say you’ve just bought another vendor’s scanner, but Ofoto sounds like the software for you? Sorry, Charlie. It’s available only with Apple’s OneScanner. If you have one of the original Apple Scanners, however, Ofoto will work with it. The software upgrade is available from LightSource (800) 231-7226 for $195. Will Ofoto eventually hit the market as a stand-alone product? Apple and LightSource answer with a resounding “No comment.” But it would be a really good idea, wouldn’t it?

So Apple has three new imaging products: the LaserWriter III and Ilg PostScript printers and the OneScanner 8-bit gray-scale scanner with Ofoto software. The LaserWriter III ($3,599) is a solid substitute for the IINTX, with significantly improved performance when printing graphics and at a more competitive price (the IINTX list price was $4,999). The LaserWriter Ilg ($4,599) has two claims to fame. The PhotoGrade technology that comes standard provides a leap forward in gray-scale-imaging quality on the desktop. If a PostScript printer is your final output device for halftoned images, you should take a serious look at the Ilg. It is also the first Apple printer with an EtherTalk port and by far the lowest-priced printer on the market to provide EtherTalk connectivity. Hopefully, Apple will be able to achieve both high-quality gray-scale images and increased speed in generating them when the unit ships in October. Upgrades from the LaserWriter IIIC, IINT, and IINTX to the III or Ilg are available.

The real winner in the new lineup is the Ofoto scanning software that ships with the OneScanner. Ofoto is unquestionably the easiest-to-use and most powerful scanning software on the market. Other applications offer more-extensive image-editing capabilities, but for obtaining a high-quality scan with an extremely low user-headache factor, Ofoto is unsurpassed. If you are in the market for a gray-scale scanner, check out the OneScanner/Ofoto bundle ($1,299) before making a decision. If you already own a scanner, pray that LightSource will release Ofoto as a stand-alone application.

Henry Bertman is MacUser’s technical director. His idea of a good time is drawing pictures of PostScript halftone cells round about midnight.
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Just look at the difference in the color scans. The single-pass Silverscanner has three separate noble gas-filled lamps for red, blue and green that are balanced so you get great scans the first time. With Silverscanner's built-in gamma correction, you get clean, bright scans with excellent detail in those hard-to-get areas that don't require difficult adjustment like other scanners. This can mean substantial time savings when every second counts.

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When it comes to scanning line art, the Silverscanner really shines! At 1200 dpi you get what amounts to an electronic stat. Compare the scans of line art shown here. The comparison is incomplete, however, because some scanners don't have hi-res capability (too bad). But even if you compare at 400 or 600 dpi, it's clear how much better the Silverscanner is, especially if you look at the price!

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Macworld, June 1991

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Storage Media

DOUBLE-DUTY DRIVES:
Multifunction Optical Storage

Need unlimited storage capacity? Absolute data security?
MacUser Labs previews three new technologies that offer both.

Storage strategy used to be simple: Buy the biggest hard drive you could afford. But even the most mammoth disk fills up fast when stuffed with enormous TIFF images, gargantuan CAD files, jumbo animations, and colossal collections of data. When your overloaded drive begins to shout, “There is not enough room on the disk . . . ” you can buy a bigger one — but what happens when that one fills up?

Absolute data security has traditionally also been a simple concept: It’s impossible. Even a rugged hard drive can fail, and the most carefully coddled backup tape can mysteriously mangle precious data. Although good data-recovery software can recover 90 percent of fractured files, Murphy’s Law decrees that your most crucial data will reside somewhere in that missing 10 percent.

BY JOHN RIZZO
AND THE MACUSER LABS STAFF
Multifunction Optical Storage

Now there’s an entirely new type of drive, one that combines the unlimited capacity of a removable-cartridge system with the ability to write data in permanent, unalterable, unerasable form. What’s more, both operations use rugged, reliable optical technology and both use cartridges that can contain as much as 1,000 megabytes of data. These multifunction drives use both erasable optical and WORM (write once, read many) cartridges — and some are selling for about the price of drives that can accept only one type of cartridge.

This month MacUser Labs looks at three mechanisms that combine WORM and erasable optical technologies. When we began our testing, only one manufacturer — Pioneer — was shipping a Mac-capable mechanism, the DE-S7001. The Panasonic LF-7010 and the Hewlett-Packard Model 650/A (based on a Sony mechanism and modified by Hewlett-Packard) quickly followed. As we went to press, more than a dozen vendors had packaged one or more of these mechanisms into drives that connect to your Mac (see Table 2) and Sony released its version of the Hewlett-Packard drive mechanism.

Erasable optical drives offer the same read/write capabilities as hard drives do (see “Erasable Optical Drives,” November ’90, page 102). They’re faster than WORM drives, four to five times faster than CD-ROM drives, and getting faster every year. Today’s models are even fast enough to be used as startup drives — although the most efficient configuration is to keep your System Folder and applications on a small, fast hard-disk drive and your data files on optical discs. Although this approach is somewhat slower than using a hard drive for everything, it enables you to take advantage of the erasable optical drive’s unlimited storage capacity.

Erasable optical drives also offer advantages over tape drives for backup. Because erasable discs are mountable volumes that look and act like hard disks on the desktop, you can access your data on an optical disc if your hard disk fails — without having to restore your data to a hard disk. Data from an optical drive can also be retrieved more quickly than can data on a tape, because optical mechanisms (like hard drives) can randomly access data instead of having to search sequentially, as do tape drives. And if you need immediate access to data that’s backed up on a tape but don’t have a healthy hard disk onto which you can restore it, you’re probably out of luck — most tape drives cannot be mounted on the desktop. Erasable optical discs are also more durable, having a shelf life of around 15 years compared with about 5 for tape.

WORM discs are optimum for permanent archiving, because data written to them cannot be altered or overwritten. With an estimated media shelf life of up to 100 years, WORM is the ideal electronic archival technology. Unlike tape or microfiche, WORM technology offers quick on-line access in a rugged and compact format.

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Multifunction Mechanisms

Each of the three multifunction mechanisms we looked at uses 5.25-inch optical cartridges — but each uses a radically different method of storing data. The Pioneer DE-S7001 mechanism uses MO (magneto-optical) erasable and ablative WORM technologies, the Hewlett-Packard Model 650/A uses MO erasable technology and a new type of MO WORM technology, and the Panasonic LF-7010 uses a nonstandard technology for both its WORM and erasable modes.

The Pioneer mechanism, like that of most erasable optical drives, writes to an erasable disc. A laser heats a spot on the disc to about 150 degrees centigrade, at which point the spot takes on the polarity of an electromagnet on the other side of the disc (see the “How It Works: Multifunction Optical Storage” sidebar). This combination of heat, electromagnetism, and light gives MO its other name, TMO, for thermal magneto-optical technology.

One benefit of MO technology is that the temperature at which the MO media can have its polarity changed (150 degrees centigrade) is high enough to prevent media alteration at room temperature. It’s also relatively harmless to the media, which can withstand up to 10,000,000 erase/write cycles. An erase pass must be performed, however, to make the polarity of a sector uniform before the write pass can be made. The erase pass effectively doubles the write time. The Pioneer
DE-S7001, which is compatible with Pioneer’s other erasable optical drives, fits more data on a disc than does the Hewlett-Packard Model 650/A. But the formatting method used by Pioneer for the DE-S7001, unlike that used by either the Panasonic LF-7010 or the Hewlett-Packard Model 650/A, resembles that of a hard disk, making it vulnerable to performance reduction due to data fragmentation, just like a hard disk.

The Pioneer DE-S7001’s WORM mode uses the time-tested ablative technique, in which the laser cuts into the media, creating a permanent pit. WORM cartridges used in the DE-S7001 mechanism are also compatible with Pioneer’s popular DD-5001 WORM drives. A particularly handy feature of the DE-S7001 is its front-panel lights, which tell you whether an erasable or a WORM cartridge is in the drive.

The Hewlett-Packard Model 650/A mechanism uses MO-technology methods for its erasable as well as its WORM modes. The Model 650/A uses a write-protected MO cartridge when in WORM mode. Custom tracks on the MO disc tell the drive’s firmware to switch to WORM mode and to implement three levels of write protection so that only empty blocks on the disc can be written to. The Hewlett-Packard WORM medium has the same 10-year archival life as an erasable optical disc instead of the century life span boasted by some ablative-WORM discs, meaning that it’s a much less durable archiving medium. The erasable format is compatible with drives based on MaxOptix, Ricoh, Sharp, and Sony mechanisms.

A major advantage of the Panasonic LF-7010 is that its phase-change mechanism can directly overwrite data. This capability makes the LF-7010 write about twice as fast as MO mechanisms, which require a separate erase pass before writing. A laser changes the structure of the 1,000-megabyte erasable disc’s metal alloy between an amorphous, or random, state and a crystalline, or highly ordered, state. This is a more drastic change to the media than that caused by MO technology, and it lowers the number of overwrite cycles to 100,000 — 1 percent of that of MO.

The LF-7010 keeps track of which sectors are approaching the 100,000-cycle threshold and prevents writing to these sectors (the drive does continue to allow reading from these sectors, however), which reduces the writable space on discs as they age. This threshold might be a concern on a heavily used file server but shouldn’t pose a problem for most desktop uses. And of course, you can always change discs.

The Panasonic LF-7010 also uses phase-change technology in WORM mode. Like the write-protected MO WORM media used by the Hewlett-Packard Model 650/A, the LF-7010’s WORM media contain code that tells the drive to switch to WORM mode and to implement write-protection methods to ensure that data is not overwritten.

The chemical composition of the WORM media is different, making it impossible to alter a sector once data has been written to it. The LF-7010 can write to and read 940-megabyte double-sided and 470-megabyte single-sided WORM cartridges used in Panasonic’s other WORM drives.

One significant weakness of the LF-7010 is that its WORM media are guaranteed for only 10 years — nowhere near the 100-year expected life span of some ablative-WORM discs. Also noteworthy is that the Panasonic LF-7010’s erasable discs contain tellurium — a toxic heavy metal. Users are protected, in that the metal is sealed within the disc, but check with a local environmental-protection agency for guidelines on how to dispose of old discs properly.

Another unfriendly aspect of the LF-7010 is that ejecting a cartridge requires two operations — pushing a button on the drive and then dragging the icon to the Trash. The other two mechanisms obey the Mac convention of spitting out the cartridge when you drag its icon into the Trash. But for most users, this slight inconvenience will be more than outweighed by the LF-7010’s price — at $3,995 it’s the least expensive multifunction mechanism we’ve seen.

**Speed, Spin, and Software**

As with hard drives, driver software plays an important part in multifunction-drive performance. Although the three mechanisms we tested came directly from the manufacturers, competing products using the same mechanisms and different driver software may have significantly different performance. For our tests, we used drivers written by Optical Access International on the Pioneer and Panasonic mechanisms. We also used a driver from Corel on the Panasonic unit. Software Architect’s Formatter One, a generic driver, was used on the Hewlett-Packard mechanism, because no drivers specific to this mechanism were available.

Of the three mechanisms, only the Pioneer DE-S7001 had Mac software shipping at press time — we used beta copies of drivers for the Panasonic and Hewlett-Packard mechanisms. Even though it was a shipping version, the Pioneer mechanism was the slowest in all our tests — in erasable as well as in
How It Works: Multifunction Optical Storage

A multifunction drive offers more flexibility than does any other optical storage device. In erasable mode, a multifunction drive is slower than a hard-disk drive but offers unlimited capacity and greater data security. In WORM (write once, read many) mode, the drive can create permanent archives with the convenience of random access. To provide this flexibility, multifunction drives must accomplish four distinct operations — writing to and reading from erasable media and writing to and reading from WORM media (without allowing the

Writing to an erasable disc: A laser heats a spot on the disc to about 150 degrees centigrade, at which point the spot takes on the polarity of an electromagnet on the opposite side of the disc. An erase pass must be made first to make the polarity of a sector uniform before the write pass can occur.

Reading an erasable disc: The laser beam reflects differently, depending on the polarity of the point on which it's focused. These differences are read as data values.

Writing to an erasable disc: The Model 650/A uses magneto-optical methods to write data. A laser heats a spot on the disc to about 150 degrees centigrade, at which point the spot takes on the polarity of an electromagnet on the opposite side of the disc. An erase pass must be made first to make the polarity of a sector uniform before the write pass can be performed.

Reading an erasable disc: The laser beam is reflected differently, depending on the polarity of the point on which it's focused. These differences are read as data values.

Writing to an erasable disc: A laser changes a spot on the disc's tellurium-metal alloy from its usual amorphous, or random, state into a crystalline, or highly ordered, state. To overwrite this spot on the disc, a more powerful burst of the laser melts the alloy, returning it to an amorphous state. This method allows the direct overwrite of data, reducing write times.

Reading an erasable disc: A laser beam reflects off the disc; amorphous areas are dull, and the crystalline areas are shiny. The differences in reflectivity are read as data.
overwriting of existing data). The three mechanisms we examined use different methods to do these tasks. The Pioneer mechanism uses magneto-optical technology in its erasable mode and ablative technology in WORM mode. The Hewlett-Packard mechanism also uses magneto-optical technology in erasable mode and a write-protected form of magneto-optical technology in WORM mode. The Panasonic mechanism uses phase-change technology in its erasable mode and a write-protected form of phase-change technology in WORM mode.

**Writing to a WORM disc:** The laser cuts a permanent pit into the disc's medium. This technique is called ablative writing. Because the pits are permanent, the data can never be altered. This medium can last up to 100 years.

**Reading a WORM disc:** Each pit causes the laser beam's reflection to be more diffuse than when it reflects from the smooth, unpitted disc surface. These differences are read as data.

**Writing to a WORM disc:** The WORM disc, like the erasable medium, is magneto-optical, but it contains code on its outer track that tells the drive to switch to WORM mode. In WORM mode, the drive's firmware allows writing only to empty blocks.

**Reading an erasable disc:** WORM media are read in the same manner as erasable media — both use magneto-optical technology.

**Writing to a WORM disc:** The WORM disc contains code on its outer track that tells the drive to switch to WORM mode. In WORM mode, the drive's firmware allows writing only to empty blocks. The chemical composition of the WORM media is different from that of the erasable media, so that once it has been altered by the laser, it cannot be changed.

**Reading a WORM disc:** WORM discs are read in the same manner as erasable discs — they both use phase-change technology.
Multifunction Optical Storage

The Bottom Line

A multifunction optical drive offers unlimited storage as well as the ultimate in data security, because it can accept both erasable and WORM (write once, read many) cartridges. Three multifunction technologies are currently available: magnetic/optical technology and ablative technology, and phase-change technology. Of the three technologies, we recommend the Panasonic LF-7010 phase-change mechanism ($3,995) — it has the fastest speed and the highest capacity. Of the WORM techniques, the ablative technology of the Pioneer DE-S7001 ($5,090) ensures the longest life for your data. However, the speed and larger capacity of Panasonic’s media, as well as the promise of increased durability in the future, make its phase-change WORM a solid alternative to the Pioneer DE-S7001’s ablative WORM.

Our overall choice for a multifunction-drive mechanism is the Panasonic LF-7010. In addition to having faster speed and higher capacity, it’s also the least expensive of the three mechanisms. However, because of the limited number of read/write cycles that phase-change discs can handle, you may want to consider our second choice, the Hewlett-Packard Model 650/A ($6,435). It’s slower than the Pioneer mechanism and more expensive; it’s big too—a drive containing it takes up almost as much desk space as a Mac IIci. However, it can read and write erasable optical discs from drives based on MaxOptix, Ricoh, Sharp, or Sony mechanisms.

A multifunction drive based on the Pioneer DE-S7001 mechanism is recommended if you need to share WORM and erasable cartridges with other Pioneer-based drives and if you need absolute maximum data security. It’s slower than the other two mechanisms, but it’s well built, takes up the least amount of desk space, and is less expensive than the Hewlett-Packard unit. It also uses an ablative-WORM mechanism—a real benefit if you need to archive something for decades.

WORM mode. (The Hewlett-Packard mechanism’s Macintosh-compatible WORM mode was not yet ready for testing at press time, because of its lack of driver software.)

We were impressed by the easy-to-use formatter software and useful diagnostics that came with the drivers from Optical Access. The Access History’s DA, which works in WORM mode, is particularly useful. Although you can’t erase files from a WORM disc, you can write a new directory that ignores previously written files so they appear to have been erased. The Access History DA lets you “reset” your WORM drive to any previous directory, giving you access to files on the disc as well as creating a sequential history of the disc itself.

As expected, the Panasonic LF-7010’s write time in erasable mode proved to be twice as fast as the Pioneer DE-S7001’s, because of the former’s combined erase/write pass. The Hewlett-Packard mechanism performed nearly as well as the Panasonic unit, because it spins the disc at 2,400 rpm—one-third faster than the others—increasing throughput by moving more data past the head in the same amount of time.

A Standard Future

If your hard drive has filled up and it appears you may have to resort to using compression software to cram more data into it or if you’re worried about data security but can’t justify the price of a WORM-only drive, a multifunction optical drive and a few cartridges might be your ideal solution. Which mechanism you should choose, however, is a more difficult decision.

It’s likely that one of the three multifunction mechanisms we previewed will dominate the field in the next two years, but it’s difficult to say which one it will be. The Panasonic LF-7010 has the edge in speed, and the Pioneer DE-S7001 uses current standards for both erasable and WORM. Sony, which recently announced its own multifunction mechanism — upon which the Hewlett-Packard Model 650/A mechanism is based — is perhaps the biggest force in the optical market, however.

The promise of further development in phase-change technologies and optical storage in general (see the Optical Lite” sidebar) makes us hope that the speedy Panasonic mechanism will hold its own against Sony’s influence when future standards are established.

John Rizzo, MacUser’s technical editor, has been a user and advocate of optical storage since he began covering the subject in 1987.

Table 1 Criteria

| List price | Suggested retail price of the drive, including the Mac interface. |
| Capacity | Unformatted capacity of both sides of a disc. |
| Recording technology | Method used to write data onto a disc. |
| Read transfer rate | Speed of reading data from the disc. |
| Write transfer rate | Speed of writing data to the disc. |
| Media price | Suggested retail price of disc cartridge. |
| Media life span | How long the media are expected to last. |
| Compatibility | Other drives with which discs can be shared. |
| Seek time | Time needed to find a specific block of data. |
| SCSI-ID selector | What you use to select the SCSI-ID number on the drive. |
| SCSI termination | The location of the terminator. |
| SCSI connectors (number, type) | The number and type of connectors. |
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# Table 1: Features of Multifunction Optical Storage Mechanisms

<table>
<thead>
<tr>
<th></th>
<th>Hewlett-Packard</th>
<th>Panasonic LF-701B</th>
<th>Pioneer DE-S7001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>List price</strong></td>
<td>$6,435</td>
<td>$3,995</td>
<td>$5,090</td>
</tr>
<tr>
<td><strong>Pros</strong></td>
<td>Compatibility of erasable media across drives from several manufacturers.</td>
<td>Direct overwrite permits fast write times. High capacity. Includes head-cleaning cartridge.</td>
<td>High track density provides great future storage capacity. Drive operates in horizontal or vertical position.</td>
</tr>
<tr>
<td><strong>Cons</strong></td>
<td>WORM media are expensive to produce and have a short life span. Expensive.</td>
<td>Compatible with Panasonic mechanisms only. Operates in horizontal position only.</td>
<td>Compatible with Pioneer mechanisms only. Slow.</td>
</tr>
<tr>
<td><strong>Erasable mode</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity</td>
<td>650 MB</td>
<td>1,000 MB</td>
<td>654 MB</td>
</tr>
<tr>
<td>Recording technology</td>
<td>magneto-optical</td>
<td>phase-change</td>
<td>magneto-optical</td>
</tr>
<tr>
<td>Read transfer rate</td>
<td>689 Kbps</td>
<td>983 Kbps</td>
<td>491 Kbps</td>
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<td>Write transfer rate</td>
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<td>552 Kbps</td>
<td>163 Kbps</td>
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<td>Media price</td>
<td>$199</td>
<td>$245</td>
<td>$250</td>
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<td>Media life span</td>
<td>10 years or more</td>
<td>10 years</td>
<td>15 years</td>
</tr>
<tr>
<td><strong>WORM mode</strong></td>
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<tr>
<td>Capacity</td>
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<td>Recording technology</td>
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<td>Read transfer rate</td>
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<td>983 Kbps</td>
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<tr>
<td>Write transfer rate</td>
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<td>552 Kbps</td>
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</tr>
<tr>
<td>Media price</td>
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<td>$149</td>
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<td>Media life span</td>
<td>10 years or more</td>
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<td><strong>Hardware</strong></td>
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<td></td>
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<tr>
<td>Compatibility</td>
<td>drives based on MaxOptix, Ricoh, Sharp, and Sony mechanisms</td>
<td>other Panasonic WORM drives and other Pioneer erasable and WORM drives</td>
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<tr>
<td>Seek time</td>
<td>95 ms</td>
<td>90 ms</td>
<td>53 ms</td>
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<td>SCSI-ID selector</td>
<td>DIP switches</td>
<td>rotary switch</td>
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<td>SCSI termination</td>
<td>external</td>
<td>internal</td>
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<td>SCSI connectors (number, type)</td>
<td>2, 50-pin</td>
<td>2, 50-pin</td>
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<td>Dimensions (L x W x H, in.)</td>
<td>11.2 x 12.8 x 4.25</td>
<td>15.24 x 8.11 x 4.92</td>
<td>13 x 8.69 x 4.94</td>
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<td><strong>Company</strong></td>
<td>Hewlett-Packard</td>
<td>Panasonic Communications and Systems Co.</td>
<td>Pioneer Communications of America, Inc.</td>
</tr>
<tr>
<td></td>
<td>Greeley Storage Division</td>
<td>Office Automation Group</td>
<td>Optical Memory Systems Division</td>
</tr>
<tr>
<td></td>
<td>700 71st Ave.</td>
<td>Two Panasonic Way</td>
<td>600 E. Crescent Ave.</td>
</tr>
<tr>
<td></td>
<td>Greeley, CO 80634</td>
<td>Secaucus, NJ 07094</td>
<td>Upper Saddle River, NJ 07458</td>
</tr>
<tr>
<td></td>
<td>(800) 772-0900</td>
<td>(301) 742-8086</td>
<td>(800) 627-3766</td>
</tr>
<tr>
<td></td>
<td>(301) 670-4300</td>
<td></td>
<td>(201) 627-6400</td>
</tr>
</tbody>
</table>
No Optical Illusion

REO-650 with Opticase Disk Holder

There is no optical illusion when choosing the best rewritable optical storage system. Pinnacle's REO-650 is the #1 selling 5.25" optical drive. By offering fast speed, superior support and service, and an unbeatable price - the optical choice is clear.

Optical drives are now 100% faster than in previous tests performed by MacWorld in 1990, making optical technology a viable replacement for hard disk drives. Since optical drives are more reliable and support removable media, the applications and capacities are virtually endless.

© (800) 553-7070

OPTICAL DRIVES
LIST PRICE
MACWORLD 1991

<table>
<thead>
<tr>
<th>Drive</th>
<th>List Price</th>
<th>Front</th>
<th>Rear</th>
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<tbody>
<tr>
<td>Pinnacle Micro REO650</td>
<td>547.94</td>
<td>$499</td>
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<tr>
<td>SuperMac Luminar</td>
<td>449.95</td>
<td>499</td>
<td>405</td>
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<tr>
<td>Brother RMB 605</td>
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<td>499</td>
<td>405</td>
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<tr>
<td>Brother Luminar</td>
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<td>405</td>
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<td>Storage Dimensions 10/1000</td>
<td>649.95</td>
<td>700</td>
<td>1201</td>
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<tr>
<td>Storage Dimensions 10/1000</td>
<td>649.95</td>
<td>700</td>
<td>1201</td>
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<tr>
<td>Pinnacle Micro 9191 Optical</td>
<td>649.95</td>
<td>700</td>
<td>1201</td>
</tr>
</tbody>
</table>

Ask about Pinnacle Micro's UP (Uniform Price Guarantee) Program.

Pinnacle Micro is 100% dedicated to leading the optical storage revolution. Pinnacle offers the largest selection of optical storage solutions, from the world's first 3.5" optical drive, to the most popular 5.25" optical drives and disk changers. Interface kits are available for MAC, SUN, DEC and IBM systems. Invest in your data's future with the optical storage leader. Call today to receive your Pinnacle Micro 1991 Optical Catalog.
## Table 2: The Multifunction Marketplace

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Bytewide DE-S7001</th>
<th>Computer Upgrade OMNISTOR</th>
<th>Computer Upgrade LF-7010</th>
<th>Corel Systems Qurata</th>
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<td>$313</td>
<td>$185</td>
<td>$185</td>
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<td>Driver</td>
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<td>Deltaic</td>
<td>Omnicache</td>
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<tr>
<td>Options</td>
<td>Mac device driver, $350</td>
<td>formatting utility included</td>
<td>formatting utility included</td>
<td>one erasable cartridge included; Mac device driver, $395</td>
</tr>
<tr>
<td>Company</td>
<td>Bytewide 522 Fairway Ave., La Chine, Quebec H3T 1C1 Canada (800) 465-5241 (514) 636-5938</td>
<td>Computer Upgrade Corp. 2910 E. La Palma Ave., Ste. A Anaheim, CA 92806 (714) 630-3457</td>
<td>Computer Upgrade Corp. 2910 E. La Palma Ave., Ste. A Anaheim, CA 92806 (714) 630-3457</td>
<td>Corel Systems Corp. 1600 Carling Ave. Ottawa, Ontario K1Z 8R7 Canada (613) 728-8200</td>
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</table>

**Corel Systems**

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>MF650</th>
<th>FWB hammerDisk 600F</th>
<th>Graphic Technology DE-S7001</th>
<th>Kintronics DE-S7001</th>
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<td>Corel</td>
<td>HD ToolKit</td>
<td>Corel</td>
<td>Optical Access</td>
</tr>
<tr>
<td>Options</td>
<td>one erasable cartridge included; Mac device driver, $395</td>
<td>Mac device driver and one erasable cartridge included</td>
<td>Mac device driver, $400</td>
<td>Mac device driver included</td>
</tr>
<tr>
<td>Company</td>
<td>Corel Systems Corp. 1600 Carling Ave. Ottawa, Ontario K1Z 8R7 Canada (613) 728-8200</td>
<td>FWB, Inc. 2040 Polk St., Ste. 215 San Francisco, CA 94109 (415) 474-8055</td>
<td>Graphic Technology, Inc. 5555 W. 78th St., Ste. D Edina, MN 55439 (800) 999-9382 (612) 944-1121</td>
<td>Kintronics, Inc. Three Westchester Plaza Elmsford, NY 10523 (800) 431-1658 (914) 347-2530</td>
</tr>
</tbody>
</table>

*The Sony E511 mechanism has the same specifications as the Hewlett-Packard Model 650/A.

118 November 1991 MacUser

Table 2: As we went to press, more than a dozen vendors were preparing to release drives based on the Hewlett-Packard, Panasonic, and Pioneer mechanisms. Different driver software and mechanism combinations will affect performance, so check with your dealer for the specifications of these drives. Please note that some of these drives use the Sony E511 mechanism. The Hewlett-Packard Model 650/A is an adaptation of the Sony E511 mechanism, so their specifications are almost identical.
The Brand New NEC CDR-36 With FREE Adobe Font Disc! $399

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CIRCLE 85 ON READER SERVICE CARD.
### Table 2: The Multifunction Marketplace, continued

<table>
<thead>
<tr>
<th>Kintronics</th>
<th>Laser Magnetic Storage</th>
<th>Optical Access</th>
<th>Optical Access</th>
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<td>LF-7010</td>
<td>LD S20-601</td>
<td>Access MF Gigabyte</td>
<td>Access MF/7001</td>
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<td>Mechanism</td>
<td>Panasonic LF-7010</td>
<td>Pioneer DE-S7001</td>
<td>Pioneer DE-S7001</td>
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<td>Options</td>
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<td>Mac device driver included</td>
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<td>Company</td>
<td>Kintronics, Inc.</td>
<td>Laser Magnetic Storage</td>
<td>Optical Access International</td>
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<tr>
<td></td>
<td>Three Westchester Plaza</td>
<td>4425 Arrowswest Dr.</td>
<td>800 W. Cummings Park</td>
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<td></td>
<td>Elmsford, NY 10523</td>
<td>Colorado Springs, CO 80907</td>
<td>Ste. 2050</td>
</tr>
<tr>
<td></td>
<td>(914) 347-2530</td>
<td>(800) 777-5674</td>
<td>(800) 433-5133</td>
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<td></td>
<td>(719) 593-7900</td>
<td>(617) 937-3910</td>
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### Table 2: The Multifunction Marketplace, continued

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<thead>
<tr>
<th>Optima Technology</th>
<th>Pinnacle Micro</th>
<th>Relax Technology</th>
<th>RexSys Corp.</th>
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<td>Concord 600MMO</td>
<td>MFO 650</td>
<td>Vista Multifunction</td>
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<td>Corel</td>
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<td>Mac device driver, $395</td>
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<td>Company</td>
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<td>Pinnacle Micro</td>
<td>Relax Technology</td>
</tr>
<tr>
<td></td>
<td>17526 Von Karman</td>
<td>15265 Alton Pwvw.</td>
<td>3101 Whipple Rd.</td>
</tr>
<tr>
<td></td>
<td>Irvine, CA 92714</td>
<td>Irvine, CA 92718</td>
<td>Union City, CA 94587</td>
</tr>
<tr>
<td></td>
<td>(714) 476-0515</td>
<td>(800) 553-7070</td>
<td>(415) 471-6112</td>
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<td>(714) 727-3300</td>
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<td></td>
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<td>(508) 465-6060</td>
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### Table 2: The Multifunction Marketplace, continued

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<td>MF9650</td>
<td>OptiXchange 650</td>
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<td>Mac device driver and one erasable cartridge included</td>
<td>SCSI hardware interface</td>
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<td></td>
<td>San Diego, CA 92121</td>
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<td>Austin, TX 78759</td>
</tr>
<tr>
<td></td>
<td>(619) 558-8882</td>
<td>(619) 558-8882</td>
<td>(800) 922-9050</td>
</tr>
</tbody>
</table>

*The Sony E511 mechanism has the same specifications as the Hewlett-Packard Model 650/A.*

120 November 1991 MacUser
All things being equal, they’re not.

They’re just about the same price. They’re made by two very good companies. Yet, there’s one thing that makes NEC’s Silentwriter® 2 Model 90 look much better on paper than the Apple Personal LaserWriter® NT. It prints your work up to 50% faster. Pretty amazing, considering all the other great things NEC’s Silentwriter2 Model 90 can do. Of course, it’s completely Mac and MS/DOS compatible. It also has screen fonts, a standard 2MB of memory, the ability to do envelopes and it prints the richest blacks you’ve ever seen.

But, most importantly, the Silentwriter2 Model 90 comes with Adobe® PostScript®. So whether you’re printing newsletters or flyers, sales sheets, stationery or shareholders’ reports, you’ll have thirty-five different typefaces to help you create the most dazzling documents possible. For product literature, call 1-800-NEC-INFO. NEC’s Silentwriter2 Model 90.

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SEARCHING FOR STORAGE PERFECTION:

100-Megabyte Hard Drives

MacUser Labs goes inside thirty-two 100-megabyte drives to discover their hidden differences.

You know what you want when you’re searching for 100 megabytes of storage: a hard drive that’s fast and built to last. The price should be fair, the manufacturer dependable, and the warranty generous, and you wouldn’t mind some free software in the bargain. But with more choices than Baskin-Robbins has flavors and with prices ranging from less than $400 to more than $1,500, how do you choose the drive that’s perfect for your needs?

Simple. Just ask every hard-drive vendor to send you a drive for evaluation. Put each drive through a battery of tests. Compare its features, warranty, and bundled software with those of every other drive you can lay your hands on. Disassemble it to evaluate its construction and case design. Investigate the service options offered by each vendor. Survey dealers across the country to compile a street-price index to strengthen your bargaining position. And then, when you’ve finished all that, assemble a panel of experienced storage technicians to review your findings.

BY OWEN W. LINZMAYER
AND THE MACUSER LABS STAFF
Figure 1: Overall Performance of 100-Megabyte Hard Drives

100-Megabyte Hard Drives

Figure 1: Along with the Mac's central processor, a hard drive is the component that has the greatest effect on your Mac's speed. A drive's speed depends on several factors, so we ran tests to compare SCSI throughput; read, seek, and write times; and file-transfer times. We performed our benchmark tests on a 5-megabyte Mac IIci running System 6.0.7.

To compute overall performance, we compared each drive's three test results with those of an Apple Hard Disk 80SC, which uses a Quantum Pro 80 mechanism. The overall results show the differences in mechanism performance: The Quantum LP105S was the fastest in our tests. Speed differences among drives with the same mechanism are due to the relative efficiency of each vendor's driver software.

The FWB PocketHammer 100 — with the best combination of a fast mechanism and excellent driver software — finished on top. The slowest drive was the MacDirect 105MB, which uses a Fujitsu mechanism.

Performance relative to an Apple Hard Disk 80SC
Realistically, you don’t have the time or resources to conduct such an extensive evaluation, even if you’re buying dozens of drives for your company or workgroup. That’s why we’ve done the work for you. We asked 32 hard-drive vendors to supply MacUser Labs with an external 100-megabyte hard drive — if they sold more than one drive in the 100-megabyte range, they chose which model to send. We tested. We disassembled. We evaluated. We compared. We surveyed. We amassed enough facts to separate the bargains from the heartaches.

But there’s one bit of analysis we couldn’t do for you. Only you can decide what’s most important to you when you choose a drive: Are you looking for the fastest drive, with price no object? Are you looking for the least expensive way to put 100 megabytes on your desktop? Do you care about what software is bundled with the drive? Or is a long-lasting warranty a must and experienced, responsive technical support a necessity? Different buyers have different requirements, but no matter what your needs, we can help. We’ve tabulated, sorted, and cross-referenced results based on speed, price, package, and service and discovered some good news for every hard-drive buyer.

**Buying Bytes**

Although we found 32 vendors offering drives in the 100-megabyte range, all their mechanisms come from only six OEMs (original equipment manufacturers). Remarkably, 27 of the drives use Quantum mechanisms: the fast new LP105S or the older ProDrive 105S or ProDrive 120S.

The Quantum ProDrive 120S-based drives potentially offer 15 more megabytes of storage than drives using the 105-megabyte Quantum mechanisms. When shopping for drives, however, compare formatted capacities only — never rely solely on vendors’ specifications — because the driver software used to format the drive often leaves several megabytes unused. For the most part, however, advertised drive capacities closely approximate their formatted ones.

A couple of the non-Quantum drives — the 109-megabyte CMS PD 100S, which uses the Seagate ST1126N mechanism, and the 116-megabyte Vision Logic Super Baby 116, which uses the Conner CP30100 — also offer a bit more storage. The three other non-Quantum drives — the MacDirect 105MB (Fujitsu M2616SA), the MicroNet MS-104 (Toshiba MK234), and the Rodime Cobra 100e (Rodime RO3128TS) — offer roughly the same storage capacity as the 105-megabyte Quantum models.

The most significant difference among mechanisms is speed. Our tests showed that there’s a simple reason why most drive manufacturers use the Quantum LP105S mechanism: It’s the fastest. In fact, most — if not all — of the vendors that sent us a drive with an older ProDrive 105S mechanism will be using the LP105S mechanism by the time you read this. Our other conclusions on package, warranty, and service will still hold, however.

Be aware that some vendors vary the OEM mechanisms to suit customer requests, market price, or availability. Be sure to specify the mechanism you want when you order your drive. If a vendor isn’t willing to commit to providing it, look elsewhere. If you’re still not sure which mechanism the drive has when you get it, you can use Robert Polc’s shareware program SCSI Probe (available on Zmac) to find out without opening the case and voiding the warranty.

You may also want to relate the price of a drive to the amount of storage you’re getting. To ascertain which drives offer the most bytes for the buck, simply divide capacity by price. MacUser Labs contacted a sampling of dealers throughout the U.S. to determine the average — not necessarily the lowest — street prices of the drives we tested. Of the 32 drives, 15 are available directly from the manufacturer only, so the list price and the street price are the same. We found that manufacturers selling directly to customers usually offer the best prices, even though street prices for drives sold through dealers range from 15 to 35 percent below suggested retail.

With a direct price of $389, the Wholesale 54 105Q is both the least expensive drive and the best buy on a kilobytes-per-dollar basis — you get a hefty 276K of storage space for every

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**Figure 2: The Classic Handicap**

![Figure 2](image-url)
100-Megabyte Hard Drives

dollar. Other bargains include the HDI PowerDrive 105MB Quantum, the MacTel Index 100MB, and the Relax Vista 105. On the other hand, the premium-priced Liberty 70 Series 105Q, the FWB PocketHammer 100, and the LaCie Tsunami 105MB provide about 100K per dollar — roughly $10 per megabyte at street prices.

**Speed Freaks**

For many buyers, speed is the all-important attribute of a hard-disk drive. This is a reasonable opinion, because aside from the central processing unit, your hard drive is the component that most affects the speed of everyday operations on your Macintosh. Because a drive’s overall speed depends on several factors — throughput, seek time, caching, and command overhead — we performed tests that focused on each aspect individually.

Our primary benchmark platform was a 5-megabyte Mac IIci running System 6.0.7. Each hard drive was formatted at a 1:1 interleave with the vendor’s own software. Because all several factors — throughput, seek time, caching, and command overhead — we performed tests that focused on each aspect individually.

Our primary benchmark platform was a 5-megabyte Mac IIci running System 6.0.7. Each hard drive was formatted at a 1:1 interleave with the vendor’s own software. Because all

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**Figure 3: Price and Speed**

If all you care about is a 100-megabyte hard drive’s price and speed — and not its warranty, construction quality, software, or vendor’s reputation — then simply compare its overall performance with the number of kilobytes it provides per dollar. The Ehman 105Q LPS offers the best combination of low price and high performance. At the other end of the spectrum are six drives that are either slow, expensive, or both: the MacDirect 105MB, Aristotle HardPac 105MB, CMS PD 100S, Procom MD100, EMAC Metro 105, and Rodime Cobra 100e. The Apple Hard Disk 80SC is sluggish as well as expensive — its list price is a hefty $1,749.
these drives contain buffers large enough to hold the data from an entire track, a 1:1 interleave is appropriate for all Mac models.

If you work primarily with large files, a drive’s throughput is an important consideration. To measure how quickly data could be passed between the drive and our test IICi, we used William Long’s shareware utility SCSI Evaluator 1.07 (available on Zmac). Drives based on the Quantum LP105S mechanism consistently came out on top, being an average of 25 percent faster than drives with competing mechanisms and almost twice as fast as the bottom-ranked MacDirect 105MB, which uses the Fujitsu M2616SA (see Figure 1).

To test real-world speed, we used DiskBasher, a utility developed by MacUser Labs to simulate a typical application’s interaction with a hard drive. DiskBasher creates a single contiguous file and performs sequential write, seek, and read operations within that file. DiskBasher results also showed that the Quantum LP105S drives were the fastest.

Finally, we timed each drive as the Finder duplicated a 13-megabyte TIFF file, a task that requires the read/write heads to move repeatedly back and forth over very short distances. This test highlights the differences in software drivers among drives using the same mechanisms. For example, although they both use Quantum LP105S mechanisms, the FWB PocketHammer 100 managed to copy the test file 35 percent faster than did the MacAvenue Protegé 100MB HD. The folks at FWB have developed software that squeezes every ounce of performance out of the already fast Quantum LP105S mechanism.

Before you rush out to buy the fastest drive you can find, consider the Mac model to which it’ll be connected. Ideally, you want a drive that spins off its information as fast as your Mac can use it. Not all SCSI ports are created equal: The fastest, on the IICi, can handle as much as 2.1 megabytes per second. Most other members of the Mac II family top out at about 1.4 to 1.7 megabytes per second — surprisingly, the otherwise speedy IIfx can do no better than 1.5. As you step down the Mac evolutionary ladder, SCSI gets slower and slower: The Mac Classic and SE can do no better than around 650K per second, and the Mac Plus is positively pokey at a bit more than 250K per second. Your Macintosh won’t choke if you hook up a faster drive, but you might be wasting money on performance you’ll never be able to use.

To demonstrate this phenomenon, we retested the fastest and the slowest drives — the FWB PocketHammer 100 and the MacDirect 105MB, respectively — with a Mac Classic. Whereas the FWB PocketHammer 100 was almost twice as fast as the MacDirect 105MB when hooked up to an IICi, it was a mere 16 percent faster when both were limited by the Classic’s slow SCSI port (see Figure 2).

If all you care about is price and speed — and you’re willing to ignore a drive’s warranty, quality of construction, and bundled software — then your choice is easy: Just look at each drive’s “bang for the buck” (see Figure 3).

We plotted each drive’s performance against its kilobyte capacity per dollar and discovered that good performance and low prices were enough to propel the Ehman 105Q LPS to the top of the heap. Six drives came close to the 105Q LPS’s stats: the APS 105 MB, Aurora 100MB Quantum External, MacProducts Magic 105LP External, MacTel Index 100MB, MirrorMP105, and VCP 105. Conversely, six other drives — the Aristotle HardPac

Figure 4: Eight of the drives in this report are small enough to fit into your briefcase (outside, clockwise from top: Aristotle HardPac 105MB, Vision Logic Super Baby 116, Tulin A-Hive Jr 120, La Cie Tsunami 105MB, Liberty 70 Series 105Q, FWB PocketHammer 100, and Lovel Maxcess 105e; center: iDS Livingstone Wip100). All you need is a power cord and a SCSI cable. Three of the drives — the Aristotle HardPac 105MB, the iDS Livingstone Wip100, and the Vision Logic Super Baby 116 — take power from the Mac’s floppy port.
The heart and soul of any hard-disk drive is its mechanism — the collection of disks and read/write heads that shares the case with a power supply, SCSI connectors, a SCSI-ID switch, a fuse, and an AC plug. The fastest mechanism used in 100-megabyte hard drives — and our favorite — is the Quantum LP105S, successor to the former champ, the Quantum ProDrive 105S, which is still used by a few vendors. We expect most — if not all — vendors to soon move up to the faster LP105S.

To gain its speed advantage over the ProDrive 105S, the LP105S combines a higher density with a faster read/write mechanism. The LP105S stores the same amount of data as the ProDrive 105S, but it uses only two platters and four heads instead of the three platters and six heads the ProDrive 105S does.

In each mechanism, every magnetic platter is divided into logical sectors. Each sector holds 512 bytes of data. The sectors are arranged in concentric circles called tracks. The LP105S packs more sectors into each track.

Because the LP105S packs data more densely than the ProDrive 105S, it can read data 20 to 30 percent faster than the older mechanism — even though both mechanisms' platters rotate at the same rate. The LP105S' faster seek time also results in 10-percent-faster operation for seek-intensive operations such as database searches.
Construction Deduction

Whereas the mechanism used in a drive determines its speed, the construction and design of the external case and internal components are crucial to a drive's ease of installation and longevity.

An important design consideration is the drive's footprint — the area a drive takes up on your desk. The most common drive design is zero footprint, which is designed to fit under a Mac Classic, Plus, SE, or SE/30. Twenty-three of the drives are this size. With Mac modular computers such as the IIfx, Iici, Illsi, and LC, you won't slide your hard drive under your Mac. Zero-footprint designs do, however, let you stack multiple SCSI devices on top of each other, which is a convenient way for a hard drive and a CD-ROM drive to occupy the same precious desk space.

A relatively new trend in hard-drive design is portability, providing a convenient way of toting your files, your customized desktop, and all your preferences with you on business trips or from office to home. Eight of these drives are compact enough to fit in your briefcase (see Figure 4).

All the hard-disk drives reviewed this month are external SCSI devices that attach to the DB-25 SCSI connector on the back of all Macs since the Plus. The SCSI standard lets you connect as many as seven devices — hard drives, scanners, printers, and so on — in a daisy chain, with each device plugged in to the back of the next one. SCSI devices usually use DB-50 connectors, which are preferable to DB-25s because of their superior grounding.

Each device must be assigned a unique SCSI-ID number, and the devices on both ends of the daisy chain must be terminated. Resolving SCSI-ID conflicts is relatively simple, even though vendors differ in how they let you set SCSI-ID numbers. The choices include mechanical settings such as DIP or rotary switches, push buttons, and thumb wheels. DIP switches (used only on the La Cie Tsunami 105MB among the drives we tested) are a nuisance, because you must interpret their binary settings. In general, external ID switches — push buttons, thumb wheels, and rotary switches — are best, because you can see the current ID setting at a glance.

More problematic is the SCSI requirement that devices at both ends of the daisy chain be terminated (see "A Beginner's Guide to Daisy Chains," August '90, page 243). Termination — whether done internally or by the installation of a separate external termination plug — ensures that all signal voltages fall reliably within the right range and prevents signal reflections from appearing on the SCSI lines. It sounds very precise and technical, but actually SCSI termination is a black art that keeps even the experts arguing about the best approach.

All drive mechanisms have removable terminating resistors, and some of the drives come with them still installed. Thankfully, most vendors of internally terminated drives provide access windows in the bottom of the drives' case, so you don't need to disassemble the entire case should you have to remove the internal terminators. The MacTel Index 100MB, unfortunately, doesn't give you access to the internal terminators — an unnecessary annoyance.

We recommend drives from which the vendor has removed the mechanism's internal terminating resistors. If you need to add termination, you can slide a terminating plug into the last connection in the SCSI chain — simple and effective, and you can easily tell whether it's installed or not. La Cie and PLI take one step closer to perfection by providing built-in SCSI termination that can be switched on or off.

We disassembled every drive to evaluate overall construction quality. Our final mouse ratings took design, workmanship, component choice, and wiring into account. We believe that the care taken in the manufacture of a hard-disk system pays off in longer, more reliable life, so we formed our conclusions about quality accordingly.

At Your Service

Unlike speed, which MacUser Labs can accurately measure with a suite of benchmarks, it's impossible to empirically test the long-term reliability of drives. So we did the next-best thing: We investigated the service offered by each of the 32 vendors (see Table 1) when their drives prove less than perfect.

All but 9 vendors ship their drives with a 30-day money-back guarantee. Warranty periods vary from the common one-year to the truly generous five-year warranty offered by Microtech. Many vendors sell optional extended warranties, and of these, Aurora's extra coverage is the least expensive, at only $50 for five years. CMS, on the other hand, charges a hefty $249 for each year beyond its basic one-year warranty.

If something goes wrong with your drive, it's comforting to know that help is just a phone call away. Although all the vendors we surveyed operate technical-support hot lines, only 15 provide toll-free support.

If a problem requires you to return the drive for service, consider where you must send it and how long it will be before you get it back. If you buy a drive from a mail-order vendor, you must usually ship the drive directly to the vendor. One of the benefits of buying retail is that you can return the drive to the dealer for repair. Keep in mind, however, that most dealers lack adequate repair facilities and simply ship the drive back to the manufacturer. Some dealers make no promises about turnaround time, although most try to return your drive to you within two or three working days.

Perhaps the most important service consideration is whether the vendor will attempt to recover your data or
### Table 1: Service and Warranty

<table>
<thead>
<tr>
<th>Model</th>
<th>Standard warranty</th>
<th>Extended warranty</th>
<th>Money-back guarantee</th>
<th>Toll-free support</th>
<th>Service center</th>
<th>Guaranteed turnaround</th>
<th>Data recovery</th>
</tr>
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<tbody>
<tr>
<td>APS 105 MB</td>
<td>2 years</td>
<td>none</td>
<td>30 days</td>
<td>yes</td>
<td>direct</td>
<td>48 hours</td>
<td>$150/2 hours</td>
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<td>Aristotle HardPac 105MB</td>
<td>1 year</td>
<td>none</td>
<td>30 days</td>
<td>no</td>
<td>direct</td>
<td>48 hours</td>
<td>free</td>
</tr>
<tr>
<td>Aurora 100MB Quantum External</td>
<td>2 years</td>
<td>$50/5 years</td>
<td>30 days</td>
<td>yes</td>
<td>direct</td>
<td>48 hours</td>
<td>free</td>
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<td>CMS PD 100S</td>
<td>1 year</td>
<td>$249/year</td>
<td>none</td>
<td>no</td>
<td>dealer</td>
<td>24 hours</td>
<td>none</td>
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<td>Cutting Edge 1050 LPS</td>
<td>2 years</td>
<td>none</td>
<td>30 days</td>
<td>no</td>
<td>dealer</td>
<td>none</td>
<td>none</td>
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<td>Deltaic Server 100Q</td>
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<td>$150/3 years</td>
<td>30 days</td>
<td>yes</td>
<td>direct</td>
<td>72 hours</td>
<td>free</td>
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<td>Ehman 1050 LPS</td>
<td>2 years</td>
<td>none</td>
<td>30 days</td>
<td>no</td>
<td>direct</td>
<td>none</td>
<td>none</td>
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<td>EMAC Metro 105</td>
<td>2 years</td>
<td>none</td>
<td>none</td>
<td>no</td>
<td>dealer</td>
<td>72 hours</td>
<td>none</td>
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<td>FWB PocketHammer 100</td>
<td>2 years</td>
<td>$104/year</td>
<td>none</td>
<td>no</td>
<td>no</td>
<td>72 hours</td>
<td>free</td>
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<td>GCC UltraDrive 1005</td>
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<td>$129/year</td>
<td>30 days</td>
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<td>dealer</td>
<td>48 hours</td>
<td>$50</td>
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<td>HDI PowerDrive 105MB Quantum</td>
<td>2 years</td>
<td>$38/year</td>
<td>30 days</td>
<td>yes</td>
<td>dealer</td>
<td>48 hours</td>
<td>free</td>
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<td>IDS Livingstone Wlp100</td>
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<td>$199/5 years</td>
<td>30 days</td>
<td>yes</td>
<td>dealer</td>
<td>72 hours</td>
<td>none</td>
</tr>
<tr>
<td>Jasmine DirectDrive 100</td>
<td>2 years</td>
<td>$175/5 years</td>
<td>30 days</td>
<td>yes</td>
<td>dealer</td>
<td>72 hours</td>
<td>free</td>
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<tr>
<td>La Cie Tsunami 105MB</td>
<td>3 years</td>
<td>$100/5 years</td>
<td>30 days</td>
<td>yes</td>
<td>direct</td>
<td>72 hours</td>
<td>$125 minimum/ $250 maximum</td>
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<td>Liberty 70 Series 105</td>
<td>2 years</td>
<td>none</td>
<td>30 days</td>
<td>no</td>
<td>direct</td>
<td>48 hours</td>
<td>$60/hour</td>
</tr>
<tr>
<td>Lovel Max巡察 105e</td>
<td>2 years</td>
<td>$150/year</td>
<td>30 days</td>
<td>no</td>
<td>dealer or direct</td>
<td>48 hours</td>
<td>free</td>
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<td>MacAvenue Proteca 100MB HD</td>
<td>2 years</td>
<td>none</td>
<td>30 days</td>
<td>yes</td>
<td>direct</td>
<td>72 hours</td>
<td>free</td>
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<td>MacDirect 105MB</td>
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<td>none</td>
<td>30 days</td>
<td>yes</td>
<td>direct</td>
<td>48 hours</td>
<td>free</td>
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<tr>
<td>MacProducts Magic 105LP External</td>
<td>2 years</td>
<td>$100/year</td>
<td>30 days</td>
<td>yes</td>
<td>direct</td>
<td>48 hours</td>
<td>free</td>
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<tr>
<td>MacTel Index 100MB</td>
<td>2 years</td>
<td>none</td>
<td>30 days</td>
<td>no</td>
<td>dealer or direct</td>
<td>24 hours</td>
<td>free</td>
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<td>MicroNet MS-104</td>
<td>1 year</td>
<td>$129/year</td>
<td>none</td>
<td>no</td>
<td>dealer or direct</td>
<td>48 hours</td>
<td>none</td>
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<tr>
<td>Microtech Nova N120</td>
<td>5 years</td>
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<td>none</td>
<td>yes</td>
<td>direct</td>
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<td>free</td>
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<td>Mirror MP105</td>
<td>2 years</td>
<td>$140/3 years</td>
<td>30 days</td>
<td>no</td>
<td>direct</td>
<td>48 hours</td>
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<td>PCPC MacBottom 105</td>
<td>2 years</td>
<td>$120/year</td>
<td>none</td>
<td>no</td>
<td>dealer or direct</td>
<td>48 hours</td>
<td>$40</td>
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<td>PLI Quantum 105</td>
<td>1 year</td>
<td>$99/year</td>
<td>30 days</td>
<td>yes</td>
<td>dealer or direct</td>
<td>48 hours</td>
<td>none</td>
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<td>Procom MD100</td>
<td>1 year</td>
<td>$50/year</td>
<td>none</td>
<td>no</td>
<td>dealer</td>
<td>48 hours</td>
<td>none</td>
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<tr>
<td>Relax Vista 105</td>
<td>2 years</td>
<td>none</td>
<td>30 days</td>
<td>no</td>
<td>direct</td>
<td>48 hours</td>
<td>none</td>
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<td>Rodime Cobra 100x</td>
<td>1 year</td>
<td>none</td>
<td>none</td>
<td>no</td>
<td>direct</td>
<td>48 hours</td>
<td>none</td>
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<tr>
<td>Tulin A-Hive Jr 120</td>
<td>2 years</td>
<td>$25/year</td>
<td>none</td>
<td>no</td>
<td>direct</td>
<td>48 hours</td>
<td>$100/hour</td>
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<td>VCP 105</td>
<td>2 years</td>
<td>none</td>
<td>30 days</td>
<td>yes</td>
<td>direct</td>
<td>72 hours</td>
<td>none</td>
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<tr>
<td>Vision Logic Super Baby 116</td>
<td>1 year</td>
<td>$50/year</td>
<td>30 days</td>
<td>yes</td>
<td>direct</td>
<td>72 hours</td>
<td>none</td>
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<td>Wholesale 54 165Q</td>
<td>2 years</td>
<td>$35/year</td>
<td>30 days</td>
<td>yes</td>
<td>direct</td>
<td>72 hours</td>
<td>none</td>
</tr>
</tbody>
</table>

Table 1: Service should not be judged only by the length of a drive's warranty. Also consider the cost of a warranty extension, the availability of a money-back guarantee and phone support, the location of the repair service, repair turnaround time, and whether the vendor offers data-recovery services.

will simply swap out faulty mechanisms. Although nobody can guarantee 100-percent success at recovering data from a damaged disk, many common problems can be resolved easily with the help of a good utility program such as Symantec's SUM II or Norton Utilities for the Macintosh (see "Surviving the Crash: Hard-Disk Recovery," April '91, Buyer's Guide page 42). Vendors that offer data-recovery services (and at least half of them do) often attempt recovery only at the customer's request and expense. Based on your data's value, you must determine when data-recovery becomes a cost-prohibitive option. Although it's been said a thousand times, the best preventive measure is to back up often.

Aurora and GCC offer comprehensive service plans: two-year warranties backed by 30-day guarantees, optional extended warranties, toll-free support, 48-hour guaranteed turnaround, and data-recovery services. Microtech also offers an impressive service package, with a five-year standard warranty, toll-free support, 48-hour guaranteed turnaround, and free data-recovery service — if only it would add a money-back guarantee, it would win the service award hands down.

At the other end of the service spectrum is Rodime Systems. It warrants the Cobra 100e for a single year and offers no extended warranty, no money-back guarantee, no toll-free support, and no data-recovery service.
Given the lofty $1,499 list price of the Cobra 100e, you deserve more service for your money.

**Software Bundles**

Many vendors sweeten their deals with free software. Bundled software runs the gamut from multiple megabytes of shareware to well-chosen commercial applications that normally retail for hundreds of dollars. Aurora, GCC, iDS, Jasmine, La Cie, MacProducts, MacTel, Mirror, and PLI, among others, pack their drives with megabytes of shareware, public-domain, and demoware programs (see Table 2). If you’re new to the Mac and need to build a software library, these loaded drives can give you a head start.

Other vendors include attractive utilities for such things as password protection and data encryption. Disk optimizers such as PLI’s Turbo Optimizer and the optimization feature of La Cie’s Silverlining improve performance by reorganizing disk contents into contiguous blocks so that the read/write heads needn’t roam the disk looking for fragments of files. Backup software such as BackMatic and Turbo Back copies files from the hard disk to another medium for safekeeping. Finally, file-recovery utilities such as MacTools Deluxe, 911, Norton Utilities, and SUM II can rescue deleted or damaged files.

**Hard Choices**

This report, like all others before it and to come, is a snapshot in time, fixing the known universe of 100-megabyte hard drives just long enough for us to test the products. But new drives appear on the market almost daily, and vendors upgrade from older mechanisms to newer, faster ones almost as often. Even with all the data we’ve compiled on the current crop of 32 hard drives, making the right selection is difficult. You must balance your needs against your means; make trade-offs between value and speed; and consider a host of intangibles such as construction quality, aesthetics, and the vendor’s reputation. There’s no “best” drive for every application; check out the “Bottom Line” sidebar for our recommendations.

**The Bottom Line**

When shopping for a 100-megabyte hard drive, consider a drive’s speed, value, service and warranty, construction quality, and special features such as portability. When we finally sorted through our mountain of data, one drive — the GCC UltraDrive 100S ($829 list, $769 street) — had the best overall combination of ingredients. This fast Quantum LP105S-based drive is a little pricier than most, but GCC offers a strong service plan and bundles an assortment of useful software packages.

Two other drives also offer an excellent combination of value, speed, service, and package. The Mirror MP105 ($497 direct) is an inexpensive, well-packaged way to get a fast Quantum LP105S with good service and warranty. The Loviel Maxcess 105se ($799 list, $650 street) is a bit more expensive, but you also get portability and Symantec’s highly rated Norton Utilities for the Macintosh.

Six drives give you a good combination of price and speed but slip slightly in service or packaging: The Ehman 105Q LPS ($489 direct) offers the best price/performance ratio, but it has minimal software and limited service. The Aurora 100MB Quantum External ($736 list, $536 street), MacTel Index 100MB ($459 direct), VCP 105 ($529 direct), MacProducts Magic 105LP External ($539 direct), and the APS 105 MB ($499 direct) follow closely behind the Ehman drive.

Each of these drives has one or two minuses, however: minimal service, poor construction, or no software bundle. But if you already have all the software you need and a dedicated MIS department or if you’re technically savvy, one of these drives is the best choice.

Three drives that come with stiffer sticker prices also deserve mention. If your bottom line is speed, the FWB PocketHammer 100 ($1,299 list, $949 street) is the drive for you — if you’re willing to pay the price. The software wizards at FWB have tweaked the PocketHammer 100’s driver to squeeze every drop of performance out of its quick Quantum LP105S mechanism. The PocketHammer is also compact and portable. The La Cie Tsunami 105MB ($949 direct) is a fast portable drive with a unique art-deco design and comes bundled with Norton Utilities and 10 megabytes of shareware. The Tsunami has a convenient external termination DIP switch but — alas — also uses DIP switches to set the SCSI ID. The Microtech Nova N120 ($1,249 list, $919 street) is expensive, but you get more storage space with a Quantum ProDrive 120S mechanism: It comes with Norton Utilities and an impressive five-year standard warranty.

For budget-conscious consumers looking for the most bytes per buck, the Wholesale 54 105Q ($389 direct) and the HDI PowerDrive 105MB Quantum ($399 direct) are the best bets. Each of these no-frills drives uses the somewhat slow Quantum ProDrive 105S mechanism and comes only with Ontrack’s Disk Manager Mac software. But as a second drive, a backup unit, or a font-storage device for your laser printer, these drives can alleviate your growing pains without hurting your bank account. And if Wholesale 54 and HDI were to offer the faster Quantum LP105S mechanisms and maintain their drives’ low prices, these drives would definitely be best buys.

Owen W. Linnemaker is a free-lance writer living in San Francisco with his wife, two cats, and Mac IIci. He frequents Zmac and can be reached via CompuServe at 72511,70.
NEW LOW PRICES.
Example: Now $339, external Quantum 50 MB.

SIX REASONS WHY LA CIE HARD DRIVES ARE THE BEST YOU CAN BUY.

A Quantum Difference.

Quantum drive mechanisms offer blazing-fast effective access time as low as 8 milliseconds.* No other drive mechanisms in their class (Mac-compatible) run faster, which is why they are in La Cie drives.**

*Typical application access time using 64KB DaCache.
**Seagate drive mechanisms also available (capacities from 300MB to 1.2GB).
Software with a Silverlining.

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

And unlike traditional utilities programs, Silverlining lets you create your own partitions. You can even re-size them to suite your needs, and you'll save time because there's no need to re-initialize.

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

Sold separately, Silverlining software costs $149. But it's ABSOLUTELY FREE when you buy any La Cie drive.

A Company You Can Count On.

La Cie is a Plus Development Company (makers of the Hardcard XL), backed by $400 million in assets. That means you can trust La Cie to provide a constant source of high-quality mechanisms and components. And you can be certain that we'll be around to help you with service and support. For a long, long time.

The Most Unusual Warranty in the Business.

La Cie features up to a 5-YEAR LIMITED WARRANTY on all its Quantum Mechanisms. So, if anything goes wrong with the mechanism of your hard drive, we'll repair or replace it within 48 hours.

And every La Cie drive is backed by toll-free support from customer service and technical assistance experts.

Award-Winning Design.

Hard drives that win design awards? Who says intelligence has to be ugly? The Tsunami and Cirrus hard drives have received prestigious awards from both the industrial design and computer communities.

La Cie drives are designed from the inside out. Designed to be quiet (with a 1/2 speed fan), lightweight (as light as 2 1/2 lbs.), durable and reliable. Plus, they have an external termination and SCSI address switch, which means you'll never have to open the case for any reason! You don't win awards for these features, but you do win a loyal following.

Rave Reviews from Critics Customers.

Frankly, there's been a lot of talk about La Cie hard drives. Leading Macintosh consumer magazines praise us. Customers write us fan letters. In fact, we're happy to let critics and customers have the last word about La Cie drives. Because they tend to be words like these:

---MacUser

"The good Housekeeping Seal. I'm now taking the safer course of buying from corporate-owned companies such as Quantum-backed La Cie..." -MacWeek

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

To order or for more information, call toll-free 800-999-0143.
Volume discounts available.
## Table 2: Features of 100-Megabyte Hard Drives

<table>
<thead>
<tr>
<th></th>
<th>APS 105 MB</th>
<th>Aristotle HardPac 105MB</th>
<th>Aurora 100MB Quantum External</th>
<th>CMS PD 100S</th>
<th>Cutting Edge 1050 LPS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pros</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inexpensive. Two power outlets.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good service.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Porta.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inexpensive. Good service. and warranty.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good software bundle.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fast.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fast. Two power outlets.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cons</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No software bundle.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second-slowest drive. 25-pin SCSI.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large case.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No software bundle.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slow mechanism.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimal warranty.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hardware</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal mechanism</td>
<td>Quantum LP105S</td>
<td>Quantum ProDrive 105S*</td>
<td>Quantum LP105S</td>
<td>Quantum ST1126N</td>
<td>Quantum LP105S</td>
</tr>
<tr>
<td>Seek time (advert/actual)</td>
<td>17 ms/19 ms</td>
<td>19 ms/23 ms</td>
<td>17 ms/23 ms</td>
<td>18 ms/23 ms</td>
<td>17 ms/19 ms</td>
</tr>
<tr>
<td>SCSI-ID selector</td>
<td>push button</td>
<td>rotary switch</td>
<td>push button</td>
<td>push button</td>
<td>thumb wheel</td>
</tr>
<tr>
<td>SCSI termination</td>
<td>external</td>
<td>external</td>
<td>external</td>
<td>external</td>
<td>internal</td>
</tr>
<tr>
<td>SCSI cable</td>
<td>2.5 feet, 25/50-pin or 1.5 feet, 50/50-pin</td>
<td>2 feet, 25/25-pin</td>
<td>2 feet, 25/25-pin</td>
<td>3 feet, 25/50-pin</td>
<td>2 feet, 25/50-pin</td>
</tr>
<tr>
<td><strong>Software</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formatter</td>
<td>Nuvo Labs 1.13</td>
<td>Disk Manager Mac 2.23</td>
<td>Software Architects 3.29 Rel 101</td>
<td>CMS Utilities 7.01</td>
<td>Software Architects 3.27 Rel 210</td>
</tr>
<tr>
<td>Bundled software</td>
<td>none</td>
<td>Advanced Security</td>
<td>5 MB shareware</td>
<td>SUM II</td>
<td>none</td>
</tr>
<tr>
<td><strong>System 7-compatible</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>User-selectable interleave</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td><strong>Password protection</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td><strong>Data encryption</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td><strong>Disk optimizer</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td><strong>Backup</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>File recovery</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Case</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Indicator lights</td>
<td>access, power</td>
<td>access</td>
<td>access</td>
<td>access, power</td>
<td>access, power</td>
</tr>
<tr>
<td>Construction</td>
<td>plastic and metal</td>
<td>plastic</td>
<td>metal</td>
<td>metal</td>
<td>metal</td>
</tr>
<tr>
<td>Fuse</td>
<td>external</td>
<td>external</td>
<td>external</td>
<td>external</td>
<td>external</td>
</tr>
<tr>
<td>Other</td>
<td>two power outlets</td>
<td>powered by floppy port</td>
<td>NA</td>
<td>NA</td>
<td>two power outlets</td>
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<tr>
<td>Size (L x W x H, in.)</td>
<td>10 x 10 x 2</td>
<td>7 x 4.5 x 2</td>
<td>10.5 x 0.75 x 3</td>
<td>11.25 x 10 x 2.25</td>
<td>10.5 x 0.5 x 2.5</td>
</tr>
<tr>
<td>Weight</td>
<td>7 lb</td>
<td>2.2 lb</td>
<td>7 lb</td>
<td>6 lb</td>
<td>9 lb</td>
</tr>
<tr>
<td><strong>Company</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alliance Peripheral Systems</td>
<td>7400 MacPherson Ave.</td>
<td>60 Skiff St., Ste. 1011</td>
<td>Aurora Industries 6900 Industrial Park, Ste. 111</td>
<td>CMS Enhancements, Inc. 2722 Michelson Dr.</td>
<td>Cutting Edge 291 Hwy., Ste. 111</td>
</tr>
<tr>
<td>Aristole Industries</td>
<td>7400 MacPherson Ave.</td>
<td>60 Skiff St., Ste. 1011</td>
<td>Aurora Industries 6900 Industrial Park, Ste. 111</td>
<td>CMS Enhancements, Inc. 2722 Michelson Dr.</td>
<td>Cutting Edge 291 Hwy., Ste. 111</td>
</tr>
<tr>
<td>Indepedence, MO 64057</td>
<td>Burnaby, BC V5J 5B6</td>
<td>Hamden, CT 06517</td>
<td>Aurora Industries 6900 Industrial Park, Ste. 111</td>
<td>CMS Enhancements, Inc. 2722 Michelson Dr.</td>
<td>Cutting Edge 291 Hwy., Ste. 111</td>
</tr>
<tr>
<td>(800) 235-2750</td>
<td>(816) 478-8300</td>
<td>(800) 426-1591</td>
<td>(603) 624-9018</td>
<td>(203) 624-9018</td>
<td>(714) 222-6000</td>
</tr>
<tr>
<td>(816) 478-8300</td>
<td>(816) 478-8300</td>
<td>(800) 426-1591</td>
<td>(603) 624-9018</td>
<td>(203) 624-9018</td>
<td>(714) 222-6000</td>
</tr>
</tbody>
</table>

* Should be shipping the Quantum LP105S by the time you read this; check for price changes.

Mechanism varies.

Will soon ship with Disk Manager Mac 2.3, which will support System 7.

Zero-footprint case.
"The Best Value...
68030 Accelerator"
(Macworld, July 1991)

Experience the Performance;
NewLife Accelerator Cards feature:
- Real Performance
- System 7 Compatibility
- 68030 Power and Speed
- Optional 68882 FPU
- Burst Mode Capacity of 030
- Memory Expansion to 20 Meg.
- Crash Resistant Bootable Ramdisk
- Optional "VIRTUAL 3.0" from Connectix
- Optional Video Adapter

Description:
The NewLife series of accelerators gives unparalleled speed, power and productivity to the compact Macintosh. No longer will you be waiting for your machine to respond to your next command, it will work with you at your speed. Newlife has broken the price/performance barrier by utilizing custom circuits (ASIC's) and surface mount devices, the same technology Apple uses in their latest machines. With a NewLife accelerator, you will have access to 20 Megabytes of RAM on the Mac Plus™, SE™ and Classic™ utilizing low profile 4 Meg. SIMM's. To further complement these features NewLife offers an optional video adapter. This allows the user to expand to a two-page display with their accelerator.

For more information, contact:
NewLife Computer Corporation
603 March Road
Kanata, Ontario Canada K2K 2M5
Telephone: (613) 592-5080
Toll free: (800) 663-6395
Fax: (613) 592-9738

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### Table 2: Features of 100-Megabyte Hard Drives, continued

<table>
<thead>
<tr>
<th>Company</th>
<th>Deltalic Systems, Inc.</th>
<th>Ehaman Engineering, Inc.</th>
<th>EMAC</th>
<th>FWB</th>
<th>GCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-Megabyte Drives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1701 Junction Ct. Ste. 302B</td>
<td>97 S. Red Willow Rd. Evanston, WY 82931</td>
<td>48451 Milmont Dr. Fremont, CA 94538</td>
<td>2040 Polk St., Ste. 215</td>
<td>580 Winter St. Waltham, MA 02154</td>
</tr>
<tr>
<td></td>
<td>San Jose, CA 95112</td>
<td>(800) 745-1240</td>
<td>(800) 821-0806</td>
<td>(415) 474-8655</td>
<td>(800) 422-7777</td>
</tr>
<tr>
<td></td>
<td>(800) 441-1240</td>
<td>(307) 769-3330</td>
<td>(510) 683-2222</td>
<td>(618) 890-0880</td>
<td>(618) 890-0880</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>List price</td>
<td>$699</td>
<td>$489</td>
<td>$1,129</td>
<td>$1,299</td>
<td>$829</td>
</tr>
<tr>
<td>Street price</td>
<td>$699</td>
<td>$489</td>
<td>$800</td>
<td>$949</td>
<td>$769</td>
</tr>
<tr>
<td>Hardware</td>
<td>Internal mechanism</td>
<td>Quantum LP105S</td>
<td>Quantum LP105S</td>
<td>Quantum ProDrive 105S</td>
<td>Quantum LP105S</td>
</tr>
<tr>
<td></td>
<td>Capacity (advert/actual)</td>
<td>105 MB/100 MB</td>
<td>105 MB/101 MB</td>
<td>105 MB/100 MB</td>
<td>105 MB/100 MB</td>
</tr>
<tr>
<td></td>
<td>Seek time (advert/actual)</td>
<td>17 ms/19 ms</td>
<td>17 ms/19 ms</td>
<td>19 ms/23 ms</td>
<td>17 ms/19 ms</td>
</tr>
<tr>
<td></td>
<td>SCSI-HD selector</td>
<td>push button</td>
<td>thumb wheel</td>
<td>push button</td>
<td>push button</td>
</tr>
<tr>
<td></td>
<td>SCSI termination</td>
<td>external</td>
<td>internal</td>
<td>external</td>
<td>external</td>
</tr>
<tr>
<td></td>
<td>SCSI cable</td>
<td>2 feet, 25/50-pin</td>
<td>2 feet, 25/50-pin</td>
<td>2 feet, 25/50-pin</td>
<td>1.5 feet, 25/50-pin</td>
</tr>
<tr>
<td>Software</td>
<td>Formatter</td>
<td>Deltalic System Installer 2.01</td>
<td>Software Architects 3.27 Rel 210</td>
<td>EMAC Disk Utility 3.31</td>
<td>Hammer Install 1.4a</td>
</tr>
<tr>
<td></td>
<td>Bundled software</td>
<td>none</td>
<td>none</td>
<td>Norton Utilities Hard Disk Partition, Hard Disk Deadbolt</td>
<td>Mac Tools Deluxe, QuickEnvelope, QuickSpool, 3.5 MB shareware</td>
</tr>
<tr>
<td></td>
<td>System 7-compatible</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td></td>
<td>User-selectable interleave</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td></td>
<td>Password protection</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td></td>
<td>Data encryption</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td></td>
<td>Disk optimizer</td>
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<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
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<tr>
<td></td>
<td>Backup</td>
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<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
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<tr>
<td></td>
<td>File recovery</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td>Case</td>
<td>Fan</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td></td>
<td>Indicator lights</td>
<td>access, power</td>
<td>access, power</td>
<td>access, power</td>
<td>access, power</td>
</tr>
<tr>
<td></td>
<td>Construction</td>
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<td>metal</td>
</tr>
<tr>
<td></td>
<td>Fuse</td>
<td>external</td>
<td>external</td>
<td>internal</td>
<td>external</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>NA</td>
<td>two power outlets</td>
<td>SCSi Sentry</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Size (L x W x H, in.)</td>
<td>10 x 10 x 2.5&quot;</td>
<td>10.5 x 8.5 x 2.5&quot;</td>
<td>10 x 10 x 3&quot;</td>
<td>9 x 6.5 x 3</td>
</tr>
<tr>
<td></td>
<td>Weight</td>
<td>5 lb</td>
<td>9 lb</td>
<td>7 lb</td>
<td>3.5 lb</td>
</tr>
</tbody>
</table>

*Should be shipping the Quantum LP105S by the time you read this; check for price changes.

**Zero-footprint case.**
"Fastest overall printer..."

The Power of RISC.

TrueLaser uses the powerful AMD 29000, 32-bit RISC processor. This powerful microprocessor gives TrueLaser the ability to process your graphics and text files many times faster than conventional PostScript printers. In addition, TrueLaser is specially optimized for greater speed when using Microsoft Windows, reducing your wait time and increasing your productivity.

TrueType and PostScript Fonts.

TrueLaser comes bundled with 35 TrueType fonts, Apple’s new font standard, which gives you high quality output in even the smallest point sizes. TrueLaser is also compatible with all of Adobe’s Type 1 and Type 3 fonts.

Versatile.

TrueLaser works in just about any computing environment—Macintosh, IBM PC, or PS/2. It comes standard with the three most popular interfaces: AppleTalk, Centronics, and RS-232C. And because TrueLaser includes built-in automatic interface switching, sharing the TrueLaser is a snap.

For added versatility, TrueLaser also provides HP PCL compatibility.

Affordable.

TrueLaser gives you everything you need to produce stunning text and graphics output in half the time, along with a 1 year warranty that includes 6 months of on-site service. For only $2695, you can get it all.

Call 1-800-654-4160 or 213-321-2121 for the name of the Microtek dealer nearest you.
### Table 2: Features of 100-Megabyte Hard Drives, continued

<table>
<thead>
<tr>
<th></th>
<th>HDI PowerDrive 105MB Quantum</th>
<th>IDS Livingstone Wip100</th>
<th>Jasmine DirectDrive 100</th>
<th>La Cie Tsunami 105MB</th>
<th>Liberty 70 Series 105Q</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal mechanism</td>
<td>Quantum ProDrive 105S*</td>
<td>Quantum LP105S</td>
<td>Quantum ProDrive 105S*</td>
<td>Quantum LP105S</td>
<td>Quantum LP105S</td>
</tr>
<tr>
<td>Seek time (advert/actual)</td>
<td>19 ms/23 ms</td>
<td>17 ms/18 ms</td>
<td>19 ms/23 ms</td>
<td>17 ms/18 ms</td>
<td>17 ms/18 ms</td>
</tr>
<tr>
<td>SCSI-ID selector</td>
<td>push button</td>
<td>rotary switch</td>
<td>push button</td>
<td>DIP switch</td>
<td>thumb wheel</td>
</tr>
<tr>
<td>SCSI termination</td>
<td>internal</td>
<td>internal</td>
<td>internal</td>
<td>externally switchable</td>
<td>internal</td>
</tr>
<tr>
<td>SCSI cable</td>
<td>2 feet, 50/50-pin</td>
<td>2 feet, 25/50-pin</td>
<td>2 feet, 25/50-pin</td>
<td>2 feet, 25/50-pin</td>
<td>3 feet, 50/50-pin</td>
</tr>
<tr>
<td><strong>Software</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formatter</td>
<td>Mac 2.25</td>
<td>Apple HD SC</td>
<td>DriveWare 1.7.9</td>
<td>Silverlining 5.31</td>
<td>Software Architects 3.29</td>
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<tr>
<td>Bundled software</td>
<td>none</td>
<td>formatters, utilities, 8 MB shareware</td>
<td>10 MB shareware</td>
<td>Norton Utilities, 10 MB shareware</td>
<td>none</td>
</tr>
<tr>
<td>System 7-compatible</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>User-selectable Interleave</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Password protection</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Data encryption</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Disk optimizer</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Backup</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>File recovery</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td><strong>Case</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Indicator lights</td>
<td>access, power</td>
<td>access</td>
<td>access</td>
<td>access, power</td>
<td>access, power</td>
</tr>
<tr>
<td>Construction</td>
<td>metal</td>
<td>plastic</td>
<td>plastic</td>
<td>plastic</td>
<td>metal</td>
</tr>
<tr>
<td>Fuse</td>
<td>internal</td>
<td>none</td>
<td>external</td>
<td>internal</td>
<td>internal</td>
</tr>
<tr>
<td>Other</td>
<td>NA</td>
<td>powered by floppy port</td>
<td>two power outlets</td>
<td>one power outlet</td>
<td>NA</td>
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<tr>
<td>Size (L x W x H, in.)</td>
<td>10 x 10 x 2.5&quot;</td>
<td>5 x 8 x 1</td>
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<td>8 x 6 x 2.75</td>
<td>7 x 2 x 5</td>
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<td>1.5 lb</td>
<td>5 lb</td>
<td>2.75 lb</td>
<td>2.5 lb</td>
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<tr>
<td><strong>Company</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard Drives International</td>
<td>IDS Livingstone Technologies</td>
<td>Jasmine Technologies</td>
<td>La Cie Ltd.</td>
<td>Liberty Systems</td>
<td></td>
</tr>
<tr>
<td>1912 W. 4th St.</td>
<td>1225 Elko Dr.</td>
<td>1225 Elko Dr.</td>
<td>15552 S.W. 90th Ct.</td>
<td>160 Saratoga Ave.</td>
<td></td>
</tr>
<tr>
<td>Tempe, AZ 85281</td>
<td>Sunnyvale, CA 94086</td>
<td>Sunnyvale, CA 94089</td>
<td>Tualatin, OR 97062</td>
<td>Ste. 38</td>
<td></td>
</tr>
<tr>
<td>(800) 767-3475</td>
<td>(800) 733-0078</td>
<td>(800) 347-3228</td>
<td>(800) 999-0143</td>
<td>Santa Clara, CA 95051</td>
<td></td>
</tr>
<tr>
<td>(602) 350-1128</td>
<td>(408) 752-2900</td>
<td>(408) 752-2900</td>
<td>(503) 691-0771</td>
<td>(408) 983-1127</td>
<td></td>
</tr>
</tbody>
</table>

*Should be shipping the Quantum LP105S by the time you read this; check for price changes.

*Zero-footprint case.
Who's the Fastest of Them All?
MicroNet's Disk Mirroring System for the Macintosh II!

Loss of hard disk data could ruin your business. But until now, data backup solutions have been slow. A Micro/Mirror system can end your worries.

Using MicroNet's mirroring controller and our unique software, Micro/Mirror transfers data across NuBus instead of the slower native SCSI port. Data is stored with a perfectly mirrored copy in a matched pair of high performance hard disk drives.

Micro/Mirror's data protection is the best in the business. With automatic real-time backups, there's no loss of data. If a drive fails, the user is alerted and the system continues automatically with no interruption of service.

Micro/Mirror preserves all data, including AppleShare access privileges, with zero down time.

The Micro/Mirror systems range in capacity from 303 to 1,350 MBytes, with access times as fast as 11.5 ms. They offer plug-and-play solutions using matched components for assured dependability. And they're fully compatible with System 7.0.

So why worry? You can have speed and security in one fault-tolerant package with the new MicroNet disk mirroring system.

For peace of mind, call the MicroNet Sales Department today for the name of a reseller near you. 1-714-837-6033.

Quality You Can Count On.
## Table 2: Features of 100-Megabyte Hard Drives, continued

<table>
<thead>
<tr>
<th>Company</th>
<th>List price</th>
<th>Street price</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacAvenue Prodigé 100MB HD</td>
<td>$639</td>
<td>$630</td>
<td>Good package. Solid construction.</td>
<td></td>
</tr>
<tr>
<td>MacDirect 105MB</td>
<td>$495</td>
<td>$495</td>
<td>Inexpensive. Good service.</td>
<td></td>
</tr>
<tr>
<td>MacProducts Magic 105LP External</td>
<td>$539</td>
<td>$530</td>
<td>Inexpensive. Good service.</td>
<td></td>
</tr>
<tr>
<td>MacTel Index 100MB</td>
<td>$459</td>
<td>$459</td>
<td>Inexpensive. Good price/performance ratio.</td>
<td></td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>Feature</th>
<th>Loviel Maxcess 105e</th>
<th>MacAvenue Prodigé 100MB HD</th>
<th>MacDirect 105MB</th>
<th>MacProducts Magic 105LP External</th>
<th>MacTel Index 100MB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal mechanism</td>
<td>Quantum LP105S</td>
<td>Fujitsu M2616SA</td>
<td>Quantum LP105S</td>
<td>Quantum LP105S</td>
<td>Quantum LP105S</td>
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<td>Seek time (advert/actual)</td>
<td>17 ms/19 ms</td>
<td>20 ms/20 ms</td>
<td>17 ms/19 ms</td>
<td>17 ms/19 ms</td>
<td>17 ms/19 ms</td>
</tr>
<tr>
<td>SCSI-ID selector</td>
<td>push button</td>
<td>push button</td>
<td>push button</td>
<td>push button</td>
<td>push button</td>
</tr>
<tr>
<td>SCSI termination</td>
<td>external</td>
<td>external</td>
<td>external</td>
<td>internal</td>
<td>external or internal</td>
</tr>
<tr>
<td>SCSI cable</td>
<td>3 feet, 25/50-pin</td>
<td>2 feet, 25/50-pin</td>
<td>3 feet, 25/50-pin</td>
<td>3 feet, 25/50-pin</td>
<td>2 feet, 50/50-pin</td>
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### Software

<table>
<thead>
<tr>
<th>Feature</th>
<th>Loviel Maxcess 105e</th>
<th>MacAvenue Prodigé 100MB HD</th>
<th>MacDirect 105MB</th>
<th>MacProducts Magic 105LP External</th>
<th>MacTel Index 100MB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formatter</td>
<td>SCSI Director 1.7.3</td>
<td>DK Research 2.02</td>
<td>Dataware 2.0</td>
<td>Disk Manager Mac 2.24</td>
<td>Index HD Utilities</td>
</tr>
<tr>
<td>Bundled software</td>
<td>Norton Utilities</td>
<td>Now Utilities, On Location</td>
<td>SCSI Commander</td>
<td>SCSbus, Stuffit, Disinfectant, 10 MB shareware</td>
<td>BackMatic, AutoSave, 14 MB shareware</td>
</tr>
<tr>
<td>System 7-compatible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User-selectable Interleave</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Password protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data encryption</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Disk optimizer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backup</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>File recovery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

### Case

<table>
<thead>
<tr>
<th>Feature</th>
<th>Loviel Maxcess 105e</th>
<th>MacAvenue Prodigé 100MB HD</th>
<th>MacDirect 105MB</th>
<th>MacProducts Magic 105LP External</th>
<th>MacTel Index 100MB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator lights</td>
<td>access, power</td>
<td>access, power</td>
<td>access, power</td>
<td>access, power</td>
<td>access, power</td>
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<tr>
<td>Construction</td>
<td>plastic</td>
<td>plastic</td>
<td>metal</td>
<td>plastic</td>
<td>plastic</td>
</tr>
<tr>
<td>Fuse</td>
<td>internal</td>
<td>external</td>
<td>external</td>
<td>internal</td>
<td>external and internal</td>
</tr>
<tr>
<td>Other</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Size (L x W x H, in.)</td>
<td>8 x 6 x 2</td>
<td>9.5 x 5 x 4.5</td>
<td>10 x 10 x 2^3</td>
<td>10.5 x 9.75 x 2.25^3</td>
<td>10 x 10 x 2.5^3</td>
</tr>
<tr>
<td>Weight</td>
<td>3 lb</td>
<td>6.5 lb</td>
<td>7 lb</td>
<td>4 lb</td>
<td>4.25 lb</td>
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</table>

### Company

<table>
<thead>
<tr>
<th>Company</th>
<th>100-Megabyte Hard Drives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loviel Maxcess 105e</td>
<td>100-Megabyte Hard Drives</td>
</tr>
<tr>
<td>MacAvenue Prodigé 100MB HD</td>
<td>100-Megabyte Hard Drives</td>
</tr>
<tr>
<td>MacDirect 105MB</td>
<td>100-Megabyte Hard Drives</td>
</tr>
<tr>
<td>MacProducts Magic 105LP External</td>
<td>100-Megabyte Hard Drives</td>
</tr>
<tr>
<td>MacTel Index 100MB</td>
<td>100-Megabyte Hard Drives</td>
</tr>
</tbody>
</table>

*Zero-footprint case.*

---

142 November 1991 MacUser
You may have seen color prints as vibrant and sharp as this before.

But, until now, you've never seen them come out of your computer.

Mitsubishi International introduces the Shinko GHC-S445 Dye-Sublimation Color Printer — for color imaging as vivid, rich and detailed as your own imagination.

How does the Shinko S445 produce prints with so much clarity and life?

We start by using a full 24-bit palette, which means you've got 16.7 million colors available at every pixel. The result? Precise, full-spectrum color, with no dithering. Then we add 300 DPI, for astonishing resolution.

But brilliant color doesn't command all our attention.

We've also made the Shinko S445 fully compatible with PostScript® via our PowerPage® interpreter. So even fine lettering comes out razor sharp.

What's more, the Shinko S445 can produce images as large as a full 8½" by 11".

Amazing as our S445 is, though, it's only the newest addition to Mitsubishi International's family of outstanding color imaging products. From scanning to high-resolution proofing to dye-sub printing, we can handle every facet of your color processing work.

For more detailed information, call Mitsubishi International at (914) 997-4999 or (408) 980-1100. And let us show you color done like you've never seen it done before.
## 100-Megabyte Hard Drives

### Table 2: Features of 100-Megabyte Hard Drives, continued

<table>
<thead>
<tr>
<th>Feature</th>
<th>MicroNet MS-164</th>
<th>Microtech Nova N120</th>
<th>Mirror MP105</th>
<th>PCPC MacBottom 105</th>
<th>PLI Quantum 105</th>
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<tbody>
<tr>
<td><strong>List price</strong></td>
<td>$795</td>
<td>$1,249</td>
<td>$497</td>
<td>$549</td>
<td>$699</td>
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<tr>
<td><strong>Street price</strong></td>
<td>$550</td>
<td>$919</td>
<td>$497</td>
<td>$549</td>
<td>$699</td>
</tr>
<tr>
<td><strong>Cons</strong></td>
<td>Minimal service.</td>
<td>Expensive.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hardware</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Internal mechanism</strong></td>
<td>Toshiba MK234 120S</td>
<td>Quantum ProDrive 120S</td>
<td>Quantum LP10SS</td>
<td>Quantum LP10SS</td>
<td>Quantum LP10SS</td>
</tr>
<tr>
<td><strong>Capacity (advert/actual)</strong></td>
<td>125 MB/104 MB</td>
<td>120 MB/115 MB</td>
<td>105 MB/102 MB</td>
<td>105 MB/101 MB</td>
<td>105 MB/105 MB</td>
</tr>
<tr>
<td><strong>Seek time (advert/actual)</strong></td>
<td>25 ms/26 ms</td>
<td>15 ms/15 ms</td>
<td>17 ms/19 ms</td>
<td>17 ms/19 ms</td>
<td>17 ms/19 ms</td>
</tr>
<tr>
<td><strong>SCSI-10 selector</strong></td>
<td>push button</td>
<td>push button</td>
<td>push button</td>
<td>push button</td>
<td>rotary switch</td>
</tr>
<tr>
<td><strong>SCSI termination</strong></td>
<td>external</td>
<td>external</td>
<td>external</td>
<td>external</td>
<td>externally switchable</td>
</tr>
<tr>
<td><strong>SCSI cable</strong></td>
<td>3 feet, 25/50-pin</td>
<td>2.5 feet, 25/50-pin</td>
<td>1 foot, 50/50-pin</td>
<td>2 feet, 25/50-pin</td>
<td>1.5 feet, 25/50-pin</td>
</tr>
<tr>
<td><strong>Software</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Formatter</strong></td>
<td>MicroNet Utility 5.1.6</td>
<td>Microtech HD Formatter V 3.28 R202</td>
<td>DK Research 2.04</td>
<td>SCSITools 2.1.5-319</td>
<td>PLI Formatter 3.1</td>
</tr>
<tr>
<td><strong>Bundled software</strong></td>
<td>none</td>
<td>Norton Utilities</td>
<td>MediaManager, Volume Back-Up, 10 MB shareware</td>
<td>HFS Backup 3.5, SuperDisk Lite, Touch Base</td>
<td>Turbo Back, Turbo Cache, Turbo Optimizer, Turbo Spool, 16 MB shareware</td>
</tr>
<tr>
<td><strong>System 7-compatible</strong></td>
<td>● ● ● ● ●</td>
<td>● ● ● ● ●</td>
<td>● ● ● ● ●</td>
<td>● ● ● ● ●</td>
<td>● ● ● ● ●</td>
</tr>
<tr>
<td><strong>User-selectable interleave</strong></td>
<td>● ● ● ● ●</td>
<td>● ● ● ● ●</td>
<td>● ● ● ● ●</td>
<td>● ● ● ● ●</td>
<td>● ● ● ● ●</td>
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<tr>
<td><strong>Password protection</strong></td>
<td>● ○ ● ● ○</td>
<td>○ ● ○ ● ●</td>
<td>○ ● ○ ● ●</td>
<td>○ ● ○ ● ●</td>
<td>○ ● ○ ● ●</td>
</tr>
<tr>
<td><strong>Data encryption</strong></td>
<td>○ ○ ○ ● ○</td>
<td>○ ○ ○ ● ○</td>
<td>○ ○ ○ ● ○</td>
<td>○ ○ ○ ● ○</td>
<td>○ ○ ○ ● ○</td>
</tr>
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<td><strong>Disk optimizer</strong></td>
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<td>○ ● ○ ○ ○</td>
<td>○ ● ○ ○ ○</td>
<td>○ ● ○ ○ ○</td>
<td>○ ● ○ ○ ○</td>
</tr>
<tr>
<td><strong>Backup</strong></td>
<td>○ ○ ○ ○ ○</td>
<td>○ ○ ○ ○ ○</td>
<td>○ ○ ○ ○ ○</td>
<td>○ ○ ○ ○ ○</td>
<td>○ ○ ○ ○ ○</td>
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<td>○ ○ ○ ○ ○</td>
<td>○ ○ ○ ○ ○</td>
<td>○ ○ ○ ○ ○</td>
<td>○ ○ ○ ○ ○</td>
<td>○ ○ ○ ○ ○</td>
</tr>
<tr>
<td><strong>Case</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fan</strong></td>
<td>● ● ● ● ●</td>
<td>● ● ● ● ●</td>
<td>● ● ● ● ●</td>
<td>● ● ● ● ●</td>
<td>● ● ● ● ●</td>
</tr>
<tr>
<td><strong>Indicator lights</strong></td>
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<td>access, power</td>
<td>access, power</td>
<td>access, power</td>
<td>access, power</td>
</tr>
<tr>
<td><strong>Construction</strong></td>
<td>plastic</td>
<td>plastic</td>
<td>metal</td>
<td>plastic</td>
<td>metal</td>
</tr>
<tr>
<td><strong>Fuse</strong></td>
<td>internal</td>
<td>external</td>
<td>external</td>
<td>internal</td>
<td>external</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>NA</td>
<td>NA</td>
<td>two power outlets</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td><strong>Size (L x W x H, in.)</strong></td>
<td>10 x 10 x 2.75 9 9.75 x 10.5 x 2.5 10.75 x 9.75 x 2.5 9.5 x 9.5 x 2 9.75 x 9.75 x 2.25</td>
<td>9.75 x 10.5 x 2.5 10.75 x 9.75 x 2.5 9.5 x 9.5 x 2 9.75 x 9.75 x 2.25</td>
<td>9.75 x 10.5 x 2.5 10.75 x 9.75 x 2.5 9.5 x 9.5 x 2 9.75 x 9.75 x 2.25</td>
<td>9.75 x 10.5 x 2.5 10.75 x 9.75 x 2.5 9.5 x 9.5 x 2 9.75 x 9.75 x 2.25</td>
<td>9.75 x 10.5 x 2.5 10.75 x 9.75 x 2.5 9.5 x 9.5 x 2 9.75 x 9.75 x 2.25</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>7.75 lb</td>
<td>6 lb</td>
<td>11 lb</td>
<td>4.5 lb</td>
<td>4.5 lb</td>
</tr>
<tr>
<td><strong>Company</strong></td>
<td>MicroNet Technology</td>
<td>Microtech International</td>
<td>Mirror Technologies</td>
<td>PCPC</td>
<td>Peripheral Land, Inc.</td>
</tr>
<tr>
<td><strong>Address</strong></td>
<td>20 Mason Irvine, CA 92718</td>
<td>158 Commerce St. East Haven, CT 06512</td>
<td>2644 Patton Rd. Roseville, MN 55113</td>
<td>4710 Eisenhower Blvd. Ste. A</td>
<td>47421 Bayside Pkwy. Fremont, CA 94538</td>
</tr>
<tr>
<td><strong>Phone</strong></td>
<td>(714) 837-6033</td>
<td>(600) 628-4276</td>
<td>(800) 654-5294</td>
<td>(800) 622-2888</td>
<td>(800) 288-3754</td>
</tr>
</tbody>
</table>

1 Mechanism varies. 2 Zero-footprint case.
Imagine getting twice the Bernoulli for two-thirds the price.

The new Bernoulli 90MB.

Welcome to the next generation of removable storage, the new Bernoulli® 90 from Iomega.®

At 90 megabytes per removable disk, we’ve more than doubled our capacity. Yet the new Bernoulli 90 is actually less expensive than our own Bernoulli ++, as well as other removable-disk drives. A lot less. And a lot faster, too.

But the best part is, it’s all Bernoulli. Rugged, reliable, endless storage—exactly what storage-intensive Macintosh users demand.

More value.
The new Bernoulli 90 is now considerably less expensive than other removable drives of similar capacity. Granted, competitive pricing alone doesn’t necessarily mean value—so consider what else you don’t get with other removable-storage drives.

You don’t get a new, 19-msec effective access time. You don’t get a technology that frees you from head crashes, or removable disks that can stand 1,000Gs of shock. You don’t get a drive that’s compatible with every major operating system, and workstations. And you don’t get Central Point’s MacTools Deluxe or Dantz’s Retrospect software.

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More recognition.
Leading publications have given us welcome recognition, but with a 98 percent satisfaction rate, our biggest supporters are Bernoulli users.

Our users enjoy worldwide support and a 24-hour drive replacement service. To further protect their investment, we’ve designed the Bernoulli 90 to read 4MB disks. And we’re instituting an upgrade program to help get every Bernoulli user into the 90s.

Call 1-800-777-6303.

Questions? We don’t blame you. There’s a lot more you should know about—like our free, 90MB disk offer, drive configurations, Bernoulli Technology,® and specific pricing. So we’ve prepared a free brochure that’s yours with a phone call. Find out today what a welcome change Bernoulli can be. Before the 90s leave you behind.

© 1991, Iomega, the Iomega logo, Bernoulli and Bernoulli Technology are registered trademarks, and Bernoulli Means Security For Your Data is a trademark of Iomega Corp. All other products are registered trademarks of their respective companies. *U.S. only. **Phone number for U.S. and Canada, Internationally, call 322-720-9916. For customer service questions, call 1-800-456-5522.
# 100-Megabyte Hard Drives

Table 2: Features of 100-Megabyte Hard Drives, continued

<table>
<thead>
<tr>
<th></th>
<th>Procom MD100</th>
<th>Relax Vista 165</th>
<th>Rodime Cobra 100e</th>
<th>Tulip A-Hive Jr 120</th>
<th>VCP 105</th>
</tr>
</thead>
<tbody>
<tr>
<td>List price</td>
<td>$1,199</td>
<td>$429</td>
<td>$1,499</td>
<td>$849</td>
<td>$529</td>
</tr>
<tr>
<td>Street price</td>
<td>$800</td>
<td>$429</td>
<td>$850</td>
<td>$629</td>
<td>$529</td>
</tr>
<tr>
<td>Hardware</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal mechanism</td>
<td>Quantum ProDrive 105S *</td>
<td>Quantum ProDrive 105S *</td>
<td>Rodime R03128TS</td>
<td>Quantum ProDrive 120S</td>
<td>Quantum LP105S</td>
</tr>
<tr>
<td>Capacity (advert/actual)</td>
<td>105 MB/101 MB</td>
<td>105 MB/101 MB</td>
<td>126.5 MB/105 MB</td>
<td>120 MB/120 MB</td>
<td>105 MB/100 MB</td>
</tr>
<tr>
<td>Seek time (advert/actual)</td>
<td>19 ms/23 ms</td>
<td>19 ms/23 ms</td>
<td>18 ms/19 ms</td>
<td>15 ms/15 ms</td>
<td>17 ms/19 ms</td>
</tr>
<tr>
<td>SCSI-ID selector</td>
<td>rotary switch</td>
<td>push button</td>
<td>push button</td>
<td>push button</td>
<td>push button</td>
</tr>
<tr>
<td>SCSI termination</td>
<td>external</td>
<td>external</td>
<td>internal</td>
<td>external</td>
<td>internal</td>
</tr>
<tr>
<td>SCSI cable</td>
<td>3 feet, 25/50-pin</td>
<td>2 feet, 25/50-pin</td>
<td>2 feet, 25/50-pin</td>
<td>3 feet, 25/50-pin</td>
<td>2 feet, 25/50-pin</td>
</tr>
<tr>
<td>Software</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formatter</td>
<td>Procom installer 2.08</td>
<td>DK Research 2.05</td>
<td>Cobra Driver 1.14</td>
<td>SCSI Commander 2.0</td>
<td>Neuron Inc. Installer</td>
</tr>
<tr>
<td>Bundled software</td>
<td>Virex, 911</td>
<td>Redux</td>
<td>Redux</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>System 7-compatible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User-selectable interleave</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Password protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data encryption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disk optimizer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backup</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>File recovery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator lights</td>
<td>access, power</td>
<td>access, power</td>
<td>access, power, ready</td>
<td>access, power</td>
<td>access, power</td>
</tr>
<tr>
<td>Construction</td>
<td>plastic</td>
<td>metal</td>
<td>plastic and metal</td>
<td>plastic</td>
<td>metal</td>
</tr>
<tr>
<td>Fuse</td>
<td>internal</td>
<td>internal</td>
<td>internal</td>
<td>internal</td>
<td>external</td>
</tr>
<tr>
<td>Other</td>
<td>NA</td>
<td>NA</td>
<td>two power outlets</td>
<td>NA</td>
<td>two power outlets</td>
</tr>
<tr>
<td>Size (L x W x H, in.)</td>
<td>10.25 x 9.75 x 2.25&quot;</td>
<td>10 x 10 x 2&quot;</td>
<td>9.75 x 10.5 x 2.5&quot;</td>
<td>7 x 7 x 2</td>
<td>10 x 9.5 x 2.25&quot;</td>
</tr>
<tr>
<td>Weight</td>
<td>7 lb</td>
<td>5 lb</td>
<td>6 lb</td>
<td>4 lb</td>
<td>5.5 lb</td>
</tr>
</tbody>
</table>

*Should be shipping the Quantum LP105S by the time you read this; check for price changes.

*Zero-footprint case.
Get the Facts, Before You Buy A

Now you can buy a state-of-the-art fax modem without compromising on data features like MNP 3 and V.42bis compression — the SupraFAXModem Plus has everything you need! This complete package turns your Macintosh® into a sophisticated telecommunications tool. Before you know it, you'll be sending and receiving faxes directly from your Mac — even while you use it for other tasks. And you can find free software and lots of useful information as you explore the amazing world of telecommunications with the included software packages and online service offers.

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Supra Corporation

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Up to 9600 bps, error-free throughput when connected to another V.42bis modem
MicroPhone™ 1.5 telecommunications software
America Online™ & CompuServe Information Manager™ software
All required cables & manuals provided
Five year limited warranty

9600 S/R FAX • MNP 5 • V.42bis

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Transparent background operation
Activity log & customizable fax cover pages
Transmission scheduling & broadcasting

Supra FAX Modem

Supra Drive S.W. Albany, OR 97321 USA • 503-957-2400 • All trademarks belong to their respective companies.
### 100-Megabyte Hard Drives

#### Table 2: Features, continued

<table>
<thead>
<tr>
<th>Feature</th>
<th>Vision Logic</th>
<th>Wholesale 54</th>
</tr>
</thead>
<tbody>
<tr>
<td>List price</td>
<td>$699</td>
<td>$389</td>
</tr>
<tr>
<td>Street price</td>
<td>$699</td>
<td>$389</td>
</tr>
<tr>
<td>Pros</td>
<td>Compact, Portable.</td>
<td>Lowest-priced drive.</td>
</tr>
<tr>
<td>Cons</td>
<td>Flimsy construction.</td>
<td>No software bundled.</td>
</tr>
</tbody>
</table>

#### Hardware

<table>
<thead>
<tr>
<th>Feature</th>
<th>Vision Logic</th>
<th>Wholesale 54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity (advert./actual)</td>
<td>120 MB/116 MB</td>
<td>105 MB/105 MB</td>
</tr>
<tr>
<td>Seek time (advert./actual)</td>
<td>15 ms/18 ms</td>
<td>19 ms/23 ms</td>
</tr>
<tr>
<td>SCSI-ID selector</td>
<td>push button</td>
<td>push button</td>
</tr>
<tr>
<td>SCSI termination</td>
<td>internal</td>
<td>internal</td>
</tr>
<tr>
<td>SCSI cable</td>
<td>2 feet, 25/56-pin</td>
<td>2 feet, 50/56-pin</td>
</tr>
</tbody>
</table>

#### Software

<table>
<thead>
<tr>
<th>Feature</th>
<th>Vision Logic</th>
<th>Wholesale 54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formatter</td>
<td>Deltaic System Installer 2.01</td>
<td>Disk Manager Mac 2.24</td>
</tr>
<tr>
<td>Bundled software</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

#### Case

<table>
<thead>
<tr>
<th>Feature</th>
<th>Vision Logic</th>
<th>Wholesale 54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator lights</td>
<td>access</td>
<td>access, power</td>
</tr>
<tr>
<td>Construction</td>
<td>metal</td>
<td>metal</td>
</tr>
<tr>
<td>Fuse</td>
<td>internal</td>
<td>internal</td>
</tr>
<tr>
<td>Other</td>
<td>powered by floppy port</td>
<td>NA</td>
</tr>
<tr>
<td>Size (L x W x H, in.)</td>
<td>9 x 5 x 1.5</td>
<td>9.5 x 9.5 x 2.5</td>
</tr>
<tr>
<td>Weight</td>
<td>2.5 lb</td>
<td>7 lb</td>
</tr>
</tbody>
</table>

#### Company

<table>
<thead>
<tr>
<th>Feature</th>
<th>Vision Logic, Inc.</th>
<th>Wholesale 54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>283 E. Brokaw Rd.</td>
<td>2415 S. Roosevelt</td>
</tr>
<tr>
<td>City</td>
<td>San Jose, CA 95112</td>
<td>Tempe, AZ 85282</td>
</tr>
<tr>
<td>Phone</td>
<td>(408) 437-1000</td>
<td>(602) 659-0054</td>
</tr>
</tbody>
</table>

* Should be shipping the Quantum LP105S by the time you read this; check for price changes.

* Zero-footprint case.

### Table 2 Criteria

<table>
<thead>
<tr>
<th>Feature</th>
<th>Vision Logic</th>
<th>Wholesale 54</th>
</tr>
</thead>
<tbody>
<tr>
<td>List price</td>
<td>The manufacturer’s suggested retail price.</td>
<td></td>
</tr>
<tr>
<td>Street price</td>
<td>An average actual price charged by dealers around the U.S. in July 1991.</td>
<td></td>
</tr>
<tr>
<td>Internal mechanism</td>
<td>The OEM model name of the disk mechanism used in the drive. Double-check with the vendor to see if it uses different mechanisms in the same-model drive.</td>
<td></td>
</tr>
<tr>
<td>Capacity (advert./actual)</td>
<td>The advertised capacity of a drive and the actual formatted capacity (useful storage space).</td>
<td></td>
</tr>
<tr>
<td>Seek time (advert./actual)</td>
<td>The theoretical time required to move the read/write head between any two tracks on the disk, as reported by the OEM manufacturer, and the actual seek time, as reported by our SCSI Hardware Evaluator benchmark testing.</td>
<td></td>
</tr>
<tr>
<td>SCSI-ID selector</td>
<td>The method (DIP switch, rotary switch, push button, or thumb wheel) used to set the SCSI ID.</td>
<td></td>
</tr>
<tr>
<td>SCSI termination</td>
<td>The location or type of termination used by the drive.</td>
<td></td>
</tr>
<tr>
<td>SCSI cable</td>
<td>The length and type of the SCSI cable shipped with the drive.</td>
<td></td>
</tr>
<tr>
<td>Formatter</td>
<td>The software that formats the drive for use with a Mac.</td>
<td></td>
</tr>
<tr>
<td>Bundled software</td>
<td>Commercial applications, utilities, or shareware that come with the drive. Also the software that vendors have developed exclusively for their drives.</td>
<td></td>
</tr>
<tr>
<td>System 7-compatible</td>
<td>After formatting, is the drive compatible with Apple’s new system software?</td>
<td></td>
</tr>
<tr>
<td>User-selectable interleave</td>
<td>Can the user specify the desired interleave ratio for the drive, or is it always automatically set by the software itself?</td>
<td></td>
</tr>
<tr>
<td>Password protection</td>
<td>Does the drive come with a method to prevent others from accessing it unless they have a password?</td>
<td></td>
</tr>
<tr>
<td>Data encryption</td>
<td>Does the drive come with a method of scrambling its contents to prevent others from accessing the data unless they have a password?</td>
<td></td>
</tr>
<tr>
<td>Disk optimizer</td>
<td>Does the drive come with a utility for reorganizing its contents into contiguous blocks to improve its performance?</td>
<td></td>
</tr>
<tr>
<td>Backup</td>
<td>Does the drive come with software that copies files from the drive to other storage media for safekeeping?</td>
<td></td>
</tr>
<tr>
<td>File recovery</td>
<td>Does the drive come with a utility for rescuing deleted or damaged files?</td>
<td></td>
</tr>
<tr>
<td>Fan</td>
<td>Does the drive contain a fan to keep it cool?</td>
<td></td>
</tr>
<tr>
<td>Indicator lights</td>
<td>What the lights (if any) on the drive indicate.</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>The primary material(s) used for the case.</td>
<td></td>
</tr>
<tr>
<td>Fuse</td>
<td>Whether the drive has an internal or an external fuse.</td>
<td></td>
</tr>
</tbody>
</table>
Some People Are Born Accountants. For the Rest Of Us, There's New ACCPAC Simply Accounting.

Easy To Learn, Easy To Use And Only $199.

Now there's an accounting program anybody can use—new ACCPAC® Simply Accounting™, the quickest and easiest way to take care of your books.

You'll have it up and running in minutes. And you can do anything with just a few clicks of the mouse. Write a check. Print out an invoice. Do your payroll. Manage your receivables.

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Call us today at 1-800-645-3003 for the location of your nearest dealer.

It's the accounting program anybody can use.

And we mean anybody.
Okay, so maybe I'm not in MIS, but I grinned and loaded FoxBASE+/Mac.

The next day, I showed them a sample of their PC inventory database with not just how much of anything we had, but with pictures showing exactly what it looked like.

I ran their dBASE sales analysis program (using a couple of new Mac screens I whipped out) as they watched FoxBASE+/Mac scream through the numbers.

And then I showed them the kinds of reports they could get, using data stored in Fox or dBASE IV/III+ files on the PC.

You could have heard a pin drop.

Then they were all over me with questions, so I just handed them the FoxBASE+/Mac manuals and smiled.

Besides not being in MIS, I'm not a professional programmer, so you can tell how easy FoxBASE+/Mac is.

For the inventory system, I just used
FoxBASE+/Mac to read the database files they had on the PC (it reads Fox and dBASE IV/III+ files directly). I added a memo field into which I cut and pasted pictures that our DTP department had for our customer literature. Then I used the MacDraw-like screen painter to create a great color Mac output screen.

The sales analysis was easy, too. I had to create new screens but FoxBASE+/Mac ran the rest of the dBASE III+ program just fine. (It typically runs as much as 95% of standard FoxBASE+/PC and dBASE III+ code with no changes.)

And I built the reports I showed them from scratch. With no programming at all.

If you’re looking for a better way to manage your data, call Fox Software and ask for their free demo. It limits the number of records you can store, but is the full program, so you can check it all out for yourself on your applications.

Around here, MIS has been pretty busy the last few weeks. They’ve hooked up Macs and PCs on an Ethernet network and our information and data processing systems are looking great.

They’re building Hypercard-like applications I see people using all over the place. Accounting likes all of this because the single-user version lists for $495, and the unlimited Multi-User version is only $695.

And even the PC programmers are happy. I hear them talking about things like the great trace and debugging facilities, adding XCMDs and XFCNs, the dBASE-like programming language, System 7 compatibility, full file and record locking in the multi-user version, and how FoxBASE+/Mac is “so astoundingly fast for a Mac.”

Everyone seems to be laughing more now, too.

Call 1-800-837-FOX2 or 419-874-0162 today for a free, full-featured demo.

(Ask for Offer MUS-1101)
SUPER SERVER SOFTWARE:

NetWare for Macintosh 3.0

Can Novell’s NetWare steal top server honors from AppleShare? The new version for the Mac provides strong competition, but it’s expensive.

BY KELLI WISETH
AND THE MACUSER LABS STAFF

AppleShare may no longer be the best file-server software for your Mac network. Although AppleShare is fast, easy to install and manage, and relatively affordable, it’s being challenged by competitors that run on minicomputers, workstations, IBM PCs, and bargain-basement-priced PC clones.

In June ’91, when MacUser Labs compared AppleShare with nine top cross-platform challengers (see “Mac, DOS, and VAX File Servers,” page 134), we concluded that Apple’s time-tested server software was still the price/performance leader. In the past few months, however, a challenger has emerged and AppleShare’s dominance is no longer as secure.
This new contender — Novell NetWare for Macintosh 3.0 — is the latest effort from the established master of network software for the IBM PC. First released in 1983, Novell NetWare has become the most popular network operating system in the PC-compatible world. The NetWare product line comprises many products, each tuned to the needs of a particular segment of the networking community.

NetWare 2.2, released in the spring of 1991, is tailored to the needs of a small mixed workgroup — from 5 to 100 users of DOS- and OS/2-based machines. NetWare 3.11, also released this spring, is designed for high-performance, enterprisewide mixed networks — as many as 250 DOS computers, OS/2 machines, UNIX workstations, and mainframe computers. With the introduction of NetWare for Macintosh 3.0, as many as 100 Macs can be included in NetWare 3.11’s high-performance mix.

NetWare 2.2 requires an 80286-based computer or later, whereas NetWare 3.11 runs on an 80386-based computer such as the Compaq DeskPro 386/33 or the Dell System 333D. With additional software — NetWare for Macintosh 2.2 with NetWare 2.2 and NetWare for Macintosh 3.0 with NetWare 3.11 — you can turn either of these Intel-CPU-equipped servers into a file server for Macs as well — you won’t even know you’re logged on to a PC.

But why would a Mac network manager consider switching to a non-Mac file server? Well, if you already have DOS- or OS/2-based computers in your organization, you can probably use existing equipment. If you want to combine Macs and PC-compatibles onto one network — especially if you want to share files among all platforms — this can be a cost-effective solution as well.

Switching to an 80x86-based server also lets you take advantage of the low-cost, high-performance bargains available in the PC-clone market. For example, a complete Zeos 33-megahertz 80386-based system with 1 megabyte of RAM, an 85-megabyte hard-disk drive, a monitor, a keyboard, and 24-hour toll-free technical support costs less than $2,500. You’d be hard-pressed to find a Mac with that much power at that price. Flip through the back pages of any PC magazine, and you’ll find even lower prices.

When MacUser Labs tested NetWare for Macintosh 2.0 earlier this year for the June file-server report, we were impressed with its performance and features. However, we doubted that its high price would justify switching from AppleShare. Just as we were finishing that report, Novell released high-performance upgrades — NetWare 3.11 and NetWare for

Figure 1: Cost per User

<table>
<thead>
<tr>
<th>Cost per User</th>
<th>20 clients</th>
<th>50 clients</th>
<th>100 clients</th>
</tr>
</thead>
<tbody>
<tr>
<td>AppleShare</td>
<td>$500</td>
<td>$400</td>
<td>$300</td>
</tr>
<tr>
<td>Mac IIci</td>
<td>$200</td>
<td>$200</td>
<td>$200</td>
</tr>
<tr>
<td>Mac IIx</td>
<td>$100</td>
<td>$100</td>
<td>$100</td>
</tr>
<tr>
<td>Compaq 386/33</td>
<td>$200</td>
<td>$200</td>
<td>$200</td>
</tr>
<tr>
<td>Zeos '386/33</td>
<td>$300</td>
<td>$300</td>
<td>$300</td>
</tr>
<tr>
<td>NetWare 2.2</td>
<td>$200</td>
<td>$200</td>
<td>$200</td>
</tr>
<tr>
<td>NetWare 3.11</td>
<td>$300</td>
<td>$300</td>
<td>$300</td>
</tr>
</tbody>
</table>

Figure 1: Novell NetWare becomes more cost-effective as your network grows. AppleShare can support only 50 users at a time, but both versions of Novell NetWare support as many as 100 Macintosh clients each. When run on inexpensive but powerful hardware, NetWare can be more affordable on a per-user basis than it first appears to be. Remember that you need a second 80x86-based machine to manage the server and, of course, a NetWare-knowledgeable person to administer it.
Macintosh 3.0 — to its top-of-the-line enterprisewide server software. However, price remains an obstacle: NetWare 3.11 commands a hefty $3,495 for 20 users, and NetWare for Macintosh 3.0 costs an additional $895. AppleShare remains a bargain at $799 for 50 users. NetWare 2.2 — an upgrade containing an amalgam of features from several of the NetWare 2 family of products and including NetWare for Macintosh 2.2 — is no impulse purchase either: It weighs in at $895 for 5 users.

To find out if these new competitors are worth their premium prices, MacUser Labs installed each NetWare system on a Compaq 386/33 and challenged AppleShare 2.0 running on a Mac IIci and a Mac IIx. And while we had everything set up, we also looked at the bottom rung of the server-software price ladder: the peer-to-peer file-sharing feature that’s built in to Apple’s System 7 (see the “You Get What You Pay For” sidebar).

Server Basics

A file server consists of three components: a computer, a hard-disk drive, and file-server software that lets network users access the hard disk. AppleShare is file-server software that runs on a Mac Plus or later Mac and works over an AppleTalk network through cables connected either to your Mac’s LocalTalk port or to an EtherTalk card or SCSI device.

Apple designed AppleShare in conjunction with its system software, and the connection between a user’s Mac (the client) and the AppleShare server is virtually seamless. This transparent communication between the AppleShare client and server is conducted according to AFP (AppleTalk Filing Protocol). AFP lets AppleShare control such things as file access by multiple clients — preventing two Microsoft Excel users from changing the same spreadsheet at the same time, for example.

AppleShare server software runs only on a Mac, but vendors such as Novell have added AFP compliance to their server software, enabling Mac clients to access a NetWare server as easily and transparently as if it were AppleShare on a Mac. Clients gain access to a NetWare server the same way as they do to an AppleShare server — simply by selecting its name from a list in the Chooser. However, NetWare stores files on-disk in its own unique format, which has been highly optimized for speedy access.

NetWare for Macintosh 2.2 is a
File-Server Software

You Get What You Pay For

If you or others on your network have switched to System 7, you may not need to invest in server software—as long as your network needs are very basic. System 7’s file-sharing feature (see Figure A) lets network users share folders and volumes without using a dedicated server. You can make as many as ten folders or disks available to other users.

You decide who can access the shared folders or disks and what their privileges are. Other users on your network—as many as ten at a time—access the shared folders or disks by selecting them in the Chooser. When shared resources appear on the desktop, they look just like AppleShare volumes. System 6 users can also access your shared files but can’t share their files with others.

Unfortunately, when we ran our suite of benchmark tests, we found that old bromide “There’s no such thing as a free lunch” to be true. AppleShare was twice as fast as System 7’s free file-sharing feature on an IIsi. Although file sharing greatly opens up communications on a peer-to-peer basis, don’t expect to squeeze file-server performance out of file sharing simply by dedicating a Mac to the task.

Novell VAP (Value Added Process) that runs on top of the NetWare 2.2 file-server software and translates between the NetWare file format and AFP. NetWare for Macintosh 3.0, which requires NetWare 3.11 and later, is an NLM (NetWare Loadable Module)—it’s linked directly into the 32-bit multitasking NetWare operating system for enhanced performance. Each version of NetWare for Macintosh also comes with a NetWare DA for the client Mac that provides additional utilities for viewing access privileges and sending messages (see Figure 2).

Mac and PC users of a NetWare server can share files among machines. The Mac filenames look like standard DOS files named by a PC—they’re limited to eight characters, a period, and a three-character extension. DOS files, on the other hand, attain Mac icons when viewed from the Mac (see Figure 3). Novell also sells software that lets you launch DOS applications from your Mac (see the “Mac As a Virtual PC” sidebar).

Laborious Installation

Installing AppleShare is a simple matter of dragging the software to the hard disk, followed by a click here and a double-click there, but installing NetWare—either 2.2 or 3.11—requires that you know your way around the C: prompt, hard-disk-drive-partition tables, and hexadecimal network numbers, among other things. Although installing NetWare 2.2 is much easier than installing previous versions, you should still hire a certified NetWare consultant to help with its installation.

Installing NetWare 3.11 is also a job for a pro. As with 2.2, the first time you set up the hardware, you may also have to configure network-interface cards and perform low-level hard-disk formatting—a far cry from pulling a Mac IIsi out of a box and plugging it up. If you’re not a die-hard do-it-yourselfer, consider buying a “NetWare ready” hard-disk drive from a vendor such as Seagate—the NetWare server software is already installed, and you just have to install the NetWare for Macintosh module, which by itself is not too daunting a task.

For those of you who insist on going it alone, Novell’s documentation is well organized and coherently written and includes a book of basic concepts that does a good job of fleshing out the...
nitty-gritty details. And you don’t have to read each and every one of the dozen or so volumes to get started or to troubleshoot your system.

**Fast and Fail-Safe**

At first glance, the difference in price between AppleShare and either of the NetWare products seems staggering. But when you start sifting through the feature sets, you realize that AppleShare is strictly a file server, providing service for as many as 50 clients, but that NetWare includes such features as print services, a software providing service for as many as 50 or so volumes to get started or to clients, but that NetWare are includes such gering. But when you start sifting Mac-based AppleShare server.

that AppleShare is strictly a file server, and file service, reliability is every bit as important as speed. System fault tolerance, a feature of NetWare 2.2 and 3.11, protects server data through various multiple-hard-disk schemes. One form of system fault tolerance is disk mirroring — automatic duplication of a hard disk’s data onto a second hard disk through the same hard-disk controller card and data channel. You do need a second hard disk for this, but both hard disks share the same controller. Disk duplexing, another form of system fault tolerance, is similar to mirroring but provides greater protection at a faster speed, because the duplication takes place through a second channel — you need a second hard disk and a second controller card. (Remember, however, that using NetWare is not the only way to gain the peace of mind that duplexing provides: The Golden Triangle DiskTwin 2.0 [S999] is a disk-duplexing system that can add a similar level of protection to a Mac-based server.)

Two of NetWare’s features, read-after-write-verification and Hot Fix, ensure that data won’t be written to unreliable blocks on the hard disk. Data written to the hard disk is read back from the hard disk and compared with the original data still in memory. If the data doesn’t match, Hot Fix redirects the original block from memory to the Hot Fix Redirection Area — a small portion of the disk’s storage space that is automatically created during the installation process — for safe storage, and the location of the bad block is noted by the operating system to prevent subsequent writes to that block.

NetWare provides monitoring of a Novell-approved UPS (uninterruptible power supply) attached to the file server to provide backup power in the event of a power failure. If the power does fail, NetWare notifies any logged-on users and — after a period of time you can specify in a configuration file — logs out any remaining users, closes

---

**The Mac As a Virtual PC**

Novell NetWare for Macintosh extends your Mac’s reach into the DOS world by letting it share files with IBM PCs on a single server. But sometimes you need to massage DOS files before bringing them onto your Mac for fine-tuning. For example, you might want to export selected fields from a dBASE III+ file as a tab-delimited file for importing into Microsoft Word on your Mac. Because you can’t launch dBASE III+ on your Mac, you need access to a DOS machine to tweak that database file. Don’t have a DOS machine on your desk? Don’t worry — with Novell’s NetWare Access Server, you can use your Mac instead.

Access Server runs on a dedicated 386 machine and enables remote users to dial in to a NetWare network and access anything available on that network — data, applications, E-mail, mainframes, and minicomputers.

Novell recently released Version 1.2 of the Access Server software ($2,395), which now includes application-server features — applications are downloaded from the network file server and processed at the machine running Access Server rather than at the remote workstation. In true multitasking fashion, Access Server can run as many as 16 sessions concurrently.

OnLAN/Mac, part of the Access Server upgrade, is emulation software that runs on your Mac and lets you connect to the machine running Access Server for DOS sessions. Simply launch the OnLAN/Mac application and log on to the Access Server machine, and the DOS interface appears as a window on your Mac monitor (see Figure B). You can switch between Mac and DOS applications simply by selecting a window, as you normally do under MultiFinder. You can also run multiple DOS sessions concurrently — up to the 16-session constraint imposed by Access Server.

---

**Figure B:** By logging on to Access Server, you can launch a DOS application — such as Microsoft Word 5.0 — and cut and paste directly into a Mac Word 4.0 document. And you can launch another DOS session to control the NetWare server directly from your Mac.
any open files, and shuts itself down.

Finally, another powerful security feature included in both NetWare versions we tested is a transaction-tracking system, which protects multiuser application files from corruption because of incomplete transactions—during a system crash or hardware failure, for example. If there’s a network failure, the transaction-tracking system backs out incomplete transactions—the data and index information in the database are returned to the state they were in before the transaction began.

NetWare for Macintosh 3.0 also includes the AppleTalk console utility—ATCON—an NLM for use at the file-server console for monitoring AppleTalk networks. With ATCON, you are able to verify that another AppleTalk node is communicating on

---

**Figure 4: File-Server Performance**

![Graph showing file-server performance comparison](image)

**Overall Performance:**

We compared the results of all tests with those from AppleShare on a Mac IIfx running on an EtherTalk network. NetWare 3.11 with NetWare for Macintosh 3.0 gave breathtaking performance, particularly at the 15- and 20-client marks.

**File-Transfer Speed:**

We kept the file server active with requests from 5, 10, 15, and 20 clients while a single client copied a 1-megabyte folder to the server. NetWare 3.11 with NetWare for Macintosh 3.0 performed about as fast as NetWare 2.2 with NetWare for Macintosh 2.2 and AppleShare on a Mac IIfx with a 5-client load. We also read the same file from the server, with similar results.

**Database-Access Speed:**

While one client searched for, changed, and summarized data in a 4th Dimension database on the server, the other clients—5, 10, 15, and 20 at a time—searched the 6,000-record database at random. Again, NetWare 3.11 with NetWare for Macintosh 3.0 finished first, and at 20 users, it was more than three times as fast as AppleShare on a Mac IIfx.
the network and view router statistics, for example, to help troubleshoot network problems.

**Snappy Service**

We got a hint of NetWare's capabilities during testing for our June report and were anxious to find out just what the high-end NetWare 3.11 with NetWare for Macintosh 3.0 could do. We installed NetWare on a Compaq 386/33 with 7 megabytes of RAM and a 310-megabyte hard-disk drive, connected 21 Macs, and ran our full suite of file-server tests. Keeping each file server busy with requests from 5, 10, 15, and 20 Macs, we timed file transfers between the 21st Mac and the server. Our database-access tests likewise placed increasing and varying demands on the server: While one
Macintosh searched for, changed, and summarized data in a 6,000-record 4th Dimension database on a server, the other Macs - 5, 10, 15, and then 20 at a time - searched the database at random.

We conducted all tests over both EtherTalk and LocalTalk networks and found that there's really no reason to install NetWare — either 2.2 or 3.11 — if you're using LocalTalk. LocalTalk's slowness hampers a high-performance file server considerably (see Figure 4). If you're still running LocalTalk, upgrade to EtherTalk before you invest in NetWare.

When we began testing, we expected NetWare 3.11 with NetWare for Macintosh 3.0 to be fast — but frankly, the results made even our jaded jaws drop.

In test after test, NetWare 3.11 with NetWare for Macintosh 3.0 — on EtherTalk — left the others in the dust. And NetWare's performance edge really stood out as the client load on the server increased. At 20 clients, NetWare 3.11 with NetWare for Macintosh 3.0 was more than three times faster than AppleShare on a Mac IIfx.

Serves You Right

File servers enhance workgroup productivity, but they have to be fast to be effective — and none is faster than NetWare 3.11 coupled with NetWare for Macintosh 3.0. Using a PC-based file server provides the advantage of file sharing between PCs and Macs — and you can use an 80386-based computer that is far less expensive than a Mac IIfx. In fact, you may already have the server hardware and software you need in another department serving files on an existing Novell network — and 60 percent of networked PC sites do. All you need to do is install the appropriate version of NetWare for Macintosh.

But switching to NetWare has disadvantages. You need a second PC to administer the PC server, and you need to know your way around DOS and the NetWare operating system. At top performance isn't necessary and you don't frequently share files between PCs and Macs, keeping Mac file services on a Mac file server may still make the most sense. And keep in mind that if you stick with AppleShare on a Mac, you'll be able to upgrade with ease as faster Macs become available.

Kelli Wise is a MacUser associate editor. As a former PC applications developer, she fondly remembers the romance of the Ctrl prompt.

The Bottom Line

No Mac is an island. Thanks to its built-in networking system — LocalTalk — Macs can easily link with other machines and store files on a central file server. But such simple networking and file serving has a negative side — Apple's server software, AppleShare, hogs down dramatically with each additional client.

But you're no longer limited to choosing AppleShare on a Mac. AppleShare-compliant server software runs on a variety of hardware platforms, including PCs based on the Intel 80x86 family that can be purchased for far less than a high-performance Mac.

For those who want the fastest file server around and also need to share files among Mac, DOS-based, and OS/2-based clients and even UNIX-based minicomputers and mainframes, NetWare 3.11 ($3,495/20 clients) with Novell NetWare for Macintosh 3.0 ($395/20 clients) provides breathtaking performance. NetWare also provides a panoply of high-end networking-management features such as system fault tolerance, with support for disk mirroring and duplexing; server- or client-based backup; and an AppleTalk-network monitoring system.

If your network is small and composed solely of Macs, you may find that NetWare has far more power than you need. But the larger your network and the more PCs and Macs you have that need to share files and services, the sooner NetWare 3.11 with NetWare for Macintosh 3.0 will justify its high initial cost.
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CIRCLE 163 ON READER SERVICE CARD.
### Table 1: Features of File-Server Software

<table>
<thead>
<tr>
<th></th>
<th>Apple</th>
<th>Novell NetWare for Macintosh 2.2 with NetWare 2.2</th>
<th>Novell NetWare for Macintosh 3.0 with NetWare 3.11</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pros</strong></td>
<td>Easiest to install and maintain, inexpensive.</td>
<td>Fast, extensive data-security features.</td>
<td>Very fast, extensive data-security features.</td>
</tr>
<tr>
<td><strong>Cons</strong></td>
<td>File-server features only, additional capability must be purchased separately.</td>
<td>Must administer from a second 80x86 machine.</td>
<td>Must administer from a second 80x86 machine. Expensive for small network.</td>
</tr>
<tr>
<td><strong>Features</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardware required</td>
<td>Mac Plus or later</td>
<td>80286-based PC</td>
<td>80386- or 80486-based PC</td>
</tr>
<tr>
<td>Maximum no. of clients</td>
<td>50</td>
<td>100</td>
<td>250*</td>
</tr>
<tr>
<td>Set up from Mac</td>
<td>●</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Administer from Mac</td>
<td>●</td>
<td>limited</td>
<td>limited</td>
</tr>
<tr>
<td>AppleShare-client software</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Additional clients supported</td>
<td>ProDOS, DOS</td>
<td>DOS, OS/2, Windows</td>
<td>DOS, OS/2, Windows, UNIX</td>
</tr>
<tr>
<td>Print services</td>
<td>○</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>AppleTalk router services</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Server-based backup</td>
<td>○</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Client-based backup</td>
<td>○</td>
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<tr>
<td>Network monitoring</td>
<td>○</td>
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<td>○</td>
</tr>
<tr>
<td><strong>Company</strong></td>
<td>Apple Computer, Inc.</td>
<td>Novell, Inc.</td>
<td>Novell, Inc.</td>
</tr>
<tr>
<td></td>
<td>20525 Mariani Ave. Cupertino, CA 95014</td>
<td>122 E. 1700 S. Provo, UT 84606</td>
<td>122 E. 1700 S. Provo, UT 84606</td>
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<td></td>
<td>(408) 996-1010</td>
<td>(800) 453-1267</td>
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<td></td>
<td></td>
<td>(801) 429-7000</td>
<td>(801) 429-7000</td>
</tr>
</tbody>
</table>

*Of these, only 100 can be Macs.

### Table 1 Criteria

- **Price/clients supported** — The price of the software and the number of clients it supports. Server software is typically priced according to the number of users.
- **Hardware required** — The type of computer on which the server software runs.
- **Maximum no. of clients** — The number of simultaneously logged-on Mac clients the software supports.
- **Set up from Mac** — Can you install the server software from a Mac?
- **Administer from Mac** — Can you administer the server from a Mac?
- **AppleShare-client software** — Can users access the server from their Mac with standard AppleShare-client software, which is included with Systems 6 and 7?
- **Additional clients supported** — Other clients with which your Mac can share data.
- **Print services** — Does the server software include print server software for spooling print jobs to AppleTalk printers?
- **AppleTalk router services** — Does the software provide routing services?
- **Server-based backup** — Does the package include software for backing up the file server?
- **Client-based backup** — Does the package include software for backing up client workstations?
- **Network monitoring** — Does the package include a network-monitoring utility for troubleshooting the network?
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Memory chips come factory-installed on plug-in cards, called SIMMs (Single Inline Memory Modules). Each one megabyte SIMM card holds eight top quality, memory chips. We carry chips by all the major manufacturers like Texas Instruments, Intel and Samsung. We also carry the full line of Dove memory products.

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- Also, TelePortFAX includes SendFAX 9600 baud modem software. Hold OPTION as you drag FILE-PRINT to easily send Faxes worldwide. MOD0058 $185.

System 7 Compatibility. Indicates that the product will run under System 7.

ACCESSORIES

Toner Cartridge
- Eastman II $155.

Basic Needs, Inc.
- ACC0356 Desk Cover - Mac II & Extended Keyboard (gray nylon) $17.
- ACC0348 High-Tech Magic Kid II Cover $18.
- ACC0347 High-Tech Mac Extended Keyboard Cover $19.
- ACC0346 High-Tech Mac Standard Keyboard Cover $19.
- ACC0340 Music Monitor Stand $39.
- ACC0351 Utility Pack $15.

B.A.S.F. (BASF)
- MED0030 Disks - 5.25" Density 1.44 MB (box of 10) $12.
- MED0029 Disks - 3.5" Density 1.44 MB (box of 10) $12.

Curtis
- ACC0419 Commander Center $9.

Ergotron
- ACC0314 MacStand II - 13" Color Screen $75.
- ACC0316 MacStand II SE Cover $75.
- ACC0317 MacStand II Apple RGB Case $75.
- ACC0312 Ultimate Classic SE Extended Display Case $85.

Famous Engineering Brand
- DAC0038 Digital $99.

I/O Design, Inc.
- ACC0369 MacLock Plus - USB Only Case $29.
- ACC0368 MacLock Plus SE Cover $29.
- ACC0367 MacLock Plus Apple RGB Case $29.
- ACC0366 Ultimate Classic SE Extended Display Case $29.

Kensington
- ACC0036 All-Lock Flat-Fix Black $33.
- ACC0037 Classic Anti-Glare Filter $49.
- ACC0035 Custom Track Ball Red $21.
- ACC0034 Keyboard Shield for Computer Macs $28.
- ACC0032 Keyboard SideWinder $47.
- ACC0030 LaserStand $79.
- ACC0031 Masterpiece Macl $193.
- ACC0033 Power Tree 50 $54.
- ACC0028 SE Anti-Glare Filter $55.
- ACC0027 System Saver Mac - Platinum $63.

MOBIO Products
- ACC0272 Family Mac DT $55.
- ACC0247 SE Silver $39.
- ACC0246 HighGuard Plus 13" $85.
- ACC0245 HighGuard Plus Platinum $75.
- ACC0244 MacLock Plus Black $65.
- ACC0243 MacLock Plus SE Case $65.
- ACC0242 MacLock Plus LE Case $65.
- ACC0241 MacLock Plus Case - Black $65.
- ACC0240 Ultimate Classic SE Extended Display Case - Navy $65.
- ACC0239 Ultimate Classic SE Extended Display Case - Black $65.

ACCOUNTING & PERSONAL FINANCE

Cheechco Corporation
- OFI9008 Check Plus $19.

Computer Associates
- F05042 ACI EAE - Error Free Accounting 1.1 $139.

Inman
- FIN9116 Business Plan Toolkit $99.

IVR
- IN0113 QuickTalk 3.0 $47.

Meic

Nolo Press
- BUS9133 For the Record 20 $32.

Carbon Copy Mac 2.0 Single & Unlimited (Microcom)
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In the not-too-distant future, you may be able to create printing plates directly from the Macintosh, eliminating traditional prepress steps such as producing imagesetter films, stripping, and manual plate making. Computer-to-plate imaging is still in its infancy, and the players include Printware, Polychrome, and Gerber Scientific Instrument. Printware already offers the 1440 MP Plate setter ($74,990), and Monotype and Autologic both plan to market the Direct-to-Plate LE55 imager developed by Gerber and Hoechst AG.

By Aileen Abernathy

Scanner skinny: Finally, an application that supplies the missing link in the color WYSIWYG chain from scanner to monitor to printer. ScanMatch, from Savitar ([415] 243-3030), provides calibrated color between flatbed scanners and the computer screen, using proprietary RGB transformations and monitor data supplied by TekColor (see image before and after calibration, right). A steal at $149, ScanMatch comes as a stand-alone application as well as a Photoshop plug-in. Watch for several scanner makers, including Microtek, to announce bundling deals. Meanwhile, Howtek has slashed the price of its Personal Color Scanner from $2,595 to $1,295 — making it the best deal around on a 300-dpi, 24-bit flatbed unit. Direct sales only. (800) 444-6983.

The best of both worlds? Quark has released a beta version of PM Import, an XTension that lets you import PageMaker 4.0 documents into QuarkXPress 3.0. The free filter is available through on-line services (such as CompuServe), but be forewarned: In its present form, PM Import is strictly a toy. Its limitations range from crashes to the inability to import PageMaker features such as text formatting, tracking, manual kerning, style sheets, rotated text, and indexing. Document interchangeability is a desirable goal, and the filter does show promise — it correctly converts master pages, for example — but thus far PM Import is just a tantalizing bit of vaporware.

Product news: Solutions has officially axed Curator, its venerable art-cataloging program. For $69, however, Curator orphans can upgrade to Mariah, a mixed-media cataloger from Symmetry Software ([800] 624-2485) that preserves Curator keywords. You can navigate through most of PageMaker’s features with a keystroke (or two), using Hot Keys, a set of predefined Fkey macros from GO Technology ([800] 468-5391). This $59.95 utility lets you assign fonts from the keyboard and quickly access undocumented commands such as printing with the Apple driver. GO Technology also offers Hot Keys versions for Personal Press and most word processors.

TrueType casting: TypeStyler does TrueType — along with balloon help and publish-and-subscribe. Version 2.0 of Broderbund’s type-manipulation program also sports faster printing and screen-rendering times, vastly improved color support, on-the-fly font conversions, and double Bézier curves. If you want to design or edit TrueType fonts, version 3.3 of Fontographer (Altsys) lets you perform these tasks for the Mac and the PC. (FontStudio 2.0 can also create TrueType fonts but only for the Mac.)
When it comes to 21" color video systems, the new RasterOps® 24XLTV is in a league by itself. Using unsurpassed VLSI and state-of-the-art surface mount technology, we've packed an unprecedented combination of features and functionality into a single slot solution.

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THE ART & SCIENCE OF COLOR™
The skillful use of a painting program's special effects can produce award-winning results.

By Janet Ashford

There's no substitute for painting skill — and no doubt that David Burwinkel, a Bridgeville, Pennsylvania-based designer, has skill to spare. But instead of oils, Burwinkel used PixelPaint Professional to create Suburban Waste, which won the Third Annual PixelPaint Art Competition. Not even a high-end painting program can turn a graffiti artist into a Rembrandt, but if you have a good eye and nimble fingers, PixelPaint Professional's powerful special effects will reward your efforts. (Burwinkel used version 1.0 of PixelPaint Professional; version 2.0 is now shipping.)

Burwinkel began with a pencil sketch of his dream house. He roughed in a first layer of color by using the paint-bucket tool to fill large shapes and then carefully added modeling, texture, and highlights to the various elements. The richly detailed look was produced by use of techniques such as masking, drawing in special-effects modes, and creating custom-shaped brushes. Similar features are available in other painting and image-editing programs, including Studio/8 and Studio/32, UltraPaint, ColorStudio, and Photoshop.

Graphic designer Janet Ashford coauthored The Verbum Book of PostScript Illustration.
STEP BY STEP

Making the Tin-Can Lid

To create the realistic-looking tin-can lid, Burwinkel begins by drawing a circle with the filled-oval tool, which is used in Fill Effect mode so that the circle is automatically filled with a gradation. The gradation is specified as a left-to-right blend of 20- to 40-percent black (a).

Next, a mask is created on top of the circle with the filled-oval tool in Mask Only mode. Two circles are drawn, one inside the other, so that the result is a filled circle with an outer ring (b). The mask (shown in red on-screen) protects the image under it from further changes.

Switching to Use Mask mode, Burwinkel draws a second circle — smaller than the outer circle but larger than the mask — in the painting layer and fills it with a gradation in the opposite direction, from 60- to 10-percent black. Although you no longer see the mask on-screen, it still protects the original circle. As a result, the new gradation appears only as two concentric rings, because those are the only unmasked areas (c). (A similar effect could have been achieved without masking, by drawing five overlapping circles filled with gray gradients in alternating directions.)

The "can lid" is selected and skewed slightly to the right with the Slant effect, and then final details and highlights are added by use of the brush and curve tools (d).

Creating Perspective

To produce the perspective effect needed for the house's horizontal siding, Burwinkel uses the brush tool in Polygonal Path mode to draw lines across the image toward an imaginary vanishing point off-screen to the right. (In Polygonal Path mode, PixelPaint's brush tool draws straight lines between two click points.) Masks protect the areas where the bushes, trash, and inside porch walls will go. The lines that bleed off the house onto the background are deleted.

Adding Depth Cues

We know that an object is far away not only because it's smaller than closer objects but also because its edges are less distinct. To add a depth cue to the background house at the right of the image, Burwinkel selects and blurs the house, using the polygon tool with the Diffuse effect applied. He uses the same technique to soften the aerosol can behind the soft-drink can on the main house.
Burwinkel creates the crumpled paper on the left-hand side of the house by first filling black-and-white outlines with areas of flat color (a). Then he makes the colored areas look three-dimensional by drawing over sections with the filled-polygon tool, which has either the Lighten or the Darken effect applied (b). These special effects increase or decrease the color saturation of selected areas by user-specified amounts without changing the underlying hues. Additional details are painted with the brush tool, and the water-drop and finger tools are used to soften the edges between color areas (c and d).

The highly textured bushes and grass in front of the house (a) are created by painting the basic shapes in a midtone green and then “stamping” over them with custom brush shapes in lighter and darker greens. Most painting and image-editing programs let you create custom brushes by editing the “footprint” of the brush pixel by pixel. Using PixelPaint Pro’s Brush dialog box, Burwinkel edits several of the preset brush shapes to create the textures he wants (b; see red circles). (This dialog box is from version 1.0; version 2.0 has a different editing interface.) For example, he creates fat and thin leaf-shaped brushes (c). To create leafy highlights, he stamps fat shapes in a darker green and then stamps over them with the thin-leaf brush in a lighter green.
The only thing missing from our new spreadsheet is the learning curve.

Application

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EXOTIQUE

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Introducing Claris Resolve.

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

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

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

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Circle 133 on reader service card.
At the recent Mactivity '91 conference, the versatility of the AppleTalk networking system was demonstrated by using its protocols to brew coffee over a network. (Don’t try this at home, kids.) Shiva was rumored to be so excited by the demonstration that the company is considering remarketing its vintage-model FastPath 4 as a networkable hot plate. Pricing wasn’t available at press time.

By Henry Bortman

Another hot box: Check out Silicon Graphics' new IRIS Indigo personal computer. The ACE-compatible, RISC-based (MIPS R3000A) computer is the fastest implementation of Display PostScript available. Other specs: 8-bit video on a 16-inch color monitor, 16-bit DAT-quality audio, Ethernet, 8 megabytes of RAM, and a 236-megabyte hard disk. All this for $9,995, in a box the size of a Mac Classic (except for the monitor, of course).

Router checkups: While you’re waiting for Apple to rationalize AppleTalk-network management, Neon Software ([415] 283-9971) has a solution for you. RouterCheck ($649) gathers network and zone information from most popular AppleTalk routers and can warn you about conflicts. It also provides graphical traffic statistics for selected routers. And if you’re looking to extend your LAN to a WAN, check out Engage Communications’ SyncRouter/LTi ($2,495). This addition to Engage’s line of synchronous WAN routers supports network-to-network connections over dedicated 56K digital phone lines. (408) 688-1021.

Product news: XGator ($495), from Cayman, and Planet X ($295), from InterCon, bring X Window client capabilities to the Mac. With either product, you can display Mac screens and control Macs remotely over Ethernet from a UNIX workstation or X Window terminal. It’s kind of like Timbuktu for UNIX. Planet X is a control panel and supports color, whereas XGator is a monochrome-only application—but color’s coming soon. Want to put your serial- or SCSI-connected personal laser printer on the network but don’t want to buy additional hardware? Try Gizmo Technologies’ ShadowWriter ($179), a software-only solution for printer sharing. It currently works with Apple’s Personal LaserWriter LS and SC and with the LaserWriter IISC. (415) 623-7899.

But is it groupware? If you’re tired of using electronic mail for in-house conferencing, try Pacer’s PacerForum ($549 for a five-user pack). Like a dial-in bulletin-board service, PacerForum organizes group discussions into topics. As with E-mail, documents can be attached to responses, but unlike with any currently shipping E-mail package, System 7 users can open the documents directly from within PacerForum, with a mere click of the mouse. (619) 454-0565. International Business Systems ([800] 733-2822) is shipping version 2.0 of its DataClub distributed virtual server, which supports System 7 and fixes several problems that hampered the initial release. DataClub Dedicated is also now available for those who want the advantages of a virtual server without the potential problems of distributed data.
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Ad design and digital illustration by Marcolina Design Inc., Philadelphia, PA.
The Client/Server Revolution

By combining the power of mainframes with the Mac's ease of use, client/server technology is revolutionizing database management in the '90s.

By David Beaver

The Macintosh has long had a reputation as a "weak" database computer. The software required was too slow, too complex, or too short on important capabilities. But this reputation is changing fast. A whole new database technology, known as client/server software, can put incredible database power behind your favorite desktop computer. Even if your database contains hundreds of thousands of records, a hundred users are accessing the database at the same time, or your network consists of a mixture of Macintoshs and PCs, client/server technology can give users fast access to the data from their desktop.

The Best of Both Worlds

In client/server computing, the server is a central computer containing database software that plays host to a network of client Macintoshes. In essence, this technology combines the best features of personal computers with the best features of mainframes while eliminating the drawbacks of each. To understand the benefits of client/server technology, you need to understand the strengths and weaknesses of desktop computers and mainframes, especially in relation to database management (see Figure 1).

The Mainframe. Mainframe computers (and the smaller versions known as minicomputers) are the high-end computing technology that large organizations use. A mainframe consists of a powerful central processor connected to several "dumb" terminals (dumb because they are helpless without the mainframe). The central machine does everything for all users: It stores the data, runs the programs that manage the data, and generates the screens displayed on the terminals.

A mainframe can manage a lot of data very quickly, and because everything is stored in one place, all users can access the same data. Mainframe software does have some weaknesses, however:

- The user interfaces generally aren't very friendly.
- It can be difficult for users to access data and manipulate it in the way they want to.
- Data-analysis tools, such as spreadsheet and charting software, are hard to use on a mainframe — if they're available at all.

The Personal Computer. The difficulties of dealing with mainframes are all reasons personal computers such as the Mac became popular in the '80s. A desktop personal computer runs user-friendly software that lets you manipulate your own data with spreadsheet and other applications, and it slows down only when you make it work hard.

With the advent of LANs (local-area networks), desktop-computer users were able to share information among themselves by using file servers. Broadly speaking, a file server is a central computer running special software (such as a Mac running AppleShare) that stores files that all the users on the network can then access. All the leading personal-computer database managers — 4th Dimension, Omnis 5, and FoxBASE+/Mac in the Mac world and
CLIENT/SERVER COMPUTING

dBASE and Paradox in the DOS one — can use file servers to share data among several users (for more on file-server database management, see "The Data Duelists," June '90, page 88).

Unfortunately, using file servers can be an inefficient way to manage data. Although the file server knows about the files stored on it, it knows nothing about the data stored in those files, so when you use a file-server database, all the real work takes place on your desktop computer. For example, say you want to find all the people in your database named Garcia. When you click on the Search button on your screen, your Macintosh sends a command to the file server that says something such as "Give me all the people in the database so I can look at them and decide which are Garcias." The file server dutifully sends every name in the database across the network, one at a time, and your desktop computer processes the data. Needless to say, this slows down performance considerably.

For acceptable speed, file-server databases require a lot of expensive hardware, especially if you have large data files. The file server should be a fast computer (a 68030-based Mac, such as a IIci) with a fast hard disk, so it can put the data onto the network quickly. Every user's desktop computer has to be fast as well (preferably an SE/30 or a more powerful Mac), because that's where the real database work happens. And if you access the database a lot, a powerful Ethernet network is a better pipeline than LocalTalk, because it gives you faster performance.

File-server databases have other weaknesses too:

• Remote access via dial-in modem is slow and cumbersome, because of the large amount of data that moves between your computer and the file server.

• There's no easy growth path as your database needs increase, because you have to upgrade (by adding accelerators, for example) or replace every machine that accesses the data and there are limits to the performance of a file server.

The Client/Server Solution

With client/server technology, you get around the problems of the mainframe and the personal computer by installing a database server on your network. A database server is a computer (anything from a Mac SE/30 to a mainframe) running powerful database software that — like a mainframe but unlike a file server — has intelligence about the data it stores. The desktop machines, which can be any desktop computers and which are known as clients, run software that sends database-search commands to the server and deals with the resulting data, using a friendly interface.

To find all the Garcias in a client/server environment, for example, the command your computer sends to the server is simply "Find all the Garcais, and send them to me." The database-server software sees...
Figure 1: In a mainframe environment (top), a heavy load can cause performance problems. In a file-server environment (middle), performance can also be slow. In the client/server environment (bottom), only data requests and the resulting data travel across the network.

Figure 2: A client/server environment consists of several complex pieces, all of which must be compatible. Here, a HyperCard stack is used to access data in an Oracle database on a VAX, with Apple's DAL software as the critical API layer.
that command, goes out to its own hard disk to search for all the Garcias, and then sends just those records back across the network. The application on your desktop machine then takes care of displaying the names through a friendly interface.

Client/server database managers are much faster than those used with file servers, for several reasons:

• The heavy database work occurs on the central machine, so each user doesn’t need a high-end personal computer to get reasonable speed. If you need faster performance, you need only upgrade the server.
• Dial-in-modem access is practical, because smaller quantities of data are being brought from the server to the client machine.
• Because much less data is moved across the network, Ethernet networks aren’t required. (The speed tests in “The Invisible Bridge to Mainframe Data,” January ’91, page 138, showed that Ethernet is barely faster than LocalTalk in a client/server environment.)

The Power of the Server

A server-based architecture offers another important benefit — the server and the client are totally separate machines. As long as they speak the same language, it doesn’t matter what kind of computer is at

What It Costs

The cost of a client/server system depends on what you already have and what you’re used to. If you’re downsizing from the minicomputer world, the cost and complexity of the hardware and software needed for a client/server database will seem reasonable. But if you’re upsizing from a file-server database, be prepared for much higher costs in return for increased performance. The higher costs are because several components are required and because you’ll need to hire a consultant to install and administer the system. When planning a large client/server system, expect to spend as much as $2,500 per user. Here’s how the cost breaks down:

• **Server hardware.** About $1,000 per user for the server hardware itself — that is, $50,000 for enough hardware to support 50 simultaneous users. The cost depends on your database’s size and how you use it.
• **Database software.** Up to $1,000 per simultaneous user. The cost depends on the server you’re using.
• **Client software (API, network software, and the front-end application).** Up to $500 per user.

One benefit of client/server technology is that you can start small and increase your horsepower as your business grows. The new Oracle Server for Macintosh, for example, might support as many as 20 users on an AppleTalk network with a Mac IIfx database server. When you need to upgrade to a larger server, you can use the same front-end application to connect to Oracle on a bigger machine.

These costs are similar to what you’d pay for comparable performance from other technologies. A minicomputer-based system sufficient to handle 25 users can cost around $150,000, for example.
A database server can be any kind of computer, depending on your needs and budget — a Mac SE/30, a $50,000 VAX or Sun workstation, or a $1 million mainframe. And with the right software, any desktop machine — a Macintosh, an IBM PC, a UNIX machine, even one using the new GO operating system — can connect to this server and share the same central database. This means that as an organization grows and the database gets bigger, the server hardware can be upgraded easily, virtually without limit and without any change in the users’ desktop computers.

Another advantage of client/server databases is that the database server doesn’t know (or care) what software is talking to it, so you can use a wide range of products on the desktop, depending on the task. For example, different users can have different interfaces to the same data, as appropriate, because the user-interface program is separate from the database itself. These interfaces can be written in a variety of development languages, such as that of ACIUS’ 4th Dimension, Claris’ HyperCard, or Omni 5, from Blyth Software. A common approach in a client/server environment is to build one interface for users doing data entry, another for users who need reports on the data, and a third for managers who need quick access to certain key data.

Client/server technology is important to mainframe and desktop-computer users alike. Desktop-computer users can move up to a client/server environment when they outgrow a file-server database; mainframe users can downsize to a client/server environment by moving databases off heavily used mainframes and onto smaller servers or by supplementing mainframe applications with new user-friendly front-end programs on desktop computers.

**Picking Up the Pieces**

With all of its power, a client/server database is more complex to set up than a file-server database (for prices, see the “What It Costs” sidebar). A client/server setup requires that numerous hardware and software products, often from several vendors, all work together in harmony (see Figure 2). Here are the various pieces you need:

**The Server Computer.** The server must run on a computer that has the power and features to support the number of users and the amount of data you require. Popular choices for server hardware are Sun workstations and VAX minicomputers; these machines are, of course, much more complex and expensive than personal computers, but they can support dozens of users and multiple gigabytes of high-speed disk storage.

Until recently, it wasn’t possible to use a Mac as a server: The Mac operating system didn’t have the multitasking features that let the UNIX and VMS operating systems support multiple users, nor did it have the power to handle large amounts of data. This situation is changing fast, however. Two new products, Oracle Server for Macintosh and PINK SQL, from MacVONK, have made the

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Mac a viable server platform for small networks. Both of these applications work under System 6 and System 7 and are easy to install and maintain on any Mac (high-end 68030 machines such as the Mac Iic are recommended).

With advances in computer-hardware technology, the line between desktop computers and minicomputers is blurring and the performance of a high-end Mac is very close to that of a comparably priced low-end minicomputer such as one in the Sun SPARCstation line.

The Database Software. The most important piece of the puzzle is the database software that runs on the server. It must be a multiuser database manager that is designed to be accessed in a client/server environment. Popular database-server products that run on mainframe or minicomputer servers include those from Oracle, Sybase, and INGRES. In addition, Oracle now has a version that runs on a Mac server, and ACIUS and Fox, among others, are working on database-server software that runs on Macs. For the most part, however, the server products you can choose from are products from the world of mainframes, and with rare exceptions, they all use the SQL (Structured Query Language)/database language. (Developed in the late 70s, SQL is a language for phrasing complex database commands in a relatively simple manner.)

These server products offer powerful features not found in any database manager used with a file server:

- They can be connected to other similar servers in a WAN (wide-area network), letting data be distributed to several different sites in an organization. In a client/server environment, for example, if your local server can’t find the information you need, it can “talk” to a server in a remote location, get the required information, and send it to your desktop computer.

- The software usually has sophisticated data-integrity features to ensure that data is not corrupted in the event of hardware problems or power outages. Database activity can be automatically logged on a backup volume such as a disk or tape drive, and complex database transactions can then be re-created from these logs.

- You can configure the software to suit your needs. If, for example, you have a lot

<table>
<thead>
<tr>
<th>Table 1: Mainframe, File-Server, and Client/Server Setups</th>
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<td><strong>Pros</strong></td>
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<tr>
<td>Mainframe</td>
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<tr>
<td>File server</td>
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<td>• The easiest and cheapest option to set up and administer.</td>
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<td>Client/server</td>
</tr>
<tr>
<td>• Because less data goes across a network, it’s faster than a file-server setup.</td>
</tr>
<tr>
<td>• Ethernet not required.</td>
</tr>
<tr>
<td>• Can access database via modem.</td>
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<tr>
<td>• Server can be upgraded easily, as needed.</td>
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</table>
of users accessing a small amount of data, you can optimize your server’s memory, central processor, and disk usage for this particular situation.

Unfortunately, this sophistication has a price in user-friendliness. None of these products is as easy to install as a file-server database manager for use with a file server, and they all need to be installed, tuned, and managed by a skilled administrator.

**The Network.** A network connection must be established between the desktop computer and the database server, and depending on the server hardware you choose, this can get pretty complex. Big server machines, such as Suns and VAXes, do not support LocalTalk wiring and require an Ethernet connection and a router to connect your LocalTalk and Ethernet networks. On top of this, you probably need to run different network protocols, such as TCP/IP or DECNet, on your Mac to establish the connection to these servers. This network software is included with some of the client/server software.

Establishing a network connection is easier in an all-Macintosh environment. The database managers for Macintosh servers — Oracle Server for Macintosh and P-INK SQL — use LocalTalk networks, but they can’t be accessed by DOS machines.

**The API.** Even when all the hardware and software pieces are in place and your network is set up, your desktop machine can’t talk to a database server until you’ve installed a layer of software that lets them communicate. To do this, you need an API (application-programming interface) installed on both the server and the desktop computer. The API isn’t an application itself; it’s an invisible connection between your Mac application and the database manager on the database server. The API is the most confusing piece of the puzzle, as different database-software vendors offer, or work with, totally different products. If an API isn’t available for the combination of software and hardware you’d like to use, nothing will work.

Apple’s DAL (Data Access Language) is one API. Others include Oracle’s SQL*Net; Sequelink, from TechGnosis; and HyperDB/Library, from Sybase. Each of these works with a different set of front-end languages on the desktop computer.

### Table: Cons vs. Ideal Users

<table>
<thead>
<tr>
<th>Cons</th>
<th>Ideal Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfriendly user interface on terminals.</td>
<td>Big companies with a lot of data and many users.</td>
</tr>
<tr>
<td>Users have limited access to data.</td>
<td></td>
</tr>
<tr>
<td>Few spreadsheet or charting programs available.</td>
<td></td>
</tr>
<tr>
<td>Slow when accessed by many users at once.</td>
<td></td>
</tr>
<tr>
<td>Expensive.</td>
<td></td>
</tr>
<tr>
<td>Need fast computer for server and on desktop for acceptable speed.</td>
<td>Small number of users on a network and low demand for shared data.</td>
</tr>
<tr>
<td>Ethernet required for best performance.</td>
<td></td>
</tr>
<tr>
<td>Remote access via modem impractical.</td>
<td></td>
</tr>
<tr>
<td>Complex to set up.</td>
<td>Medium-sized to large companies that need fast access to a central database or that have several users accessing a database at the same time.</td>
</tr>
<tr>
<td>More expensive than a file-server setup.</td>
<td></td>
</tr>
<tr>
<td>Needs to be installed and administered by a skilled administrator.</td>
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</tbody>
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and back-end database managers on the server, and the prices vary greatly (for more on these products, see "The Invisible Bridge to Mainframe Data").

**Client Software.** Most of the complexity of client/server technology is behind the scenes; users see only the software and screens that run on their own desktop computers. These front-end applications must be able to communicate with the server and display the returned data in a usable format, and either an off-the-shelf application or custom software can be used for this role.

If you're looking for an application that can communicate with a database server right out of the box, packages such as ClearAccess, from Fairfield Software, and GQL, from Anodyne Computing, are the best choices for searching a database and putting the results into a spreadsheet. If you need a custom system, say a true database application with entry screens and reports, you can program such a system in several environments. Many popular Mac programming environments, including 4th Dimension, Omnis 5, and HyperCard, can use add-in software modules to let them talk to database servers.

4th Dimension and Omnis 5 are particularly good development tools, because data that's brought down from the server can be stored in a local database for such uses as creating reports.

Unfortunately, designing applications with these products is not yet as easy as it should be. In all these development environments, some pretty complex programming and a good knowledge of relational-database design are required to develop a client/server application. Writing good client/server systems is still a new art, and programmers who cut their teeth on database applications for mainframe or file-server environments have to learn new design methods.

Things are bound to get better, though, because new products — such as Oracle Card, 4D SQL Server, and the upcoming server version of 4th Dimension — are making front-end applications easier to develop and more powerful. In the meantime, client/server technology won't really come into its own until programming a system is as easy as designing, say, a FileMaker Pro database.

**The Technology of the '90s**

Client/server technology promises to be one of the most important developments in the computer industry in the next decade. It will allow small businesses to improve their information systems without changing their existing personal-computer network, and it will let larger organizations move the processing load off big computers and onto personal computers — where it belongs. And it will, at long last, let all of us do serious data management through a friendly interface.

David Beaver is president of The Automation Group in San Francisco. His license plate reads MAC SQL.
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Rogue Routers

All it takes is a single misbehaving router to lead 'good' routers astray, causing widespread network chaos.

By Kurt VanderSluis

AppleTalk routers are often a sore point for managers of large networks. Some of the features that make AppleTalk routing protocols easy to implement for a small network can cause major headaches in a large internet. AppleTalk offers the marvelous luxury of routers that can take a tiny seed of information (which networks and zones they're directly connected to) and, by exchanging this information with other routers, deduce the structure of the entire internet and intelligently route data packets through it. But all it takes is one poorly configured router to set off a cascade of network trouble.

Although routers can receive information about the internet from other routers, they aren't able to question whether the information they receive is true. A properly configured router can "learn" the structure of the internet from routers that have erroneous information and then "teach" this misinformation to other routers that are learning the internet structure.

If you manage a large network, you know how easily this can happen. You've tried to design an intelligent scheme for numbering networks and naming zones, and you've communicated this scheme to everyone who might need it. But it's impossible to know everyone in your company who might be building an AppleTalk network. Anyone can buy a router and — without telling you — slap it onto your Ethernet backbone and sow the seeds of chaos. Or maybe one of your own undertrained, overworked technicians will mistakenly configure a router with the wrong information. Large networks have more router problems, because of their size and complexity; unfortunately, it's also harder to diagnose and correct problems, because the ways in which an error can affect a large network are more numerous and unpredictable.

One network manager told me he planned to disable every AppleTalk router on his internet — more than 100 of them! — and reconfigure them one by one. Although this strategy would certainly solve his router troubles, such a Herculean task is unnecessary if you use the right investigative techniques. This month, I'll outline some methods for tracking down rogue routers. First, I'll cover the symptoms of router distress and the simplest, cheapest way to locate an errant one — by pinpointing device names attached to the bad router's network. In a future column, I'll discuss some advanced techniques that require a protocol analyzer such as the AG Group's EtherPeek or Neon Software's NetMinder.

Distress Signals

If all your routers are configured properly, they will agree with each other about how the internet is structured and the network will behave consistently. That is, the same zone lists will appear in the Chooser of every computer on the network, and users will experience consistent success in connecting with printers, servers, and other devices on the internet.
TROUBLE SHOTS

What does evil look like? Router chaos takes many forms, depending on how the trouble started and how it propagates through the network. You may see zone names appearing in the Chooser that you have never seen before, or zone names may appear and disappear throughout the day. You may connect easily with a file server across the internet at noon and fail to find it an hour later. You may notice increased or unusual traffic on your backbone network (caused by routers trying in vain to resolve their differences), or you may experience unusually long delays when using network devices.

When router chaos strikes your network, your top priority is to identify which routers have good information and which routers are carrying bad information. This is an important troubleshooting task, but it can be very challenging, because of the numerous ways in which the routers can be confused and the variety of symptoms that router chaos can cause. It can be hard to distinguish among routers that were improperly configured and routers that were correctly configured but learned bad information. In either case, the cure is the same: Tag the routers off-line, check their configurations, correct any mistakes, and restart them.

It’s vital that you take all the misbehaving routers off-line at the same time, so that when you restart them after reconfiguration, they won’t relearn the erroneous information. Usually, you’ll find that you need to perform this procedure for just a small group of routers and not every single router on the internet.

Sleuthing for Names

If you do discover an unexpected zone name, such as Twilight Zone, in the Chooser, try using Apple’s Inter*Poll or a similar product to get a list of devices in that zone. If you discover that one of the device names is Serling’s Mail Server, for example, it may help you determine who’s responsible for the problematic router, so that you can talk with the person about getting it fixed.

Next, use Inter*Poll to send a few echo packets to the mystery mail server and look at the hop count of the returning packets (for more on Inter*Poll and echo tests, see “Isolating Network Problems,” April ’91, page 221). The hop count tells you how many routers the packet passed through on its way back to your Mac. Compare that number with the number of routers you think it should have passed through. If the numbers differ, it suggests that someone has attached an unauthorized router to your internet. If you’re operating a mixed AppleTalk Phase 1 and Phase 2 internet, for example, and the actual hop count exceeds your expected count by one, Twilight Zone may be connected to a Phase 1 router that is using one of your transition routers (routers that connect Phase 1 and Phase 2 networks) to make itself available to the rest of the internet.

Sometimes looking at the zone list won’t reveal anything about a misbehaving router, because nothing unusual will show up. In these cases, the setup of the errant router is so incompatible with that of your regular routers that they can’t work together at all. What happens, for example, if your Ethernet internet is configured for a network number range of 1 to 10 and someone attaches a router with a network number of 53? Chances are (depending on which configuration options are set) that this new router will be invisible to the routers already on the internet and that the zone names from that router will never appear in your Chooser.

Router chaos begins when auto-configuring routers, which don’t save the tiny seed of information telling them which network they’re connected to and its zone name, ask the internet for this information. Because they can choose to use the information supplied by any router on the internet, they can just as easily learn the erroneous information (supplied by the unauthorized router with a network number of 50). In this scenario, you can wind up with two completely unconnected internets or the same Ethernet wire.

Mac can experience the same network confusion as nonseed routers, because when a Mac first joins a network, it selects one router to supply it with zone information. Depending on which router your Mac picks as the supplier of its zone information, you can get one of two entirely different zone lists. One way to discover names in the mystery zone is to exploit this “feature.” Sing the Network control panel, you can switch back and forth between LocalTalk and Ethernet—effectively leaving and rejoining the Ethernet network—until your Mac picks the bad router (you can tell by opening the Chooser and checking the zone list). When you get the bad router, you can begin your name search with Inter*Poll.

Kurt VanderSlyke is president of The Network Group, a training and consulting firm in Seattle.
Microtek removes the biggest barrier to owning a Slide Scanner

If price has been the barrier separating you from high quality color scanning, take a look at the ScanMaker 1850. Another stunning price breakthrough from Microtek, the leader in affordable color scanning solutions.

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THE PRIVATE LIFE OF FRED B. DULL

Laura Lovely, up and coming starlet, is seen on the arm of Fred B. Dull at the Peacock Hilton in Las Vegas. Dull, the entrepreneurial paper clip king, flew in on his private Concorde with a 43-carat diamond ring for his birthday girl.

Winner at Le Mans, Fred B. Dull known as a man who loves to live on the edge, receives yet another trophy to add to his collection. Purposely bored by constant victory, Dull plans to take a year off by circumnavigating the globe in his 110-foot yacht, "The Dinghy."

Fred B. Dull scores again. Finding life too serene on his 130,000-acre Texas ranch last week, Dull imported the entire Argentine polo team for one afternoon of play. Dull reportedly found the day to be fairly amusing.

Fred B. Dull flips his cigarette butt, "Le Coin" into a double corncob sombrero on Lake Washington and comes up smiling, going on to win his heat and the grand trophy. "This baby is really built," says Dull, as he queues Dom Perignon in the winner's circle.

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By James Bradbury

Worth a thousand words: When Caere Corp. ([408] 395-7000) introduced the Typist last year, the hand-held OCR scanner generated more enthusiasm for the concept than for its execution. This year's version, the Typist Plus Graphics, adds graphics-editing software that ought to broaden the Typist's market. The new Typist also addresses several complaints about the original (while keeping the same $695 price). One improvement left us scratching our heads, though: The original Typist could be installed only at the end of a SCSI chain — effectively tying your hands when trying to configure systems with multiple SCSI devices. The Typist Plus Graphics, in contrast, can go anywhere you like in the SCSI chain — as long as it's at the beginning. The more things chain, the more they stay the same ....

If you're suffering from "7 Oh" envy, this might be the time to check out ClickChange, from Dubl-Click ([818] 700-9525), which just shipped a 1.05 System 7-compatible update to the interface-customization utility (for more on how ClickChange works, see "Radical Cosmetology," March '91, page 231). The new version ($89.95; free to registered users) can bring System 6 users the 3-D look of System 7 without making them add any of the new operating system's more useful features — sort of like putting a phony cellular phone into your car.

Interface customization goes preppie with a computerized man Friday from Bright Star Technology ([206] 451-3697). For $59.95, At Your Service introduces an animated “actor” named Phil to your Mac. When you start your Mac, buttoned-down Phil greets you on-screen. When you get E-mail (either QuickMail or Microsoft Mail), Phil pops up politely to say so. He can even let you know if you've been working too long (“Excuse me, it's time to take a break”). A simple appointment-reminder program is also included. If (or more likely, when) you tire of the clean-cut Phil, other actors are available to registered users. You can also create your own actors, using Bright Star's interFACE program, which is available separately for $495. Equally intrusive (but a lot goofier) is the System 7-compatible version of the Talking Moose, from Baseline Publishing. For inspired and pointless lunacy, it's the closest thing to MAD magazine you can buy for your Mac. Now if we could only get the Moose and Phil talking to each other. (910) 682-9676. $39.95.

Just for fun: Last year's Rising Star Eddy Award winners, Robyn and Rand Miller, of Cyan, haven't been resting on their laurels. Spelunx and the Caves of Mr. Seudo is another interactive entertainment for children along the lines of Cosmic Osmo and The Manhole but with some hidden lessons in ecology, astronomy, and biology. (509) 238-6789. $49.
CoStar's new ergonomically designed trackball beats the competition hands down.

A few years ago trackballs were a big idea. They provided more speed and precision than a mouse and took up less desk space. Unfortunately, over time they also felt big. And heavy. And uncomfortable.

Well, now there's a smaller, much more comfortable idea, The Stingray ergonomic trackball from CoStar.

The Stingray was carefully designed to work with the human hand. Its low profile offers a natural position, reducing strain on the hand, wrist, and forearm. The ball is 75% smaller and lighter. And the jumbo size buttons mean that no matter where your hand rests on the Stingray, it's resting on a button.

So, if you'd like all the advantages of a trackball with all the comfort of a mouse, give us a call. When you compare the Stingray to the pointing device you're now using we think you'll agree, there's just no competition.

Stingray retails for $129. For more information on the Stingray ergonomic trackball or the dealer nearest you, call 800-4-COSTAR. For information by fax, 24 hours a day, call 800-388-4888.

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Beginner’s Bucks

When you buy your first Mac, what extras do you really need? Here’s a checklist of what hardware and software you should and shouldn’t bring home with you.

By Steven Bobker

All new computer owners discover a great truth shortly after they buy their hardware: The price of a computer is only a small part of the total cost of owning it. A reasonable rule of thumb for the personal-Mac user is that in the first year of ownership, you’re going to spend about the same amount on software and supplies as you did on the original hardware.

Yes, you can get away with spending less, but on average you won’t. The most obvious way to get away cheap is to steal software, a crime often romantically called software piracy. Software is notoriously easy to steal, and the chances of getting caught and punished are extremely low. That’s too bad. If you steal your software, do me a favor: Read something else.

When you bought your Macintosh, your dealer may have tried to sell you certain software packages at tempting prices or tried to get you to buy programs you didn’t really need. Rarely do dealers attempt to ascertain user needs and experience levels so they can match the software to the user. Thus, that chore — figuring out the right software to start with — becomes your No. 2 task as a buyer (selecting the hardware was No. 1; let’s keep the cart behind the horse).

Many new Mac owners end up buying a copy of Microsoft Works with their new computer. Works is a low-cost, integrated package that offers word processing, spreadsheets, telecommunications, and data management. It’s relatively easy to learn, and it makes a reasonable stepping stone to the greater universe of Microsoft Mac products. It’s also a poor choice for getting the most out of your new computer.

Taken as a whole, Works is OK. But when you look at the modules individually, not a single one stands out in its category. On the DOS side of the personal-computer marketplace, integrated packages such as Works make a lot more sense. That’s because they provide a unified interface and take better advantage of limited amounts of RAM. Those benefits don’t translate to the Mac, however, because the Mac interface is already consistent from program to program; basic integration is part of the Macintosh package. You bought that when you bought your Mac. Don’t pay extra to buy it again.

Also, chances are that you don’t need a database, spreadsheet, or telecommunications program right away, so you’re paying for things you don’t need. You’re better off putting the money into separate products.

So what software do you need immediately? A word processor. Everyone needs a word processor — even the people who think they don’t. Fortunately, good word processors are cheap and getting cheaper. As far as the other main productivity applications are concerned, if you don’t already know that you need them, wait until you’ve had a chance to figure out exactly what you want and spend the rest of your money on hardware and utility software.
**Starting on the Right Foot**

Let’s assume that you’ve decided to get an LC with that really nice new Apple 12-inch monitor. The list price for both is $3,098, but hefty discounts are readily available, so let’s say you pay $2,700 for the pizza box (a nice descriptive term for the LC) and the monitor.

You should expect to spend that much more on it in the next year. You could spend even more, but there’s an awful lot you can do with just that $2,700.

The first thing you should do, before you buy your first program, is pick up more memory. The LC has two empty slots just begging to be filled with more memory (other Macs have anywhere from one to four empty slots). Sure, you can run the LC just fine on the 2 megabytes it comes with, but you can do lots more with more memory — especially if you want to take advantage of the Mac’s ability to run multiple applications at the same time.

There’s often a gotcha in memory purchasing. Apple sells memory, and your dealer will likely install it for you. However, even though Apple recently slashed its prices for memory almost in half, it still charges substantially more for memory than third parties do. Because installing memory is easy (especially on modular Macs such as the LC), don’t be afraid to open the box and do it yourself.

Yes, Apple says that even thinking about installing memory voids your warranty, but no decent dealer will see that you have extra memory and then say, “Sorry, we can’t fix your blown power supply (which has nothing at all to do with memory), because it looks like you have opened the case.”

Lots of mail-order outlets sell memory — just look in the back of this or any other Mac magazine. I’d recommend buying from a company that’s been around long enough to establish a good reputation. I’ll mention just a few: MacConnection’s and MacWarehouse’s memory prices are a bit on the high side, but both of them provide an instructional videotape to walk you through the process of installing RAM (right, I know I said it was easy, but you still want to know what you’re doing). Technology Works, another excellent source, includes a well-written manual that anyone can follow.

Get as much memory as your budget allows. For an LC, you have three choices: you can add 2, 4, or 8 megabytes of memory (for a total of 4, 6, or 10 megabytes). At publication time, 2 megabytes costs between $80 and $120, 4 megabytes between $275 and $325, and 8 megabytes around $600. Just stay away from Apple memory.

**Tools of the Trade**

When you buy a car, you get a basic tool kit with it. If you want to get the most out of it, you add some specialized tools. It’s the same with computers. Your system-software disks contain a few basic tools. Which tools you have varies, depending on your system-software version. Everyone has Disk First Aid, a diagnostic and repair program that can find and fix some damage. One handy tip when using Disk First Aid is to use it repeatedly if it fails to fix the problem on the first try. It fixes some problems in small steps. I’ve run it ten times in a row before getting the repair to take. So don’t give up too easily. Still, there are going to be times when Disk First Aid won’t be enough.

The second tool that all users automatically get with their Mac is HD Setup. This program takes care of the details involved in preparing an Apple-brand hard disk for use. You may never need to use it, but Apple hard disks come ready to load these days and it doesn’t work on third-party hard disks. But keep it in a safe place just in case.

Some of you might also get a copy of Font/DA Mover. This venerable war horse is not part of System 7 and is not needed to make the best use of fonts and DAs when you run System 7. It has never been a good tool. It’s done the job but caused significant user hair loss while doing so. That it is not required by System 7 is an excellent reason to use System 7. (There are lots of other excellent reasons to use System 7; for a few good ones, check out “70 Things You Need to Know About System 7.0” June ’91, page 96.)

Obviously, the tools you get from Apple with your Mac won’t come close to...
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PUTTING WORKSTATIONS TO WORK

What's the difference between Workstations and Desktop Computers? The MacUser Labs explains it all, in an in-depth report concerning this network computing alternative. Another MacUser First: Workstations are tested against industry-standard SPECmarks. Never before accomplished on a Macintosh. Only available in MacUser.

Although the hard disk you start out with might seem to offer a huge amount of storage space, you'll quickly discover that no matter how big it is, it's too small.

leading contenders are StuffIt Classic and StuffIt Deluxe (from Aladdin; Classic is shareware, and Deluxe is commercial) and Compact Pro (shareware from Bill Goodman). All three are very good. StuffIt Deluxe has suds of extra features that are especially helpful for archiving and for dealing with files to be sent to or received from non-Macintosh computers.

You might also be tempted to get a good address-book program right away. Here's one important consideration. There are several excellent programs and two main categories. Category 1 programs (which include DyroDex, Address Book Plus, and TouchEASE) have many separate fields in each record (for instance, city, state, and postal code each have their own field). Category 2 programs (1Ntouch and QuickDex) have only a field or two, and data entry is quite free-form. The simplicity of Category 2 might seem tempting, but you should avoid programs in this category at first. Start with a Category 1 program. Then if you later decide to convert to a Category 2 program, you'll have no problems. The same can't be said for the reverse journey from Category 2 to Category 1. That trip can be made, but it ain't fun.

As this is being written, address managers are in a state of flux, with major updates expected for most of the programs mentioned above. You can expect to see some recommendations in MacUser soon, though. In the meantime, start thinking about things you can do with your Mac that are out of the ordinary — beyond word processing — and unique to you. We haven't spent the whole $2,700 yet....

[All shareware programs mentioned here can be found in Zmac's Download and Tech Support libraries. — Ed.]

Steven Bobker runs Raw Fish Systems. He has been writing about Macs since 1985 and is at least as devoted to Apple as to low-end Macs and their users.
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Under-the-Desktop Publishing

Don’t be blinded by delight in the magic of technology — you might find yourself at the wrong end of a desktop metaphor.

By Douglas Adams

I thought all this computer stuff was meant to save us time. One thing that Apple left out of the Mac’s desktop metaphor was the pair of legs sticking out from under the desk while you’re trying to find out what your computer’s getting itself into a tizzy about now. Mine’s been in quite a lot of tizzies lately, because I’ve been trying to add a lot of new stuff to it to make it run faster and better and do all sorts of sexy new things. The result is that I’ve become extremely well acquainted with the underside of my desk and with the magisterial chime the Mac uses to tell you that it’s had enough for the moment and is going to restart itself. When it restarts, it does so with that infuriating little question-mark icon that seems to say, “Yes? What do you want me to do?” What do I want it to do? It’s got a 160-meg internal hard drive, a 600-meg Qisk external hard drive, a MacPeak 140-meg external hard drive, a Rodime SyQuest removable-cartridge drive, a Relax optical drive, an Apple CD-ROM drive, and an Apple scanner — and it’s asking me what I want it to do? I want it to start itself up, goddamnit, and stay started up.

Even before my Mac started to behave like this, of course, I had been exploring the floor quite a lot, attempting to address my one available serial port. This is a ridiculous problem and should have been dealt with years ago. I generally have my modem attached to my serial port, but then I got a fax modem (before you could buy combination modems). All I have to do when I want to send a fax is select the appropriate driver from the Chooser menu, click on Print, and then crawl around under my desk to change the plug in the serial port. There is, of course, a Kensington serial-port switcher attached there so that I can at least switch between two devices. Two. So if I want to use my Farallon MacRecorder, I have to dive back under the desk, meaning that any voice mail I record usually has a few expletives at the beginning that ought to be deleted. Similarly, if I want to write some music on my synthesizer, I have to connect my MIDI Time Piece to the serial port. This has led to some musical compositions that are as loud and bad-tempered as Beethoven but with fewer good tunes.

Sometimes I escape from my Mac for a day. Writers very rarely get to go out, but when they do, they like to know what they’re doing. Because my diary and address book are in HyperCard, I have to download them into my Sharp Organiser. Guess what that means I have to do? Scrabble around on my knees with a plug again.

I got very excited a while back, because I saw some excellent reviews of a new digitizing tablet. It’s called the Wacom tablet, and an artist friend of mine told me it’s excellent because it responds to pressure — the harder you push, the thicker the line it creates. It’s transformed the business of trying to draw on the Mac. I’ve constantly been on the lookout for something that would transform the business of drawing on the Mac, because I refuse to learn from experience. Experience tells me that however whizzo and zappy the tools you get for doing graphics on the computer, if you...
basically can’t draw. Then whatever you do is going to look as if it’s been done by someone who basically can’t draw. Having graduated all the way from MacPaint to PixelPaint, MacroMind Director, and so on, I have succeeded only in making increasingly elaborate and startling messes. However, there is an ignorant and primitive part of me — much like the ignorant and primitive part of Sylvester Stallone (I’m referring here to his brain) that actually thinks that he could look like a real actor if the crew could only get the camera angle right — that still remains convinced that I could be a good artist if only I didn’t have to use a mouse. (Many earlier years of hopeless thrashing about with a pencil are, of course, conveniently overlooked by this ignorant and primitive part of me, which was waiting for a computer to make this process easy.)

So, my I & P part got very excited by the idea of the Wacom digitizing tablet, and I was ready to quote some plastic over the phone to MacConnection when some uneasy sixth sense made me consult a review in greater detail to find out how the tablet connects to the Mac. The answer was, of course, that it connects to the Mac’s serial port. Not to my serial port, it didn’t. I am trying very hard to increase that portion of my life I call quality time, by which I mean time that is not spent under my desk.

I was ready for the worst when I heard about the Cleere Typist. For those of you who don’t know, it’s a neat little handheld device that works like a vacuum cleaner for text. I read through the reviews with deep gloom. Not because it didn’t sound wonderful — it did. It sounded terrific. It is a constantly available input source that sits by your elbow. If you come across a passage in a book or magazine you want to record, you simply run the Typist over it — hey, presto — the text appears right in your document. This was the sort of thing that Arthur C. Clarke was talking about when he said that any sufficiently advanced technology would be indistinguishable from magic. A few years ago, magic is exactly what we would’ve thought was at work if someone had demonstrated the Typist. The reason that it filled me with the gloom, however, was that I assumed that it would have to connect to the Mac’s serial port and that therefore I would not be buying one.

But no! My I & P part suddenly went whiz and zing with excitement. Typist connected to the SCSI port! Everything was going to be all right. I would have to move one of my hard drives out to the network somewhere, because I was fresh out of SCSI numbers, but it was worth it to get some serious magic into my system. I picked up the phone and talked plastic, and a day or so later, a satisfyingly hunky box was delivered to my door. I unpacked it, I started to install my Typist.

The reason I mentioned that it was my ignorant and primitive part that got all excited rather than my rational and sophisticated part is that my rational and...
This SCSI-chain business is rendered impenetrable by the assumption made by manufacturers that theirs is the only device you're ever going to attach to your Macintosh.

sophisticated part was raising its eyebrows rather sharply at this point. My rational and sophisticated part knows perfectly well that SCSI is a whole other basket of snakes next to which the behaviors addressed by Heisenberg's Uncertainty Principle are as predictable as rain at Wimbledon.

You will have noticed that I have rather a lot of stuff hung off my Mac's SCSI port. It didn't get there by chance, or at least it didn't get to be in its particular configuration by chance. There was an awful lot of head-banging work involved in getting it into an order that wouldn't make the Mac go "Yes? What? What is it that you want me to do exactly?"

The business of getting a SCSI chain into the right order is one of the world's blacker arts and is rendered all the more impenetrable by the assumption made by many manufacturers that theirs is the only device you are ever going to attach to your Macintosh. Are they mad? Are they bent, twisted, barking creatures who have never consulted the back pages of MacUser? Don't they know that others are also out there selling Mac stuff? Obviously not, or at least they choose to ignore the fact. What do they do? They put internal termination into their damn stupid machines! How do you know I don't need to put their wretched device somewhere in the middle of a chain? How do they know I'm not running a DFS?

Excuse me, I'm getting cross — but not as cross as I'm about to get, not by a long shot. But let's get there by stages.

So setting up a SCSI chain that doesn't make your Mac go "Bing!" or "What?" involves not only crawling around under your desk but also fiddling around with screwdrivers trying to remove the internal termination from the interiors of equipment that would've made Marconi squint. You finally get them into an order in which they all work without stumbling; sulking; going "Bing!" or "What?"; or, out of sheer spite, scrambling your boot disk's directory — and then what happens?

Your Caere Typist arrives, and you try to install it. I mentioned earlier the being, twisted, barking creatures who put internal termination into their SCSI devices, thus consigning you to weeks of sitting under your desk like a cursing hermit, but these people appear as shining white knights of rational thought next to the blithering, cross-eyed insects who designed the Typist with only one SCSI port! My world reeled. I clinched helplessly at the furniture, hyperventilating.

Of course it didn't work, stuck at the end of the SCSI chain. Nor, for that matter, did anything else while the Typist was stuck there. Then its INITs wouldn't init properly. I phoned to ask for advice on this and was told the obvious: Try every possible combination of SCSI devices against every possible combination of INITs in logical order, and see if any of them work. A quick calculation told me that this procedure would be unlikely to be finished before the most optimistic estimates of when we may expect the heat death of the universe and that it would certainly be quicker simply to hire someone to type everything out for you. I mean everything — the Library of Congress, the Bodleian Library, everything.

I spent one weekend getting everything to work, and for one brief flickering moment on Sunday afternoon, it did. But it's rather like building a 12-story house of cards: It's a neat trick if you can do it, but you wouldn't want to live in the thing. Someone banged a door elsewhere in the house and the SCSI chain went "Bing!" and "What?" again and stayed like that until I removed the Typist altogether.

So now it works quite well as a very smart and elegant — if rather expensive — paperweight. It holds down great stacks of paper quite effortlessly while I type in their confines myself. I wouldn't mind so much, except for one thing: I have acquired a wonderful NuBus card called a Quadra-Link. It gives me four extra software-switchable serial ports. Four! And if that's not enough, you can put in another card and get another four. It is absolutely wonderful and is responsible for a nicely deepening layer of dust on the floor under my desk, which I have not had to visit for weeks. What bothers me is that I could have bought myself a Wacom tablet after all. It costs about the same as my smart new black-and-red paperweight.

In his spare time, when not coping with SCSI chains, Douglas Adams writes international best-sellers.

Test It Yourself — Hard-Disk Drives

Have you ever wanted to conduct your own hard-drive fub? You can download the tools that MacUser Labs uses to test hard-disk drives from Zmac's Download & Support Forum. MacUser's hard-disk benchmark, DiskBisher, was programmed by our own Stephan Sonnogyi. It's in Library 1. (Applications): BASHER is the filename. If you're having problems with your disk, check out Generic Hard Disk Tips. It's available in Library 7. (Reference), and the filename is GENTIP.SIT.

How to Join Zmac

Here's how you can get access to Zmac:
1. If you're a CompuServe (CIS) user, just type GO ZMAC at any ! prompt.
2. If you're not a CIS subscriber, you can sign up for Zmac by following these directions:
   1. Call (800) 635-6225 (voice) to find your local access number.
   2. Set up your modem and telecommunications software with the following standard Mac settings: 8 bits, one stop, and no parity.
   3. Dial your local access number. When connected, press Return. You'll see the following prompts on-screen. Your responses are printed in boldface type:
      Host Name: CIS
      User ID: 1770005200
      Password: ZMAC
   4. You will then be prompted for additional information, including a credit-card number for billing purposes. If you cannot bill to a credit card, call the CompuServe customer-support line listed below. Sign-up is free, but normal access time is billed at $12.50 per hour.
   5. Call CIS again with your user ID and password. A new password will arrive in the mail within ten days. For more information, call CompuServe customer support at (800) 848-8990.
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How to Buy Monitors

So you’ve just upgraded from a Mac Plus to an LC. You’ve got a computer with more power, more storage, and a sleek design, but there’s still something missing — a monitor. If you’re used to the built-in 9-inch display that’s part of the Plus, SE, and Classic, the array of monitors available can be both enticing and intimidating. Here’s a quick guide to the fundamentals of shopping for the right monitor (for tips on test-driving a monitor at a dealer, see “Do-It-Yourself Screen Tests,” February ’91, page 198).

By Victoria von Biel

Monitors are available with screen sizes of 12 to 21 inches. As with TVs, the screen size is measured along the diagonal.

Although some monitors are compatible with the built-in video port of the Mac Iici, IIsi, and LC and you can plug them straight in to your Mac, in most cases you need to buy a monitor/video-card package (called a display system) that’s compatible with your Mac model.

Depending on the monitor’s resolution, a 12-inch monitor shows about half of an 8-x-11-inch page, a full-page display (15 inches) shows the whole page, and a two-page display (21 inches) shows most of two pages side by side.

Wide displays are good for such applications as spreadsheet and page-layout programs or if you like to work with several applications open simultaneously.

If you’re using your Mac for desktop design and need a direct correlation between the size of objects on the screen and their size when printed, look for a monitor with a resolution of 72 dpi (dots [pixels] per inch). Apple’s screen-resolution standard is based on 72 dots per inch, and monitors that have 72 dpi are known as WYSIWYG monitors. On a monitor with higher resolution, objects appear smaller and more of the page fits onto the screen, but text may be harder to read.

If you do little more than word processing, go for a monochrome (black-and-white) or gray-scale monitor. They’re cheaper and sharper than color monitors.

Buy a color monitor if you’re using your Mac for graphic design or presentations. If your Mac supports it, buy a 24-bit-color board. You’ll get millions of smooth colors (8-bit color tends to “band”), and when you want to speed things up, you can use the Monitors control panel or an Fkey (such as the shareware Switcheroo) to switch the color mode to 8-bit.

When buying a monitor, ask to see several brands at once, so you can compare their performance. To avoid interference from magnetic fields (which can cause screen jittering), don’t place the monitors too close together.

A good monitor has accurate screen geometry — circles are round, not oval, and squares have straight, even sides. There may be distortion at the edges of the screen, because the electron beam that creates the screen image has to travel farthest to get to the edges of the screen, but the distortion should be minor.

Larry Pina’s shareware program Test Pattern Generator (available from user groups and on-line services such as Zmac) lets you easily test a monitor’s screen geometry.

To avoid eyestrain, look for a monitor with sharp focus. Focus is most apparent with small font sizes and thin lines.

Some monitors have etched screens to cut down on glare, but it shouldn’t be at the expense of sharp focus. You can also reduce glare with antiglare screens from manufacturers such as NoRad, Kensington, and Curtis.

To avoid screen flicker, opt for a monitor with a vertical refresh rate of more than 60 hertz. If your eyes are sensitive to fluorescent lights, choose the highest possible refresh rate.

Your Macintosh can work with more than one monitor at a time, even if you have a Plus, Classic, or SE — the SE/30 accommodates an added color monitor as well. You need to install a video card for each additional monitor, though.
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Ever fed a laser printer manually, only to discover someone else’s memo printing out on your envelope? Scope out the printer traffic with Blue Parrot ($149), a control panel from Casa Blanca Works ([415] 461-2227) that gives you a list of who’s printing what for each printer in your network zone.

By John Rizzo

Beyond System 7: You can customize the new system software at little or no cost with some of the utilities available from on-line services. One of the best is Helium, a freeware INIT that lets you turn balloon help on and off on the fly by holding down certain keys. And if you have software that doesn’t yet run on System 7, why not use both System 6 and System 7? System Switcher and System Picker are nearly identical programs that let you switch between the two versions. Or for those who are merely nostalgic for the way System 6 did things, JustClick lets you cycle through applications by clicking on the Application menu and Trash Chute empties the trash when you shut down your Mac. Find these and other INITs on MacUser’s on-line service, Zmac (part of CompuServe), as well as on other on-line services.

CD-ROM heaven: If you’re a CD-ROM fanatic, you know only too well that many more CDs are available for PCs than for Macs. Thanks to Insignia’s SoftPC 2.5, you can now run any DOS CD-ROM on your Mac, even those finicky discs from Microsoft. SoftPC is a DOS emulator that runs on Macs and on about 20 UNIX machines. And if you think DOS on UNIX is weird, SoftPC can also run Windows 3.0 on your Macintosh. (800) 848-7677. $199 to $499, depending on configuration.

Power up: Don’t let the Mac LC’s 4-watt power limit for add-in cards prevent you from adding the hardware you need. LC Power, a replacement power supply from Applied Engineering, gives you 15 watts for expansion cards—enough for power-hungry accelerators. Installing LC Power is a simple matter of popping out your LC’s standard power supply and popping in the new one. (214) 241-6060. $159.

Programming news: Some programs let you graph math functions so you can see how they differ, but only Wolfram’s Mathematica lets you hear the differences. That’s because version 2.0 of the mathematical programming language supports sound, among other new features. Another of those new features is that Mathematica now runs in a client/server configuration on 20 platforms. (217) 398-0700. $595. ObjectMaker, from Mark V Systems, is a CASE tool that lets you model and analyze your software designs as well as produce some programming code. You can even use a variety of languages—the program’s object-oriented-language modules can generate code in Ada, Smalltalk, C++, and C. (818) 995-7671.
Powering Up MacDraw Pro

MacDraw Pro has plenty of new features — millions of colors, gradient capability, and better file-importing options and greater control over text than in previous versions of MacDraw — but you may still be left with a lot of questions. Where do you start objects? How do you edit many colors in an image at once or control letter spacing in text? Here are some tips for getting the most out of MacDraw Pro:

1. **Installing MacDraw Pro.** If you have MacWrite II, Claris CAD, FileMaker Pro, or an earlier version of MacDraw already installed, check to see if you have the Claris XTND System document in your System Folder. If so, throw it out before running the MacDraw Pro installer, which will automatically install the XTND document in the Claris Folder in the System Folder. If you have more than one XTND document installed, you’ll have difficulty opening MacDraw Pro. (Claris XTND is the technology that lets you import and export graphics and text files.)

2. **Speeding up functions.** If performance is sluggish, go to the Apple menu and check your memory allocation in the About MacDraw Pro box. If the box says “Available colors are currently limited by memory,” here are some ways to increase available memory and speed:
   - Use fewer colors.
   - Decrease the size of document windows on-screen.
   - Increase the memory allocation for MultiFinder or System 7 by selecting the MacDraw Pro icon in the Finder and choosing Get Info from the File menu (Command-I). Type a slightly larger amount of memory in place of the amount presently allocated.
   - If you’re using gradients, turn on “Fast display of Gradients” in the Preferences dialog box, which you access via the Layout menu (gradients will appear banded rather than dithered). You can toggle this option on and off with Command-Option-G.
   - Turn off “Kerning by pairs” in the Preferences dialog box.
   - Use the Layers feature to structure complex documents. Hiding layers lessens the time the Mac takes to redraw the screen.
   - If you’re using System 7 with a 68030-based Mac, turn on virtual memory. If not, close applications and documents you’re not using.

3. **Keyboard shortcuts.** If you hold down the Command key in a dialog box for a moment, you will see keyboard command equivalents for dialog-box items. For additional drawing shortcuts, turn on “Typing activates shortcuts” (Command-Option-S) in the Preferences dialog box. You can then select tools by using the keyboard (R for rectangle, T for text, and so on).

4. **Controlling letter spacing.** If you’re working with text, you can control letter spacing (kerning) automatically or manually. Turn on “Kerning by pairs” in the Preferences dialog box.

   To control letter spacing manually, make sure that this option is turned off. Select a range of characters by using the text tool, and hold down the Option key while pressing one of the arrow keys. The left arrow moves the characters closer together, the right arrow moves them apart, and the up arrow returns the letters to their default spacing. Adjust letter spacing throughout a large block of text by selecting it, holding down the Option key, and pressing the appropriate arrow key.

5. **Splitting an object into sections.** Although MacDraw Pro doesn’t include a tool for splitting objects in two, you can use copying and pasting to cut an object into two or more parts. Say, for example, you’ve drawn a map and want to split it into regions. Here’s how you do it:

   - Select the object, and choose “Reshape” (Command-R) from the Edit menu. This shows all the reshaping handles along the object’s sides (see Figure 1). Click at the point where you want to split the object, adding a new handle. Select the handles of the part of the object you want to cut off — including the point you just added — by Shift-clicking. Copy the handles to the Clipboard. Deselect (Shift-click) the new handle you created, but make sure the other handles are still selected. Use the Delete key to get rid of the remaining selected handles (make sure you don’t cut them by using Command-X, though, because you’ll just copy them over the Clipboard’s contents). Click away from the object, and paste in the contents of the Clipboard. You now have an object split into two sections.

6. **Adjusting colors in an imported image.** If your Mac is capable of only 8-bit color, imported images that were created in 24-bit color won’t look as good as they could. To get around this, select the image, bring up the Color Editor from the Layout menu, and choose “Image Colors” from the color palette’s Special menu. This creates a new palette from the colors in the image. The

By Shelley Zulman
Creating custom color blends. By using the Blend feature in the Color Editor, you can create custom colors within a selected range (for example, a series of orange shades that range from deep red to pale yellow). To do this, first choose Colors from the Layout menu. Unlock the padlock icon on the top right corner of the Color Editor, and click on the flag icon in the lower right corner (this brings up editing options such as Blend and Warmer).

To create a linear blend of colors, drag the color from which you want the blend to start to the bottom of the palette. Next drag the color to which you want to blend, and place it next to the starting color. Figure out how many intermediate shades you want between the starting and ending colors, and then Shift-click to select that number of cells in the palette (you can use any colors — they're just being used as placeholders). Drag these shades down to the bottom of the palette, and place them on top of the ending color (this forces the ending color to the end of the range). Select the entire range, and click on Blend. You now have a series of colors ranging in color from the starting-color cell to the ending-color cell (see Figure 2).

Using gradients for special effects. You can use gradients to create special effects such as background texture or a 3-D look. The Gradient Editor (which you access via the Layout menu) lets you add color to a gradient as well as change its angle and focus. Here's how to generate a gradient that gives objects a silver-metallic look (see Figure 3).

With the Gradient Editor selected, choose View by Name in both the Claris Colors and the Gradients palettes. In the Gradients palette, choose one of the diagonal gradients (such as 45° directional) and choose New Gradient from the palette's Edit menu. Give the gradient a name in the Gradient Editor dialog box, select the first of the four Colors boxes, and click on 60% black in the Claris Colors palette. In the second and fourth Colors boxes, place 10% black. Place 60% black in the third Colors box. You can create a gold-metallic look in similar fashion, by assigning shades of orange/yellow to the gradient.

Figure 1: Although MacDraw Pro doesn't include a tool for splitting objects in two, you can use cutting and pasting to split an object (in this case, the state of Maine [a]) into two or more parts. Select the handles in the section of the object that you want to cut (b), and copy those handles to the Clipboard; delete the selected handles on the original object (c); and finally, paste in the Clipboard's contents (d).

Figure 2: By using the Color Editor's Blend function, you can quickly create a range of closely related colors. In the example here, vivid orange is blended to pale orange in a series of six shades to create a palette of desert tones.

Figure 3: The Gradient Editor lets you create several special effects. Here, a silver-metallic effect results from adding different shades of black to a 45° directional gradient.
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CIRCLE 89 ON READER SERVICE CARD.
Riding on System 7’s coattails comes a bunch of books on the new system software. Need to know which one is right for you? Read on . . .

By Bob LeVitus

In recent weeks, no fewer than four books with the words System 7 in their title have crossed my desk, and several others will be released soon. It’s not instantly obvious how they fit into the grand scheme of things. If you’ve already bought Apple’s $99 Personal Upgrade Kit — which includes five manuals — do you need to buy one of these new books too? Or can you skip the upgrade kit, get the system software elsewhere, and buy one of the books for reference and troubleshooting?

There’s really no right answer to this question. If you’re a beginner, you’re probably best off buying the upgrade kit and one — or even two — System 7 books. Intermediate users can go either way — get the disks from their local MUG (Macintosh user group) and buy one of these books, or spring for the upgrade kit. Power users, especially those who don’t think they’ll need tech support (90 days of free tech support is included with the upgrade kit), can probably do without the Apple kit but may want to check out the books available.

Getting into the System

But before I tell you about the books, I want to talk a little about where you get your copy of the system software, because no book on System 7, no matter how wonderful, will be any use at all if you’re still running System 6. If you don’t buy Apple’s upgrade kit, the cheapest way to get the system software is through a user group. Of course, you can download it from CompuServe or America Online, but it takes several hours and the online time alone will almost certainly cost more than the $20 to $30 that user groups are charging. Theoretically, your dealer is authorized by Apple to let you copy the System 7 disks, but in my experience, few dealers are this obliging.

Now for my user-group plug: A good Mac user group is indispensable. If you’re not a member of one, you should be. A MUG is a great place to get questions answered or to acquire public-domain and shareware software. Call Apple at (800) 538-9696, ext. 500, for a list of groups in your area.

Depending on your local MUG’s policies, you may be able to order System 7 disks by phone. For example, my user group, BMUG, offers a System 7 package you can order by phone. For $55, you get the system software, Kay Yarborough Nelson’s The Little System 7 Book (Berkeley, California: Peachpit Press, 1991), and a one-year membership that includes two issues of BMUG’s always awesome 400-page newsletter. You can reach BMUG at (415) 549-2684.

But even though this is a great deal and I think MUGs are wonderful, seriously consider going down to your dealer and buying the upgrade kit anyway, no matter how much you know (or think you know) about System 7. It’s one of Apple’s best-executed products in a long time, and it’s packed with useful stuff. What makes it worth more than twice what the disks cost elsewhere? Aside from the
unusually well-written (at least for Apple) manuals, you get a copy of HyperCard 2.1 and the aforementioned toll-free technical support. You won’t get HyperCard 2.1 if you download the software from an online service (although most user groups can distribute it), and you certainly won’t get technical support.

The support is the big difference, and it’s hot. I’ve called several times, with problems both real and made-up, and have been pleasantly surprised by the quality of the service. I knew Apple was providing support; I just didn’t expect it to be good support.

So there you have it — my reasons for recommending the upgrade kit. Unless you’re a major power user or your budget is unusually tight, buy the upgrade kit first. Then, after you’ve digested it, it’s time to go buy a book.

At the Bookstore


(By the way, there’s a fifth System 7 book — *System 7 Revealed* by Anthony Meadows [Reading, Massachusetts: Addison-Wesley, 1991] — that looks at developing System 7-friendly applications. Because it’s not a troubleshooting handbook for System 7 users, I haven’t included it here, but if you’re a developer — or interested in becoming one — definitely check it out.)

First things first. In the interests of columnist ethics, I must disclose that I am quoted on the back of Craig Danuloff’s book, saying, “The System 7 Book is a must-have. Even the most experienced users will learn a thing or two.” That statement is absolutely true, but I hadn’t seen the other three books when I said it. In retrospect, the same could have been said for all the books — I learned something new from each one.

Which is to say that there isn’t a bad one in the bunch. Although each has a slightly different look and feel and is aimed at a slightly different audience, they all contain just about everything you need to know to get going with System 7.

One problem almost all these books share is that — with the exception of Lon Poole’s — they were released last May, when System 7 finally came out (Poole’s came out in July). That means that the authors did most of the writing and screen dumps with beta versions of System 7 — and it shows. All the books contain errors of fact and, in some cases, inaccurate illustrations.

Fortunately, the errors are usually minor; you probably won’t notice most of them. And even more fortunately, the publishers are making corrections in subsequent printings. By the time you read this, second or third printings (look on the
Copyright page, with corrections, may be available. If you're concerned, order directly from the publisher and insist on the most recent printing. Also, if you buy Danuloff’s or Poole’s book and send in the registration card, you’ll receive two free newsletter updates that will tell you of any errors in early printings.

**The Little System 7 Book.** At $12.95, this book is a bargain, and like all books from Peachpit Press, it’s good to look at. Kay Nelson has a delightful style — witty and lighthearted yet not overly fluffy. If you’re a newcomer to the Mac, this is the book for you. There’s just enough handholding to keep beginners from getting lost but not so much that experienced users will lose interest. That said, this is also a great little book for more-advanced users. Steve Costa, executive director of BMUG, obviously agrees. In a sticker on the cover, he proclaims: "I’ve read all the available System 7 books, and this is definitely the best in terms of what most people are going to need."

Although this book is the smallest of the

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**The System 7 File: Aliases with Style**

The default font style for an alias is italic — pretty boring, not to mention hard on the eyes. To add a little style to your aliases, MacUser’s alias specialist Bill Monk, of Birmingham, Alabama, has developed a utility that adds a default font style, such as bold, underlined, or italic, to all your aliases. Called Alias Stylist, it also has a "Not So Stylish" option for adding outline, shadow, condensed, and extended styles. Adding all seven options makes for one ugly default, but at least you can easily distinguish between what’s real and what’s an alias. (If you’d rather not know whether a file is an alias, just turn off all options and alias names will appear in the type style you’ve selected for your system.)

Alias Stylist is available exclusively through Zmac, MacUser’s on-line service. Look for ALISTY in Library 3 (Utilities) of the MacUser Forum. And while you’re at it, check out MacUser’s other alias utilities, Alias Assassin (ALIASA.SIT) and Nom de Plume (PLUME.SIT).

Now on to this month’s tip, which comes from Peter Crownfield (via Zmac). Peter says he keeps an alias of the Startup Items folder on his desktop to make it easier to add or remove items. But, he says, there are occasions when he wants to start up without waiting for the applications and documents in the Startup Items folder to launch.

Happily, Peter discovered that holding down the Shift key during startup not only bypasses System extensions but also bypasses items in the Startup Items folder. If you want your extensions to load but not the files in the Startup Items folder, wait until all your extensions have loaded and you see the "Welcome to Macintosh" message and then press the Shift key. Continue holding down the Shift key until the desktop appears.

Submit your favorite System 7 tips either by mail or by modem in Zmac’s System 7 Forum (please include your address as well). If you submit the month’s best tip, you’ll not only receive notoriety and fame but you’ll also get a spiffy (and rare!) "I Beat the System" T-shirt.

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**New Aldus SuperPaint 3.0.**

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Of course, the best way to settle any argument over SuperPaint is to try it. See your Aldus dealer or call 206-628-2320 for more information.

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bunch, it packs a lot of information into its 150 pages. It’s well organized, sports an inviting layout with lots of illustrations, and ends with a wonderful troubleshooting section. Phsy and helpful tips appear in the margins.

This book’s only flaw, if you can call it that, is that the topics are covered in the fewest words possible. If all you want is the essentials, this is the book for you; if you’re looking for lengthier explanations, instructions, and tutorials, you’ll probably be happier with Danuloff’s and Poole’s book.

The Macintosh Bible Guide to System 7. Charles Rubin’s $12 book is very succinct: It reminded me of Joe Friday in “Dragnet”: “Just the facts, ma’am.” Still, it’s relatively complete and, like all these books, contains just about everything you need to know.

Rubin assumes that readers know quite a lot — there’s less hand-holding than in Nelson’s book and more raw facts. If you’re brand-new to the Mac, this isn’t the best choice for you; if you’re a power user looking for the most information in the fewest pages, it probably is.

One quibble: This is the only book typeset on a laser printer. All the other books were produced with a high-resolution imagesetter, and it makes a big difference. This book is ugly compared with the others — the pictures aren’t crisp, and some of the text and linebox look washed out. I find it irritating and amateurish.

But let’s not judge this book by its pages: On the whole it’s clear, easy to understand, and the least expensive of the bunch. And it comes with a 30-day money-back guarantee. Still, this book was my least favorite — probably because it wasn’t as attractive as the others.

The Macworld Guide to System 7. This $24.95 reference book was written by Lon Poole, Macworld’s How To/Quick Tips columnist, and it’s chock-full of lucid explanations and undocumented tips. Poole writes as though he’s chatting with a friend, yet every paragraph is clear, concise, and very informative. The illustrations are first-rate too.

This is the most complete book of the bunch (Danuloff’s The System 7 Book is a close second). It’s big, well organized, and easy to look at, and it includes a truly comprehensive index.

Although this book’s layout is the busi- est, the guide is easy to follow. The margins contain icons that denote comparisons (between earlier system-software versions and System 7), warnings, quick tips, and undocumented features. Although the pages sometimes seem crowded, the format works well.

This book includes a couple of bonuses: a decent tear-out quick-reference card that puts information on file sharing, publishing and subscribing, Finder shortcuts, and directory dialog boxes — plus the free updates mentioned above — conveniently at your fingertips.

The System 7 Book. Craig Danuloff’s $22.95 guide is both witty and wise. His explanations are crystal clear, and the book is well organized; it’s obvious this guy knows a lot about the Mac (he also wrote Encyclopedia Macintosh [Alameda, California: Sybex, 1990]). The book has a decent amount of hand-holding but never enough to be bothersome. The sections on file sharing and networks are particularly good, especially for network novices.

Beyond the basics, Danuloff provides tons of tips, techniques, and hints. And like the others, this book has no shortage of helpful graphics. It also includes two free updates.

Danuloff adds another nice twist: For $39.95, you can order a two-disc companion set with six commercial TrueType fonts licensed from Bitstream, Letraset, and Linotype ($200 value) plus public domain and shareware utilities and fonts. Note, however, that the coupon for this great deal doesn’t appear in the book’s first printing.

The Bottom Line

For power users, I recommend Rubin’s The Macintosh Bible Guide to System 7 — it’s the least expensive, and it tells you everything you need to know without mewling words. Danuloff’s The System 7 Book and Poole’s The Macworld Guide to System 7 take longer to read, but they’re both chock-full of good advice and useful techniques.

For intermediate users, I recommend Nelson’s The Little System 7 Book — it’s inexpensive and has a cheerful, non-threatening tone — or Poole’s and Danuloff’s books, which cover significantly more material.

Beginners should look at Nelson’s book, which is friendly and to the point; Poole’s book is longer and more thorough.

Bob LeVitus recently finished new editions of his books Dr. Macintosh and Son of Staple/Mac Tricks, both published by Addison-Wesley (Reading, Massachusetts, 1991).
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Send your tip, together with your name, address, and phone number, to Tip Sheet, c/o MacUser, 950 Tower Lane, 18th Floor, Foster City, CA 94404.

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

System 7 and ResEdit

Several of the commands in System 7's Finder lack keyboard command equivalents. Some obvious ones spring to mind—Command-M for Make Alias and Command-P for Page Setup. You can easily add these keyboard shortcuts to the Finder's Edit menu with ResEdit. To do this, you need a copy of ResEdit; if you don't have one, try a local user group or an on-line service such as CompuServe or America Online.

1. Make a copy of the Finder, and work only with the copy—a new active file with ResEdit is always a bad idea (in fact, ResEdit 2.1 doesn't let you work with the active Finder). Open the copy of the Finder in ResEdit.
2. Locate the fnmu resource (resources are listed alphabetically). Double-click on the icon, and then double-click on ID 1252. This brings up a window filled with arcane text and numbers.
3. The far-right column contains some familiar strings of text, such as New Folder, Close Window, and other Finder menu commands. The keyboard command equivalents for these (and all other Finder menu items) are stored in the third character before the name of each item—the M before New Folder and the W before Close Window, for example. Make a copy of the Finder (see Figure A). It's important that you select only the character you want instead (see Figure A). It's important that you select only the character you want instead (see Figure A). It's important that you select only the character you want instead (see Figure A). It's important that you select only the character you want instead (see Figure A). It's important that you select only the character you want instead (see Figure A). It's important that you select only the character you want instead (see Figure A). It's important that you select only the character you want instead (see Figure A). It's important that you select only the character you want instead (see Figure A). It's important that you select only the character you want instead (see Figure A). It's important that you select only the character you want instead (see Figure A).
4. To change or add a keyboard-command equivalent, select the appropriate character in the far-right column and type in uppercase the keyboard command equivalent (the M before New Folder and the W before Close Window). This brings up a window filled with arcane text and numbers.
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Tip of the Month

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Canvas

The way to produce filled or patterned text in Canvas is not readily obvious, because the Fill tool fills the background instead of the actual letters. Here's an easy method for creating filled text:

1. Type the text. Thick letters work best.
2. Draw a rectangle (or other shape) so that it covers the text, and fill the rectangle with a shade or pattern.
3. Select the ink-manager tool (indicated by the word Copy near the bottom of the toolbox) and drag over to Bic (black is clear). This eliminates the black in the text and fills it with the pattern or shade (see Figure 1).

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Printer Descriptions

In some applications, such as QuarkXPress, PageMaker, FreeHand, and Illustrator, the Print or Page Setup dialog boxes let you select a specific printer, such as a LaserWriter II, QMS PS-810, or Linotronic 300. Your printer choice affects the PostScript code that is sent to the printer and can occasionally limit the output

LaserWriters can be finicky about printing documents that use the ink manager, but you should have no problems using non-PostScript printers such as the DeskWriter.

Marc Knodeler
Milington, MI

MacUser November 1991 231
quality. This is because when you choose a printer, the application uses a printer-description file to determine what information to send to the printer. Some descriptions are built in to the application; others use separate printer-description files. These files are usually identified by a special filename extension, such as APD for Aldus applications, PDF for Quark programs, and PPD for Adobe applications. The printer descriptions affect gray levels, page margins, and other factors—some permit more versatility than others.

It would be great if these descriptions were perfect, but that’s not always the case. If you suspect that the printer description is limiting the quality of your output, try telling your application that you’re printing to a Linotronic 300, which is a high-end imagesetter. In many cases, this printer description gives the printer the ability to print the best-looking page instead of sending a restricted copy of the page’s code.

Dave deBronkart
Salem, NH

Word 4.0
Here’s how to put a Zapf Dingbat check mark into a box with a drop shadow:
1. Press Command-Y to see the symbols for paragraphs, spaces, and tabs.
2. Press Command-Option-Backslash, and then type o(0,4).
3. Select the text (including the backslash), and choose Zapf Dingbats from the Font menu.
Press Command-Y again to hide the paragraph and space symbols. You now see a box containing a check mark. You can experiment with the various boxes and check marks in Zapf Dingbats until you have a combination you like.

Nathan Leon
Pleasanton, CA

Navigator 3.0.4
When creating a message in Navigator 3.0.4, type the first few letters of the recipient’s name into the Msg To field and select Lookup.
If Navigator finds only one matching entry, it will paste the name into the field. If it finds multiple matching entries,
it will open the address book and highlight the first one.
Craig O'Donnell
Boston, MA

StyleWriter
Here's how StyleWriter owners can reduce printing time for large word-processing documents. The StyleWriter is definitely no speed demon when used with any computer less powerful than a Mac LC. But if you don't mind if the print quality is slightly less than the best, try this: Use a bold TrueType font for your text. When the Print dialog box appears, choose the Print Faster option. The document will print in about one-third of the time, and the output will be almost as good as that of the best printing quality.
Michael J. Hull
APO, NY

Finder
Sometimes you just can't throw a folder away: You place it in the Trash and select Empty Trash, and you keep getting a message reading, "The Trash couldn't be emptied (a file was busy or a folder was not empty)." Shortly thereafter, the (nonempty) folder reappears on your desktop. Even though there are no "busy" files in the folder, there isn't anything you can do to throw it away.
I've found that this happens when I've closed a document within an application but haven't yet quit the application. In such a situation, the Finder lets you throw away the closed document directly, but if you try to throw away a folder containing the document, you run into this snag: Although the file itself has been trashed, there is no way to throw the folder away until you've quit the application.
To get around this when you're trashing a folder, remember to select its contents by opening the folder and pressing Command-A. Throw away the selected files, empty the Trash, and then throw the folder away. This procedure, which works every time, has let me discard seemingly "locked" folders without resorting to any of the nuclear weapons that are available for unlocking files.
Bruce McEachern
Davis, CA

If you do want to resort to "nuclear weapons," try HellFolderFix, a utility available from freeware sources such as on-line services and user groups. You can download HellFolderFix from the Application Library of Zmac's SYMANTEC.
Bob Greenspan
Bonsall, CA

For more information.

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CIRCLE 317 ON READER SERVICE CARD
HELP FOLDER

The Many Systems of Eve

Q. I've installed System 7 and really like it, but because one of my favorite programs is allegedly incompatible with it, I'd like to be able to have System 6 available too.

However, when I copied a version 6.0.5 System Folder onto my hard disk and tried to re-start, my Mac wouldn't boot properly. I have been told that this is because there were two System Folders on the same drive. How can I have System 7 and System 6 on my Mac at the same time?

Ed Notmyrename via Zmac

By Bob LeVitus and Andy Ihnatko

Andy: The Mac becomes profoundly befuddled when it goes through its startup procedure and finds more than one System Folder on the same volume. At best, you'll have no control over which System Folder the Mac boots from — although typically it's the folder that was created first — and at worst you'll get a cheerful system error such as the one you describe.

But enough preamble! Let's dive into a variety of solutions. (In an attempt to generate an atmosphere of suspense so often absent in computer magazines, I'm saving the best solution for last.)

A shareware program called System Picker (see Figure 1) is the dicest solution. It's an application that searches for folders that contain a System file and then lets you reboot the Macintosh with the System Folder you select.

It's dicey because it does something that no Macintosh with the System Folder you select.

Figure 1: Here are three ways of switching easily between System 7 and System 6: Using a slimmed-down version of System 6 on a floppy disk (top), using an INIT such as System Picker (middle), or partitioning your hard drive and installing different systems in separate volumes (bottom).

... But Were Afraid to Ask

Throughout the grand march of history, pivotal events have hinged on the importance of men and women unafraid to ask a simple question. Take the tragedy of Amelia Earhart's last flight, for example. Historians now agree that it was largely the fault of her copilot, who was too timid to ask the famed aviatrix if she had remembered to have the sea-landing pontoons installed during the last fuel stop.

So if you have a question that seems just too simple to ask, send it on in! You may save countless lives. If you're concerned about ridicule and abuse from coworkers, fret not: We'll say the question was sent in by an athlete who, in our opinion, was single-handedly responsible for losing the World Series for the Boston Red Sox at some time or another.

Q. I'm in charge of maintaining a FileMaker Pro database, and one of my biggest problems is that of blank fields and records in our inventory database — that is, whoever enters the data creates a new record with nothing in it or somehow omits a key piece of data.

My problem is finding these pesky rascals and getting rid of them. It seems as though I should be able to search for an empty field by using the Find command and leaving the fields blank, but that doesn't work. Help!

Bill Buckner

First Base, Red Sox, 1986 (Game 6)

Andy: Well, you've learned the fundamental truth of application development: Programs wouldn't work just great if it weren't for the — pardon my language — users.

But, in fact, there is a simple built-in way to find an empty field: Use the Find command and enter =in every field where you want to find blank data. The equal sign means "Find the following data.

And if those empty fields are a constant source of irritation, why not fix things so that FileMaker Pro won't accept blank fields? In Layout mode, go to Define Fields, select the field name, and click on the Options button. Check the "Verify that the field value is not empty" box, and FileMaker Pro will issue a savage tongue-lashing to any pinhead who tries to create a record without entering data in that field. (Or you can threaten to tell the boss that the pinhead was printing resumes on the office LaserWriter — whichever appeals to your sense of justice.)

MacUser November 1991 235
program is technically supposed to do: It “blesses” the chosen folder as The One And Only Folder that the Mac should examine for System files. I managed to mess up my hard disk with an earlier version of the program, so I don’t trust it. But just for the record, the current version (1.08b at this writing) seems to work just fine.

If you’re going to be using System 7 primarily and you don’t need many INITs or control panels when you use System 6, you can try creating a floppy disk that contains a minimal version of System 6.0.5. The System, Finder, printer drivers, and control panels fit comfortably on one 800K disk. If you can also fit Suitcase II, from Fifth Generation Systems, on the disk, you can access all the fonts and DAs that are stored on your hard disk. With this setup, when you want to switch to System 6.0.5, you merely shut down your Mac, chomp your System 6 floppy into the drive, and restart. This scheme always works, because the Mac always checks the internal floppy drive for System files before checking any other drives.

I wouldn’t recommend trying to create a System 7 startup disk, however. The only way you can get it all on one disk is to create an insanely stripped-down version of the System; it’d be like embarking on a camping trip equipped with nothing but a roll of Saran Wrap and an extra pair of shoelaces.

At last, the shocking conclusion. The best possible solution is to have the old and new Systems on separate volumes and then use the Startup Device control panel (called the Startup Disk under System 7) to select which volume your Mac should boot with. If you have more than one hard drive (say an internal and an external drive), you can install a different system-software version on each one without further muss or fuss. If you have only one hard drive, then partition its disk into separate volumes, using a utility such as La Cie’s Silverlining. Then put a folder with System 6 onto one volume and System 7 onto another. This method is simple and foolproof and won’t cause you to turn into a pillar of salt.

Unfortunately, the Mac Plus, because it lacks the special section of PRAM (parameter RAM) where the control panel records the startup info, can’t use the Startup Disk control panel. But don’t you fret: Most partitioning programs worth their salt come with a DA for determining which SCSI partitions are mounted on the startup disk and which are left in the slipcase, so to speak. Silver Volumes, supplied in the Silverlining package, is the DA I use. When I need to switch to System 6, I open the DA and order that Jessica (System 7) is not to be mounted and that Deathlok (System 6.0.5) should be mounted in its place.

Bob: For those who are using two or more volumes, there’s a freeware INIT called SwitchBoot. It lets you choose which volume you want to boot from at startup time. Without it, you have to wait for the Mac to boot, use the Startup Disk control panel, and then restart. With SwitchBoot, if you hold down the S key during startup,
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you'll see a dialog box with a list of your bootable hard drives. Choose one and click on the Reboot button, and your Mac will start up with the System on that volume.

For those who switch between hard drives (or partitions) more than a couple of times a day, SwitchBoot is a real time saver. Unfortunately, like everything pertaining to startup devices, SwitchBoot doesn't work with a Plus or earlier Mac models.

SwitchBoot and System Picker are available from user groups and on-line services.

**Formatting 400K Disks As HFS**

Q. I thought I read somewhere that there's a key combination that lets you format 400K disks as HFS (Hierarchical File System) disks. Is there such a beast, and if so, what is it?

Cecil Habermacher
Houston, TX

Bob: There is indeed such a beast. But first, a word for our readers who're too young to remember 400K disks and MFS (Macintosh File System).

In the old days, all Macs came equipped with 400K drives, and all floppy disks were formatted with MFS. When the Mac Plus appeared in 1987, Apple introduced HFS, the now-familiar system that allows folders within folders. The difference between the two systems is that MFS was a flat-filing system (every file on a disk was at the same level, as if there were no folders), and HFS is, well, hierarchical (files are separated by the folders they're in). With MFS, folders were visible only when you looked at the disk in the Finder, and they disappeared in the Open and Save dialog boxes.

Now for the answer to your question, but before I begin—we don't recommend storing important information on disks formatted this way, because 400K disks are tested only on one side during manufacturing:

To format a 400K disk as an HFS disk, simply hold down the Option key when you click on the One-Sided button in the disk-initialization dialog box and continue to hold it down while the disk is being initialized.

**Cheap SuperDrive Solution?**

Q. I'm looking for a reasonably priced internal SuperDrive. I've looked at — and rejected — Apple's pricey upgrade, because it requires new ROMs and floppy chips. And as nice as it would be, a Hfs upgrade would blow my budget. I know there are external SCSI drives that claim high-density and DOS-disk compatibility, but with an empty spot in my Macintosh case, they seem like a clunky alternative.

There must be a bunch of Mac II owners stuck in the same boat — somebody must have such a product!

Warren L. Gawwe
Lockport, NY

Andy: Well, Warren, you're right, and you're wrong. Yes, there are a whole bunch of Macintosh II (and Mac SE) owners out there who have 800K floppy drives and want to upgrade to the high-density 1.44-megabyte SuperDrives. Unfortunately, no one has the product you describe (at least

---

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as far as Bob and I know).

Here's the problem: Moving from an 800K drive to a SuperDrive isn't a simple little upgrade. For starters, your Mac lacks the basic circuitry that's necessary for moving data in and out of a high-density drive. And even if it had the right circuitry, your Mac II's old ROM would still think that it was hooked up to a puny 800K drive.

So you're stuck. You really have only two options: You can swallow your pride and spring for the official Apple upgrade, or buy one of those external SCSI disk drives you mentioned. The Macintosh treats one of these drives like a 1.44-megabyte SCSI hard drive, so no ROM or disk-controller upgrades are necessary.

Personally, I favor the external-drive solution to the official upgrade. It costs about $200 less, and these drives typically come packaged with some extra goodies, such as an INIT that mounts DOS disks right on the desktop without using Apple File Exchange as an intermediary.

**How to Turn On the Spooler**

Q. How do you turn on Apple's print spooler? I've installed both Background and Print Monitor in my System Folder, and I still can't figure out how they work.

Bob: To turn on the spooler, open the Chooser, select your printer, and click on the button next to Background Printing. By the way, if you're using a version of the system software earlier than System 7, print spooling works only in the MultiFinder mode; you can't use it if you're running under the Finder.

And now for your second...

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Features

<table>
<thead>
<tr>
<th>Features</th>
<th>Apple AE</th>
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</thead>
<tbody>
<tr>
<td>DHD5 (read/write MS-DOS, ProDOS)</td>
<td>yes yes</td>
</tr>
<tr>
<td>Sony mechanism</td>
<td>yes yes</td>
</tr>
<tr>
<td>Manual and auto eject</td>
<td>yes yes</td>
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<tr>
<td>FCC certified design</td>
<td>yes yes</td>
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<tr>
<td>Apple-standard footprint</td>
<td>yes yes</td>
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<tr>
<td>ABS plastic case</td>
<td>yes yes</td>
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<tr>
<td>Apple-standard platinum case</td>
<td>yes yes</td>
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<tr>
<td>2-color read/write indicator</td>
<td>no yes</td>
</tr>
<tr>
<td>Full daisy-chain compatibility</td>
<td>yes yes</td>
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<tr>
<td>Custom molded DB-19 cable</td>
<td>yes yes</td>
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<tr>
<td>800K capacity</td>
<td>yes yes</td>
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<tr>
<td>1.44 MEG SuperDrive capacity</td>
<td>yes yes</td>
</tr>
<tr>
<td>One year warranty</td>
<td>yes yes</td>
</tr>
<tr>
<td>Worldwide dealer sales &amp; support (over 2,000)</td>
<td>yes yes</td>
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question: There is an easy way to change the default font in Word. Choose Define Styles from the Format menu, click on the Normal style, pull down the Font menu (or type Command-D), choose the font you want, and click on the Set Default button (see Figure 2). A dialog box will confirm that you want to record your choice to the default style sheet. Click on OK. That's it — your default font is changed.

Keeping a LaserWriter Running, Part 2

OK, we blew it. To wit: our advice to Gloria Baciewicz last July (see "Keeping a LaserWriter Running," page 234).

Gloria's dealer told her to switch her LaserWriter IIISC on before starting up her Mac and leave it running as long as the Mac is turned on. We said she didn't have to. We were wrong. Because her printer connects via the SCSI port, she should turn it on before starting up her Mac and leave it running whenever her Mac is powered up. SCSI devices should be turned on before you turn on your Mac — otherwise the entire SCSI chain won't work.

Our excuse is that we thought Gloria's printer, like ours, connected to her Mac via the printer port, in which case she could have turned it on and off at will.

Heap-Big Tool

Q. Thanks for pointing out the necessity of keeping some extra space in my system heap (see "The System Heap," June '91, page 247). However, I have no idea how to find HeapTool, the shareware control panel you mentioned.

Bud Trinayar

Maxwell AFB, AL

Andy: It's a wonder I can even make it to the computer to write this reply. Bud, because my office is buried in a blanket of letters three feet deep, all of them asking exactly that same question.

HeapTool is shareware, which is copyrighted software, distributed free of charge, whose author requests that you pay a small fee if you like the program. To get HeapTool, you have to turn to the usual sources of shareware and freeware. First, there are on-line services (such as Zmac and America Online), which have boatloads of software, some literally only hours old.

Second, you can try a commercial shareware distributor. This kind of outfit, with or without the shareware authors' consent, assembles shareware collections on-disk and sells them for a nominal duplication fee (usually between $6 and $10). Shareware distributors usually advertise in the back of glossy, information-packed magazines such as the one you're holding in your hands right now.

Finally, you can turn to the vast national brotherhood/sisterhood of Macintosh user groups. Almost every user group sells disks of public-domain and shareware software. All you have to do is give your local (or not-so-local) user group a call, and ask what's available. (Call Apple at [800] 538-9696, ext. 500, and ask for a list of the groups in your area.)

Of course, the fact that you've paid a user group or a shareware vendor for the disk or paid an on-line service for the downloading time does not mean you've paid for the software itself; if you enjoy the software, you're still honor-bound to pay the mealy, pidling, hardly significant little registration fees that the authors request.

Bob: One last thing: If you've upgraded to System 7, you don't need HeapTool — the system software automatically adjusts the system heap for you.
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### General Utilities

**AFE (Apple File Exchange)**

AFE (Apple File Exchange) is one of the utilities that come free with the Mac System Tools disks. It has a simple interface and works with a wide variety of data-transfer methods. Best feature is that it works with current MacLinkPlus Translators. By itself, AFE translators are limited to MacWrite generation text. Free. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014. (800) 776-2353 or (408) 969-1010. (Oct '89)

**AutoSave II**

AutoSave II provides insurance against system crashes. It saves your work automatically at intervals from 1 to 99 minutes. Compatible with many applications but not recommended for use with databases. Version 1.0 reviewed. Version 2.0 shipping. $49.95. Magic Software, Inc., 2239 Franklin St., Berkeley, CA 94704. (510) 524-6243 or (402) 291-0670. (Dec '89)

**ClickChange**

ClickChange is a control panel that customizes your Mac's interface by modifying various features such as window borders, title bars, text, menu background, sounds, and dialog boxes. Comes with a library of more than 40 cursors and 30 excellent sounds. Extremely easy to use. Version 1.0.3 reviewed. Version 1.0.4 shipping. Mac Plus or later and System 6.0.3 or later. $79.95. Dub-Click Software, Inc., 9316 Deering Ave., Chatsworth, CA 91311. (818) 707-9525. (Mar '91)

**Desk***

Desk is a collection of seven powerful DAs: DeskPaint, DeskDone, DeskWrite, DeskSecretary (appointment calendar), DeskCom (modern control), DeskCalc, and DeskFile (minidatabase). Although not on a par with MicroMacWorks, Desk lets you access its DAs from within any application. Version 1.0 reviewed. Version 3.0 shipping. Requires Mac Plus or later; DeskPaint requires System 6.0.3 or later. MicroMacWorks, Inc., 2095 Rose Dr., Ste. 50, Laguna Niguel, CA 92677. (714) 567-0007. (Feb '90)

**Handoff II**

Handoff II lets you launch documents from applications that are not the ones the documents were created with. Handoff II works with a variety of document types (including graphics) and lets you simply double-click on documents created with earlier programs to open them. Its ability to remember pixel depth (colors or grayscale) and volume settings for different programs is also useful. Version 1.1 reviewed. $99. Connectix Corp., 125 Constitution Dr., Menlo Park, CA 94025. (800) 950-2880 or (415) 324-0727. (Feb '91)

**LifeGuard***

LifeGuard is an INIT that acts like an electronic alarm clock, letting you know when a user-defined length of time has elapsed. You control the frequency of breaks as well as the interval allowed before it's time to resume work. Audible sounds or flashing on-screen signals serve as warnings, and a "snooze" function can override the alarm. Some basic information on exercise and ergonomics is also provided. Go ahead, take five — it's good for you. Version 1.0 reviewed. $79.95. Visionary Software, Inc., P.O. Box 6447, Portland, OR 97201. (800) 877-1822 or (503) 246-6200. (Feb '91)

**MailRaider***

MailRaider is a larger HyperCard stack that determines postage rates. Erasable data stacks. Includes HyperCard. Version 1.1 reviewed. Version 3.0 shipping. Requires Mac Plus or later and HyperCard 1.2 or later. $29.95. Tight Line Software, 2760 Four Seasons Rd., Ste. 50, Laguna Niguel, CA 92677. (714) 567-0007. (Feb '90)

**Maxima***

Maxima breaks the 8-MB limit on your Mac SE/20 or Mac II. Lets your applications use up to 14 MB of virtual hard-disk memory. Can also create a lightning-fast RAM disk. Elegant design is flawless. No RAM disk automatically through-or-volume-size partitioning features. Version 1.0.5 shipping. Requires SE/30 or Mac II and hard-disk drive. $129. Connectix Corp., 125 Constitution Dr., Menlo Park, CA 94025. (800) 950-3880 or (415) 324-0727. (Sept '90)

**MicroRX SE1***

MicroRX SE1 is a HyperCard stack that diagnoses your SE's problems. The details are meant for qualified service techs, but anyone using it can gain better knowledge of what's inside the SE. Well done and easy to use. Version 1.01 shipping. Requires HyperCard 1.2 or later. $99. MicroMat Computer Systems, 7075 Redwood Blvd., Novato, CA 94945. (415) 898-6227. (July '90)

**MockPackage Plus Utilities***

MockPackage Plus Utilities is a set of extremely powerful DAs. Includes a text editor, text printer (supports LaserWriter), calendar, terminal, EZMenus, and several other useful tools. Version 4.4 shipping. Requires Mac Plus or later and System 6.0.3 or later. $399.95. Z.Cdcor, 4500 E. Speedway Blvd., Tucson, AZ 85712. (602) 800-9525. (Oct '91)

**Now Utilities***

Now Utilities is an inexpensive collection of tools: StartUp Manager INIT (controls INITs, control panels, and Chooser documents); Super Booterang INIT (adds navigation features to Open and Save dialog boxes); Profiler (hardware/software analysis); Now Menus; WYSIWYG Menus; FinderKeys; MultiMaster (desktop and menu-bar management); DeskPicture (custom desktop background); Customizer (alters windows, folders, and the like); Alarm Clock; Previewer (preview printed documents); ScreenLock (a moderately secure password system that 'crashes' on interact with other INITs). Version 2.0 reviewed. Version 3.0 shipping. $129. Now Software, Inc., 520 S.W. Harrison, Ste. 435, Portland, OR 97201. (800) 237-3611 or (503) 274-2800. (Apr '91)

**Partner***

Partner is an INIT that lets you edit embedded graphics while using DTP or word-processing programs. Can put graphics files into text documents and accept them. Version 1.0 reviewed. Requires Mac Plus or later with at least 2 MB of RAM, System 6.0.3 or later, and MultiFinder. $99. Salient Software, Inc., 124 University Ave. #103, Palo Alto, CA 94301. (415) 852-9567. (May '90)
**MINIFINDERS**

**Personality**

Personality is a control panel that lets you change the look and feel of your Mac's interface. You can modify scroll bars, menus and their backgrounds, window borders, title bars, text, and so on. Extremely easy to use, Personality is unique, because it can change the menu font and create 3D menus. Provides only eight cursors and doesn't include any sounds. Version 1.01 reviewed. Requires Mac Plus or later and System 6.0.2 or later. $50.95. Baseline Publishing, Inc., 5801 Benjamin Ctr. Dr., Ste. 103, Tampa, FL 33634, (813) 882-8635, (Sept '89)

**Stepping Out II**

Stepping Out II is a software alternative to a large-screen monitor. Lets you create a virtual screen (as large as memory allows) inside the Macintosh's 9-inch screen. Automatically scrolls to new document position as you type or draw. Version 2.0 reviewed. Version 2.02 shipping. Requires Mac Plus or later. $95. Berkeley Systems, Inc., 2095 Rose St., Berkeley, CA 94709, (415) 540-5535. (Oct '85)

**SuperGlue II**

SuperGlue II, an excellent print-to-disk program, offers superior operation along with many nice touches, such as Gline Notes (Post-it-like notes) and One-Timer. The Fkey that makes operation immensely easier. Version 2.01 shipping. Requires Mac Plus or later and System 6.0.2 or later. $119.95. Solutions, Inc., P.O. Box 783, Williston, VT 05495. (802) 865-9220. (Nov '89)

**Tempo II Plus**

Tempo II Plus is a powerful macro program designed for owners of extended keyboards. Especially good for building sequential macros. Unique features include conditional branching and the ability to remember menu selections by name. Tempo II Plus' use of several separate files is potentially confusing, but the bundled installer application helps a lot. Version 2.01 reviewed. Version 2.03 shipping. $169.95. Affinity Microsystems Ltd., 1050 Walnut St. #425, Boulder, CO 80302. (303) 442-8480. (May '91)

**Virtual 2**

Virtual is a virtual-memory program. Provides up to 15 MB of effective RAM, using hard-disk drive for temporary storage. Excellent interface and very good support. Version 2.0 reviewed. Version 2.03 shipping. Requires Mac Plus or SE (with accelerator card), II (with optional 68851 PMMU), SE/30 or later, $199; with PMMU chip, $275. Connectix Corp., 125 Constitution Dr., Menlo Park, CA 94025, (800) 950-5861, (Apr '91)

*89 Eddy

**Shadow**

Shadow is a data recovery utility that automatically backs up selected files at specified time intervals and after specified actions. Doesn't work with all programs (Eccel 2.2 in particular). Version 1.2 shipped. Requires Mac Plus and System 6.0.3 or later. $249. Dantz Development Corp., 1400 Shattuck Ave., Ste. 103, Berkeley, CA 94709, (415) 849-0293, (Dec '89)

**CanOpener**

CanOpener is a search-and-retrieval utility: It searches files for specified strings. Reads and supports incremental and differential backups and offers a choice of compression levels. Backup configurations can be saved as preference files. Macro language supports automated procedures. Nonstandard dialog boxes are unclear. Version 2.0 reviewed. Version 2.10 shipping. Requires Mac 512c or later and System 4.2 with System 5.3 or later. $49.95. Natural Intelligence, Inc., 2067 Massachusetts Ave., Cambridge, MA 02140. (800) 999-4649 or (617) 876-8876. (May '90)

**FILE & DISK MANAGEMENT**

CanOpeners are a search-and-retrieval utility: It searches files for specified strings. Reads and supports incremental and differential backups and offers a choice of compression levels. Backup configurations can be saved as preference files. Macro language supports automated procedures. Nonstandard dialog boxes are unclear. Version 2.0 reviewed. Version 2.10 shipping. Requires Mac 512c or later and System 4.2 with System 5.3 or later. $49.95. Natural Intelligence, Inc., 2067 Massachusetts Ave., Cambridge, MA 02140. (800) 999-4649 or (617) 876-8876. (May '90)

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Compactor

Compactor is a shareware application that creates the smallest possible compressed files, and it does so quickly. It can also create self-extracting archives that open automatically when you double-click on their icons, even when the Compactor application isn’t available. The self-extracting feature adds only 14K to an archive.

Compactor unzips StuffIt files up to 13.5% faster. Some of the compressed files available on online services have been created with Compactor. Version 1.21 reviewed. $22.50.

Directory

DIREcTory is a fast, excellent file-cataloging tool. Easy-to-use Finder-like interface. Good printed reports. Includes actual icons and version numbers for Mac Plus or later. $125; free upgrades. Abbott, 15220 N.W. Greenbrier Pkwy. #200, Beaverton, OR 97006. (800) 888-8199 or (503) 690-8990. (Mar ’91) *85 Eddy

Disk Finder

DiskFinder is a command-line utility that copies directories from one hard disk to another. Version 3.4 reviewed. $25.

Disk Organizer

Disk Organizer is a shareware application that manages and organizes your hard disk. Version 2.0 reviewed. $19.95.

DiskTop

DiskTop is the quintessential Finder-replacement DA. It is easy to use, is powerful, and has an excellent interface. Launches application software, opens files, batch copies and moves. It’s very fast, and the Find function’s multiple options are unmatched. Version 4.0 reviewed. Version 4.01 shipping. Requires Macs 512K or later. $99.95. CE Software, Inc., P.O. Box 65580, West Des Moines, IA 50265. (800) 523-7638 or (515) 224-1995. (June ’90)

FetchIt

FetchIt is an INIT that puts a pop-up menu on the right side of the desktop. Version 3.15 reviewed. $75.

File Director

File Director is an extremely easy-to-use, versatile, and powerful collection of utilities. It includes Disk Tools (for file management and searching), FileDirector (an application launcher formerly called PowerStation), Calendar (a basic monthly appointment and phone-number manager that attaches notes to entries), MacPlus Disk Pad (a combination notepad and phone dialer), and RPN Calculator and Scientific Calculator (two sophisticated improvements on Apple’s Calculator DA). This package is a winner, especially if you have hard-disk drives containing many different files and applications. Requires Mac Plus or later. $129. Fifth Generation Systems, 10049 N. Reiger Rd., Baton Rouge, LA 70809. (800) 873-4534 or (504) 291-7221. (Apr ’91)

Findswell

Findswell is an indispensable utility that installs a new button in the Open dialog box of every Mac application. Click on the button to type a search string, and click on Find, and Findswell searches for any files that match. Version 2.01 shipping. Requires Macs 512K or later. $59.95. Working Software, Inc., P.O. Box 1884, Santa Cruz, CA 95061. (408) 423-5696. (Nov ’87) *87 Eddy

INITPicker

INITPicker is a control panel that offers a scrollable list of INITs in the system so you can determine their loading order. Holding down a predetermined key combination at startup automatically shuts off all INITs and bypasses the INITPicker screen. Can be invoked at startup. Version 1.0 reviewed. Version 2.0 shipping. Requires Macs Plus or later. $69. Microplus Publishing, Inc., 5801 Roosevelt Dr. Cr. Dr., Ste. 103, Tampa, FL 33634. (813) 882-8635. (Aug ’89)

KiwiFinder Extended

KiwiFinder Extended lets you name, sort, and search through large numbers of files, using a simple application called Manager. The application maintains a database about all the files on your hard-disk drive. KiwiFinder adds buttons to the Mac’s standard Open and Save dialog boxes, providing many of the options available with the Manager application. For users with reasonably organized hard drives, this package isn’t necessary, but it can add those whizbang features that large-scale file management requires. Version 1.2 reviewed. $99. Kiwi Software, 6546 Pandale Rd., Santa Barbara, CA 93117. (800) 685-0549 or (805) 685-0431. (Apr ’91)

MacTools Deluxe

MacTools Deluxe contains utilities that include a disk optimizer, a backup program, security options, partitioning software, search/launch capabilities, and a code-manipulation program called FileEdit. This suite of tools Deluxe has mediocre performance as a file-recovery package — unless it is preinstalled as a preventive system, in which case it has good panic performance and recovers deleted or erased files well. Version 1.2 shipping. $129. Central Point Software, Inc., 15220 N.W. Greenbrier Pkwy. #200, Beaverton, OR 97006. (800) 888-8199 or (503) 690-8990. (Apr ’91)

MultiDisk

MultiDisk is an excellent software disk partitioner that allows partitions to be dynamically resized, password-protected, and even encrypted. Can’t erase partitions from the Finder. Version 1.1 reviewed. Version 1.2 shipping. Requires System 6.0.3 or later. $89.95. AlSoft, Inc., P.O. Box 927, Spring, TX 77383. (713) 353-4090. (May ’89)

Norton Utilities for the Macintosh

The Norton Utilities package provides a complete system optimizing and restoring the data on your hard-disk drive. Utilities that optimize hard-drive performance and speed searches for missing files are included as well as an application that modifies the appearance of Finder windows. Another useful software component is the KeyFinder DA, which simultaneously displays all available keyboard characters. This utilities package is highly recommended. Version 1.4 reviewed. Version 1.5 shipping. Mac Plus or later. $129. Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014. (800) 441-7234 or (408) 253-9600. (Mar ’91) *90 Eddy

On Cue

On Cue lets you switch applications without returning to the Finder. Under MultiFinder, active applications are listed on a pop-up menu. Can also launch directly to a specific document. Version 1.0 reviewed. Version 1.3 shipping. Requires Mac Plus or later. $99.95. ICOM Simulations, Inc., 648 S. Wheeling Rd., Wheeling, IL 60090. (708) 520-4440. (Sept ’88)

On Location

On Location finds files and text strings. Once they’ve been found, you can view file contents (for most common document formats); open a file in its native application; or copy, delete, rename, or move a file. Main asset is blazing speed. Nonstandard interface. Has one-year, money-back guarantee. Version 1.0 reviewed. Version 1.0.2 shipping. Requires Mac Plus or later. System 6.0.3 or later. A hard-disk drive. $129.95. ON Technology, Inc., One Cambridge Center, Cambridge, MA 02142. (617) 224-2281. (Sept ’90)

PickTure

PickTure is an INIT and control panel that serves as a visual file...
doesn't have the StuffIt Deluxe application. Includes security features, optional compression speeds, and a control panel for quick access. Version 2.0 requires Mac Plus or later and System 6.0.3 or later. $99.95. Aladin Systems, 165 Westridge Dr., Watsonville, CA 95076. (408) 761-6200. (Oct '91)

**SUM II (Symanite Utilities for Macintosh)**

SUM II is an upgraded, expanded version of the full-featured SUM data-recovery package. Includes utilities for partitioning, encrypting, backing up, defragmenting, and optimizing floppy and hard-disk drives. Straightforward and reliable for defragmenting and optimizing, but less easy to use for undocting files. Requires Mac Plus or later. $149.95. Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014. (800) 441-7234 or (408) 253-9600. (Dec '89) * **$89**

**Super Boomerang**

Super Boomerang is a handy INIT that adds full navigational and search features to all Open and Save dialog boxes. It automatically remembers all the files and folders recently accessed. Can be configured to always show certain files and folders. Big time saver. Version 2.0 shipping. Requires Mac Plus or later. With Now Utilities, $129; free upgrade from Boomerang. With Mac Plus or later. $520 S.W. Harrison, Ste. 435, Portland, OR 97201. (800) 237-3611 or (503) 274-2800. (Apr '90)

**Silverlining**

Silverlining is an advanced hard-disk-utility set. Excellent disk-partition features available. Formats most hard-disk drives. Powerful, safe optimizing and testing features. Excellent performance. Includes DS Backup (for Mac Plus or later and good disk duplicator. Version 5.27 shipping. Requires Mac Plus or later and a hard-disk drive. $99.95. La Cie Ltd., 90th Dr., East, C. Tualatin, OR 97062. (800) 999-0143 or (503) 691-0771. (Jan '90)

**StuffIt Classic**

StuffIt Classic compresses files to reduce the amount of space they occupy on disk. Great for transferring documents via modem. Also joins and encrypts files. Version 1.0 reviewed. Version 1.6 shipping. Requires Mac Plus or later and System 6.0.3 or later. Shareware, $25. Aladin Systems Inc., 165 Westridge Dr., Watsonville, CA 95076. (408) 761-6200. (Dec '88)

**StuffIt Deluxe**

StuffIt Deluxe is the commercial version of StuffIt Classic, a file-compression and archiving utility. This powerful version is quick and easy to use and provides nearly every feature needed for compressing files. Can create "self-extracting archives," which can be opened on a Mac that doesn't have the StuffIt Deluxe application. Includes security features, optional compression speeds, and a control panel for quick access. Version 2.0 requires Mac Plus or later and System 6.0.3 or later. $99.95. Aladin Systems, 165 Westridge Dr., Watsonville, CA 95076. (408) 761-6200. (Oct '91)

**PrintBar**


**Freedom of Press**

Freedom of Press gives you PostScript-quality output on non-PostScript printers and creates large PostScript clone available. The only limit to output quality is the printer's maximum resolution. Adobe Type 1 fonts and Adobe Type Manager are supported. Process is slow and creates large PostScript files, but output is nearly indistinguishable from true PostScript printer output. Background printing is tolerable running under MultiFinder. Some users would do just as well getting a PostScript cartridge for their printer. Version 3.0 requires Mac Plus or later with 2 MB of RAM, a hard-disk drive, and 1 MB of printer memory. $495. Custom Applications, Inc., 900 Technology Park Dr., Bldg. 8, Billerica, MA 01821. (508) 667-8585. (Feb '91) * **$89**

**MacPrint**

MacPrint is a printer driver that lets you print to non-PostScript HP-compatible printers. Provides screen fonts for every HP font cartridge and special Compu­

**MINIFINDERS**

This combination D/A application has many powerful features for envelope printing and mailing, but it lacks font flexibility and unlimited-record capability. Features include graphics ability, postal-bar-code creation, data import/export, and print merge. You can customize envelope sizes, or you can use 11 predefined formats as well as 150 label templates. Sorts by name or ZIP code. Version 5.0 reviewed. Requires Mac Plus or later. $89.95. Syncex, 602 Ten St., Bldg. 2, Unit 2, Emeryville, CA 94608. (510) 447-9639 or (718) 499-6293. (Apr '91)

**Kiwi Envelope 3.1**

This DA has limited features and flexibility for envelope printing, but it supports UPC/EAN, Interleaved 2 of 5, and Code 39. Operation is a bit clumsy, but performance is fine. Can print easily transferable. Easy to use. Version 2.0 reviewed. Version 3.0 shipping. Requires Mac Plus or later. Four volumes (for different codes), $95 to $295 each. Bear Rock Technologies, 609 Enterprise Dr., Diamond Springs, CA 95619. (916) 622-4640. (June '90)
QuickLetter

QuickLetter is a well-designed and thoughtfully implemented DA for creating letters and envelopes. It creates stationary, complete with graphics, logos, and an address book that includes salutations.

Version 1.0 reviewed. Version 1.1.5 shipping. Requires Mac Plus or later, System 4.1 or later. $69. Macmillan Software, Inc., P.O. Box 1844, Santa Cruz, CA 95061. (408) 423-5696. (Apr '89)

SharpenUp

SharpenUp is an INI and control panel that automatically adjusts the relative width of lines, the texture of gray patterns, and the overall brightness on your laser printer. It has no effect on text or bit-mapped or EPS graphics. It can greatly improve the quality of lines in tables, graphs, or cell outlines in Excel. Comes with a nice set of predefined styles, and users can create custom styles easily. Version 1.0 shipping. Requires Mac Plus or later, System 4.1 or later. Greene, Inc., 22734 Ponola Dr., MI. T. Branch Post Office, Cambridge, MA 02139. (617) 624-2594. (Apr '91)

SuperLaserSpool

SuperLaserSpool supports a wide range of printers, including the HP DeskWriter. Excellent performance. Installation is a snap, and use is mostly transparent. Version 2.0 reviewed. Version 2.1 shipping. Requires Mac Plus or later, System 6.0.2 or later, and hard-drive disk. $279; discounted site license for computers. $124.95. Working Software, Inc., 111 M Street, Suite 111, Los Angeles, CA 90020. (800) 842-5020 or (619) 942-2556. (Sept '90)

TurboSpool

This spooler has a nice interface but forces you to load spooled files into the queue manually. Sometimes printing delay is unnecessarily long. Compatible with LaserWriter and MultiFinder. $69. PLI (Peripheral Land, Inc.), 47421 Bayside Pkwy., Fremont, CA 94538. (415) 268-8754 or (415) 657-2211. (Apr '90)

UltraScript for the Macintosh

UltraScript provides software routines for PostScript emulation that lets Mac applications get the maximum quality possible from non-PostScript printers. A serious disadvantage is that 1 font must be converted into a proprietary format in order to work with UltraScript. Adobe Type Manager still works, but it doubles the hard-drive space used by fonts. Batch processing is not possible, and not all printers and film recorders are supported. Version 1.1 reviewed. Requires Mac Plus or later and at least 3 MB of RAM (hard drive recommended), $195. UltraScriptPlus (includes network specification routines), $445. QMS, Inc., One Magnanuus Pass, Mobile, AL 36618. (800) 523-2696 or (205) 633-4300. (Feb '91)

Security

A.M.E. (Access Managed Environment)

This industrial-strength security system offers some of the most complete features available for the Mac, but its unforseen approach makes it suitable only for knowledgeable users. Version 1.1 reviewed. Requires Mac Plus or later and at least 3 MB of RAM (hard drive recommended), $195. UltraScriptPlus (includes network specification routines), $445. QMS, Inc., One Magnam PASS, Mobile, AL 36618. (800) 523-2696 or (205) 633-4300. (Feb '91)

FileGuard

FileGuard is an excellent security package that operates primarily in the background. It is unique in that it can protect folders, applications, and data files, which it accomplishes by using an easily updated list of persons who have different levels of access. There is no DES encryption, but its propriety encryption is well done. FileGuard provides support for the optional MaccessCard magnetic-identity-card reader that operates as part of the ADB circuitry. Version 2.5 reviewed. Verses 2.5.2 shipping. Requires Mac Plus or later; SE users should use MaccessCard reader. $299; 5-user office pack, $395; 10-user office pack, $595. ASD Software, Inc., 4650 Arrow Hwy., Montclair, CA 91763. (714) 624-2594. (Apr '91)

Ft. Knox

Ft. Knox is an excellent security software utility. Supports two forms of encryption. Files or volumes can be "sanitized" to U.S. top-secret standards. Version 1.05 reviewed. Requires Mac Plus or later. $195. Transfinite Systems, P.O. Box N, M.I.T. Branch Post Office, Cambridge, MA 02139. (617) 969-9570. (Nov '89)

MaccessCard Reader

MaccessCard is a magnetic-identity-card reader that operates as part of the ADB circuitry and requires ASD's excellent FileGuard software. In conjunction with FileGuard, the reader prevents unauthorized access to each user's hard disk, which is protected by a specified selection of files, folders, applications, and partitions. Requires Mac SE or later, with FileGuard software. $349. ASD Software, Inc., 4650 Arrow Hwy., E-E, Montclair, CA 91763. (714) 624-2594. (Apr '91)

MacSafe

MacSafe is a data-file-security program that lets you put multiple files into a "safe," where you can protect them further by two types of encryption (including DES). Flexible and easy to use. Allows for installation on hard disk drive. Version 1.0 reviewed. Version 2.0 shipping. Requires Macintosh 512Ke or later. $189.95. Kent Marsh Ltd., P.O. Box 460289, 120 Post Oak Blvd., Ste. 210, Houston, TX 77086. (800) 325-3587 or (713) 623-8618. (Sept '88)

NightWatch

NightWatch locks up your hard disk drive by using a floppy-style chip that acts as a key. Type in the correct password, and access to the hard-drive disk is allowed.

Version 1.02 reviewed. Version 1.03 shipping. Requires Mac 512Ke or later and hard-drive disk. $149.95. Kent Marsh Ltd., P.O. Box 460289, 120 Post Oak Blvd., Ste. 210, Houston, TX 77086. (800) 325-3587 or (713) 623-8618. (Sept '88)

Rival

Rival is a utility that inspects open files for known viruses. Rival checks files constantly, but delays are hardly noticeable. Also scans disks and does some file repairs. Experienced users can easily add protection against newly discovered viruses. Version 1.1.6 shipping. $99. Microseed Publishing, Inc., 501 Benjamin Dr., Ste. 103, Tampa, FL 33634. (813) 882-8635. (Sept '90)

SAM (Symantec AntiVirus for Macintosh)

SAM employs a powerful, effective virus detection and eradication program. One unique feature is the ability to monitor files while code resources are available. Good support and update history: Toll-free number is available for update information. Easy to use and easy to modify to fit special needs. Allows networked users to access single virus-definable files on central server. System-7-compatible with balloon help, allows users to choose which files can be accessed by a Mac. Requires Version 6.0.2 or later, and hard-disk standards. Version 1.1.5 shipping. Requires Mac Plus or later and System 6.0.3 or later. $99. Symantec, 1200 Post Oak Blvd., Ste. 113, Encinitas, CA 92024. (800) 842-5020 or (619) 942-2556. (Sept '90)

Virex


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<th>Special</th>
<th>Apple IIe System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mac Classic 2mb RAM, 40mb HD, 1.44mb FDHD, mouse, keyboard.</td>
<td>Your Price $1,175</td>
<td></td>
</tr>
</tbody>
</table>

Mac LC System
Mac LC CPU, 40mb HD, 4mb RAM, standard keyboard, Apple 12" RGB monitor, + System 7.0

| Your Price | $3,645 |

Mac IIG System
Mac IIG CPU, 5mb RAM, 105mb HD, MacPro Ext, keyboard, "14" Trinitron Monitor, + System 7.0

| Your Price | $4,695 |

Mac IIfx System
Mac IIfx CPU, 6mb RAM, Wren Runner 330mb HD, Seiko 14" Monitor, 24-Bit Color, MacPro+ keyboard.

| Your Price | $7,795 |

Syquest External
44MB w/Cart $439
44MB Cartridge $69
88MB w/Cart $799
88MB Cartridge $129

- 30 Day 100% Guarantee
- Multiple case options
- Formatted drives
- Free test software
- Lifetime toll-free support
- One year instant replacement
- All hardware included
- No credit card surcharge
- Same day shipping on most products

MacTown

Hardware Express • 1-800-622-7123 • 1-800-MAC-S123

CIRCLE 47 ON READER SERVICE CARD.

"Q" Series

<table>
<thead>
<tr>
<th>MB-msec</th>
<th>Int Ext</th>
<th>LPS105-10</th>
<th>$349</th>
</tr>
</thead>
</table>

Seagate

Maxtor

EXABYTE

CIRCLE 20 ON READER SERVICE CARD.
NO WILD, NO WILDLIFE.
The California desert tortoise is losing ground.
The fact is that the tortoise population has declined as much as 90% over the last fifty years. This drop is a true biological indicator of how severely the desert ecosystem is at risk.
The Sierra Club works to save our wildlife by saving the wilderness. We have a history of victories. And, we believe, with your help, the three-million-year-old desert tortoise can win back its native turf.

For more information: Sierra Club, Dept. DT
730 Polk Street
San Francisco, CA 94109
(415) 775-2211
Introducing...

Quantum 425MB Internal Drive
$1399

Seagate

<table>
<thead>
<tr>
<th>Capacity (mb)</th>
<th>Model</th>
<th>Size</th>
<th>Access</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>330</td>
<td>2383</td>
<td>5.25&quot;</td>
<td>15ms</td>
<td>$1135</td>
<td>$1195</td>
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<tr>
<td>320</td>
<td>4385</td>
<td>5.25&quot;</td>
<td>11ms</td>
<td>$1285</td>
<td>$1385</td>
</tr>
<tr>
<td>425</td>
<td>1480</td>
<td>3.50&quot;</td>
<td>12ms</td>
<td>$1375</td>
<td>$1435</td>
</tr>
<tr>
<td>645</td>
<td>4767</td>
<td>5.25&quot;</td>
<td>11ms</td>
<td>$1795</td>
<td>$1895</td>
</tr>
<tr>
<td>1.20</td>
<td>1200</td>
<td>5.25&quot;</td>
<td>15ms</td>
<td>$2099</td>
<td>$2199</td>
</tr>
<tr>
<td>1.60</td>
<td>1600</td>
<td>5.25&quot;</td>
<td>15ms</td>
<td>$2885</td>
<td>$2985</td>
</tr>
</tbody>
</table>

Seagate hard drives carry a ONE year warranty. Internals include a mounting kit and cables. Externals include all cables needed for installation. FIVE year warranty available!

Seagate 1.0GIG Internal Drive
$2099

Maxtor 1.0GIG Panther Internal
$1995

<table>
<thead>
<tr>
<th>Capacity (mb)</th>
<th>Model</th>
<th>Size</th>
<th>Access</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>7080</td>
<td>3.50&quot;</td>
<td>15ms</td>
<td>$285</td>
<td>$345</td>
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<tr>
<td>120</td>
<td>7120</td>
<td>3.50&quot;</td>
<td>13ms</td>
<td>$375</td>
<td>$435</td>
</tr>
<tr>
<td>213</td>
<td>213</td>
<td>3.50&quot;</td>
<td>13ms</td>
<td>$599</td>
<td>$659</td>
</tr>
<tr>
<td>340</td>
<td>340</td>
<td>3.50&quot;</td>
<td>11ms</td>
<td>$985</td>
<td>$1045</td>
</tr>
<tr>
<td>760</td>
<td>8760</td>
<td>5.25&quot;</td>
<td>16ms</td>
<td>$1449</td>
<td>$1549</td>
</tr>
<tr>
<td>1.20</td>
<td>P1.0</td>
<td>5.25&quot;</td>
<td>13ms</td>
<td>$1995</td>
<td>$2095</td>
</tr>
</tbody>
</table>

Maxtor hard drives carry a TWO year warranty. Internals include a mounting kit and cables. Externals include all cables needed for installation.

Visa and Mastercard accepted - No surcharge! Credit cards will be billed at time of shipment. University PO's accepted NET 30. Corporate PO's accepted upon approval. All items carry a 30 day money back guarantee.

Circle 406 on reader service card.

Qmac • 7 Musick Irvine, CA 92718 • Sales (800) 854-6227 • 24 Hour Fax (714) 768-7307 • International (714) 380-0816
### HEWLETT PACKARD

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Model</th>
<th>Size</th>
<th>Access</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>325mb</td>
<td>C2234</td>
<td>3.50&quot;</td>
<td>13ms</td>
<td>$1169</td>
<td>$1229</td>
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<tr>
<td>425mb</td>
<td>C2355</td>
<td>3.50&quot;</td>
<td>13ms</td>
<td>$1389</td>
<td>$1449</td>
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<tr>
<td>635mb</td>
<td>97548</td>
<td>5.25&quot;</td>
<td>17ms</td>
<td>$1619</td>
<td>$1719</td>
</tr>
<tr>
<td>1.0gb</td>
<td>97549</td>
<td>5.25&quot;</td>
<td>17ms</td>
<td>$2289</td>
<td>$2389</td>
</tr>
<tr>
<td>1.0gb</td>
<td>97558</td>
<td>5.25&quot;</td>
<td>13ms</td>
<td>$2519</td>
<td>$2619</td>
</tr>
<tr>
<td>1.4gb</td>
<td>97560</td>
<td>5.25&quot;</td>
<td>13ms</td>
<td>$2749</td>
<td>$2849</td>
</tr>
</tbody>
</table>

Hewlett Packard hard drives carry a FIVE year warranty. Internals include a mounting kit and cables. Externals include all cables needed for installation.

### SyQuest

**Syquest 44mb Removable Drive**

- **Capacity**: 44mb
- **Description**: Single removable drive
- **Price**: $435

**Syquest 44mb x 2 Removable Drive**

- **Capacity**: 44mb
- **Description**: Dual removable drives
- **Price**: $799

**88mb Cartridges**

- **Price**: $69

**88mb Single removable drive**

- **Price**: $799

**88mb x 2 Dual removable drives**

- **Price**: $1429

**88mb Cartridges**

- **Price**: $119

**44/88mb Dual 44mb & 88mb**

- **Price**: $1195

*Includes 44 & 88 cartridges

Syquest hard drives carry a TWO year warranty. Cartridges carry a ONE year warranty. All drives include ONE cartridge, cables and software.

### Tape Backup Systems

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Capacity / Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archive</td>
<td>2.0gb DAT</td>
<td>$1399</td>
</tr>
<tr>
<td>Exabyte</td>
<td>2.0gb 8MM</td>
<td>$2099</td>
</tr>
<tr>
<td>TEAC</td>
<td>155mb</td>
<td>$579</td>
</tr>
<tr>
<td>TEAC</td>
<td>600mb</td>
<td>$799</td>
</tr>
<tr>
<td>Wangtek</td>
<td>2.0gb DAT</td>
<td>$1489</td>
</tr>
</tbody>
</table>

All tape drives carry a ONE year warranty. All Tape backup systems include ONE media tape, cables and software.

---

**1-800-854-MACS**

Sales (800) 854-6227 • Information (714) 380-0811
International (714) 380-0816 • 24Hr Fax (714) 768-7307

**Qmac**

7 Musick Irvine, California 92718
<table>
<thead>
<tr>
<th>E-MACHINES</th>
<th></th>
</tr>
</thead>
</table>
| **Mac IIfx System** | Macintosh IIfx, 4mb RAM, 125mb HD, 1.44mb Apple FDHD, Mouse, Standard Keyboard, 14" Color Monitor, Relax 8 Bit Color Card.  
**System 7.0 Included.**  
**Only...** $6,099  
With 24 bit Color ...add $270  
With Seiko CM-1445 ...add $265  |
| **Mac IIci System** | Macintosh IIci, 5mb RAM, 105mb HD, 1.44mb Apple FDHD, Mouse, Standard Extended Keyboard, 14" Color Monitor, 8 Bit Color.  
**System 7.0 Included.**  
**Only...** $4,359  
With 24 bit Color ...add $539  
With Seiko CM-1445 ...add $265  |
| **Mac LC Special** | Macintosh LC, 4mb RAM, 105mb Hard Drive, 1.44mb Apple FDHD, Mouse, Standard Keyboard, 14" Color Monitor, 8 Bit Color.  
**Only...** $1,339  
With 16mb Accelerator ...$1,559  |
| **Mega-Mac Classic** | Macintosh Classic, 2mb RAM, 105mb Hard Drive, 1.44mb Apple FDHD, Mouse.  
**Only...** $1,265  
With ColorPage E-16 Monitor ...add $265  |
| **Mac IIsi Special** | Macintosh IIsi, 9mb RAM, 105mb Hard Drive, 1.44mb Apple FDHD, Mouse, Standard Keyboard, 14" Color Monitor, 8 Bit Color.  
**Only...** $5299  |

### Free Shipping on All E-Machines Monitors In October.

**Color Displays**

- **Award Winning ColorPage E-16** .................................. $1750  
  *The II6 helped me save $600* running by MacUser.*  
- **Full Page, 16-inch Sorry Tri-Maps**, SS2424 Resolution.  
**E-Machines TX16** .................................................. $1780  
**E-Machines TX19** .................................................. $2996  
**Color Interface Cards**

- **Futura EX** ........................................................... $579  
  24-bit Accelerated NuBus interface card for the Apple 12 and 13-inch displays, ColorPage E16, and Mac compatible displays with 640 x 480 resolutions.  
- **Double Color Board** for the TII6 .................................. $349  
- **Futura SX/8** ...................................................... $695  
- **Futura SX** ......................................................... $1095  
- **Futura MX** ....................................................... $1495  
- **E-Machines TXSi and TII9/si** ................................... $909  
- **E-Machines TXSE3/8 and TII9SE3/8** ......................... $909  
**Options**

- **Futura SX/8 to Future SX Upgrade** ......................... $345  
- **Future EX to Future SX Upgrade** ......................... $490  

**DirectSource℠ Service Agreement Available on All E-Machines Monitors, Guaranteed repair or Replacement of E-Machine products within 48-hours. Only from MacSource!**

### E-MACHINES

<table>
<thead>
<tr>
<th>Brand</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Seiko CM1445</strong></td>
<td>Goldstar 1450 Plus</td>
<td>$589</td>
</tr>
<tr>
<td><strong>RasterOps</strong></td>
<td>RasterOps 24x</td>
<td>$539</td>
</tr>
<tr>
<td></td>
<td>RasterOps 24s</td>
<td>$539</td>
</tr>
<tr>
<td></td>
<td>RasterOps 24s</td>
<td>$539</td>
</tr>
<tr>
<td></td>
<td>RasterOps 24sr</td>
<td>$539</td>
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<tr>
<td></td>
<td>RasterOps 24xty</td>
<td>$3339</td>
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<tr>
<td></td>
<td>RasterOps 264/SE30</td>
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<td></td>
<td>Video Expander</td>
<td>$480</td>
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<td><strong>Radius</strong></td>
<td>Radius Pivot-SI/CI</td>
<td>$769</td>
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<tr>
<td></td>
<td>Radius Pivot (with card)</td>
<td>$979</td>
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<tr>
<td></td>
<td>Radius Pivot (with card)</td>
<td>$979</td>
</tr>
<tr>
<td></td>
<td>Radius Color Pivot Interface</td>
<td>$897</td>
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<tr>
<td></td>
<td>Radius 19&quot; TPD</td>
<td>$1399</td>
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<td></td>
<td>Radius 19&quot; TPD/GS</td>
<td>$1685</td>
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<td></td>
<td>Radius 21&quot; Color Display</td>
<td>$3096</td>
</tr>
<tr>
<td></td>
<td>8 bit interface for above</td>
<td>$1265</td>
</tr>
<tr>
<td></td>
<td>24 bit interface for above</td>
<td>$2395</td>
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<tr>
<td></td>
<td>Radius Direct Color/GX</td>
<td>$560</td>
</tr>
<tr>
<td></td>
<td>Radius Rocket</td>
<td>$2415</td>
</tr>
<tr>
<td><strong>Other Radius Products</strong></td>
<td>Call</td>
<td></td>
</tr>
<tr>
<td><strong>TI MicroLaser PS/35</strong></td>
<td>TI MicroLaser PS/17</td>
<td>$1335</td>
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<tr>
<td><strong>LaserWriter 11LX</strong></td>
<td>LaserWriter 11LX</td>
<td>$3445</td>
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<tr>
<td><strong>Apple StyleWriter</strong></td>
<td>Apple StyleWriter</td>
<td>$435</td>
</tr>
<tr>
<td><strong>HyperNet Phone Net Connectors</strong></td>
<td>Only $23 Each</td>
<td></td>
</tr>
<tr>
<td><strong>ZOOM V.42 bmodem</strong></td>
<td>Includes all cables, Software and Documentation</td>
<td>$689</td>
</tr>
</tbody>
</table>
| **ZOOM 2400 modem** | | $95

**Scanners**

- MicroTek 800x8 Scanner | $1499 |
| MicroTek 600x8 Scanner | $1999 |
| LogiTech ScanMan | $299 |

**Graphic Tablets**

- Wacom 6x9 | $329 |
| Wacom 12x12 | $759 |
| Wacom 12x17 | $1099 |
| Wacom 15x15 | $1099 |
| Wacom 18x23 | $2949 |

**Input Devices**

- Keytronics MacPro Plus | $125 |
| DataDesk Switchboard | $149 |
| DataDesk Mac101E | $125 |
| Kensington Turbo Mouse | $110 |
| Silhouette Trackball | $79 |
| **Mac Classic 16mb Accelerator** | Call |

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SOFTWARE

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ADOBE PHOTOshop ........................................ 1310
Desktop Publishing Program, more goes to Macintosh!Long wished-for Desktop Publishing Program(13,100),(991,992), case goes to Macintosh! Macintosh version available.

ADOBE ALPHABET ......................................... 12195
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Free Acrobat Reader 3.0 and Macintosh version of Acrobat 3.0 now available on Macintosh.
1. Please indicate which of the following computers you currently use in your company or organization (check all that apply):
   a) Mac Plus
   b) Mac SE
   c) Mac II
2. For how many micro computers do you buy products?
   a) 1-4
   b) 5-9
   c) 10-19
   d) 20 or more
3. Your primary job function is:
   a) Administrative/General Management
   b) MIS/DP, Communications Systems, Programming
   c) Engineering/R&D
   d) Finance/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) SOFTWARE
      i) Accounting
      ii) Spreadsheets/Financial Planners
      iii) Project Managers
      iv) Word Processors
      v) Database Managers
      vi) Graphics
      vii) CAD/CAM
      viii) Communications
   b) HARDWARE
      i) Mainframe
      ii) Mini
      iii) Micro
      iv) Interface Devices
      v) Printers/Plotters
      vi) Monitors
      vii) Disk/Tape Back-up
      viii) Add-in Boards
      ix) Indexers/Project Managers
   c) PRINTING DEVICES
      i) Laser
      ii) InkJet
      iii) Pagehunters
      iv) Printers/Plotters
      v) Monitors
   d) PROJECT MANAGEMENT
      i) Project Managers
      ii) Program Managers
      iii) Financial Planners
      iv) Printers/Plotters
   e) OTHER
      i) Engineering/R&D
      ii) MIS/DP, Communications Systems, Programming
   f) Equipment/Supplies
5. Are you involved in the purchasing of microcomputer equipment at your company? (Check one)
   a) Yes
   b) No
6. If so, what function do you serve in the buying process? (Check all that apply)
   a) Evaluations/Specification
   b) Recommendation
   c) Buyer/Purchaser
HOW TO STAY ON TOP OF WHAT'S IN THE MAC MARKET

USE THIS CARD TO OBTAIN FREE INFORMATION ABOUT MACINTOSH PRODUCTS AND SERVICES IN THIS ISSUE

(SEE OTHER SIDE)

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**Color Displays**

- Monitors only
  - T16 16" full-page $1,545
  - TX 16" 2-page $1,695
  - T19 19" 2-page $2,795

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- Mac LC, 2/40 $1,745
- Mac IIfx, 3/40 $2,595
- Mac IIfx, 5/80 $3,140
- Mac IIfx, 5/10 $3,565
- Mac IIfx, 5/105 $3,685
- Mac IIfx, 4/0 $4,875
- Mac IIfx, 8/210 $5,865

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Scanners include full version of Adobe Photoshop

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- 1850S Slide Scanner $2,195

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Hard Drives include Norton Utilities & 5yr warranty

- 50 MB External HD $565
- 100 MB External HD $735
- 120 MB External HD $949
- 170 MB External HD $1,059
- 200 MB External HD $1,299
- T150 Tape Backup $749
- CD-ROM Drive $749
- Optical Drive $3,395

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**Cache Cards**

- NEW! PowerCache for the LC, SE/30, II, IIfx, IIfx & IIfx
- 25 MHz PowerCache $599
- 40 MHz PowerCache $795
- 50 MHz PowerCache $1,649
- FastCache IIfx $299
- FastCache IIfx $299

**E-Machines**

- Color Cards
  - DoubleColor $395
  - 8-bit color for T16 $750
  - Futura EX $1,250
  - Futura SX $795
  - Futura SX/8 $1,695
  - Futura MX $1,695

**Wacom Tablets**

- All sets include Cordless Pressure Sensitive Stylus
  - 6 x 9 standard $539
  - 12 x 12 standard $759
  - 12 x 12 electrostatic $849
  - 12 x 18 standard $1,099
  - 12 x 18 electrostatic $1,249
  - 18 x 25 standard $2,949

**QMS Printers**

- QMS-PS 410 $1,749
- QMS-PS 810 $2,799
- QMS-PS 815 MR $4,285
  - ColorScript 100(10p) $5,995

---

**The Express Advantage**

- Complete Mac Systems in stock ready for same day shipping
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- Experienced, knowledgeable Macintosh Sales Professionals
- Exclusive ExpressCare™ Service Agreement – Guaranteed repair or replacement of most Express Direct products within 48-hours. One and two-year plans available. Some restrictions apply. Call for details!
Peace of Mind. 
Free with all our drives. 
Breathe a sigh of relief. All our drives come with 2 or 5 year factory warranties.

New Board Members

LCPU16MHz—$99
Speed up math calculations on your LC. Up to 4MHz available. Call for pricing.

Ilisi 64K Cache Card $169
40% performance increase.

Ilisi030 Adaptor—$59
Use both a cache and an expansion card!

Ilisi 20MHz FPU—$75
(Requires slot adaptor.)

Ilci 64K Cache Card $159
40% performance increase. Industry standard 64K!

8 & 16 Mb SIMMs

For memory intensive applications like Photoshop. For Ilci, Ilisi and Ilfs. Call for pricing.

Internal & External Disk Drives

All drives up to 210mb are Quantum, warrantied for two years. Micros (up to 20mb) carry the five year warranty. Should you experience a drive failure in your first year, we’ll ship an identical one within 24-48 hours.

<table>
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*New power internal drives that meet Classic, Ilisi & LC power specs. All drives pictured are in premium enclosures.

SyQuest, Tape, DAT, Optical

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<tr>
<td>Optidisk™ 1000 Tahiti Optical Drive</td>
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Datadrive—$1495

SIMM’s—lowest prices, no CFC’s

Third Wave manufactures a full line of 1, 2, 4, 8 and 16mb SIMMs without releasing harmful CFCs into the atmosphere. Call for manufacturers’ prices on SIMMs for all Mac’s.

SIMMpack for Classic 8mb bd. $39
Board w/1mb     49
LC VRAM     69
Board w/3mb    129
SIMMpack drive bracket kit * 16

*Renew drive in Ilci & LC, install in Classic.

XAPSHOT—the quickest way to bring a high-quality 24-bit image into your Mac. Only $429. $749 with 24-bit frame grabber.

XAPSHOT allows you to import high quality video images to your Mac using a frame grabber. It stores up to 50 images on 2" diskettes and can be connected to your i.e.c. for previewing. Great for video, slide graphics and print work. 20 diskettes shipped overnight only $10.

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Performance. Noise level. Price. Speck. Our’s are best all around. Fastest—(US) 991 Macworld. **Quietest tested—Macworld 391.*** One of the best manuals, and a solid rack record—991 Macworld.***

45 Removable—$479
88 Removable—$799

Logica’s Triple Crown for the Ilisi.

Exhume your Ilisi three ways. Use our 64K Cache card for 40% improved performance. The 800 Adaptor lets you use two expansion cards, as shown above. The adaptor can be used with or without the 88882 math coprocessor (FPU) for faster math calculations. Buy them all or two at a time, or to your need, please.

Ilisi 64K Cache Card $169
Ilisi Slot Adaptor $9
Ilisi FPU $75

Media

Teac CT-5000H (60mb) $17
Teac CT-5000N (150mb) $28
SyQuest SQ-400 (44mb) $70
SyQuest SQ-800 (88mb) $149
4mm DAT Tape, 60 meter $19
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*Editors SCN Evaluate Read/Write of any drive tested, Sept. '91 Macworld Review. **Quickest drives tested, March '91 Macworld Review.

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Quantum, Maxtor and Conner drives are three of the highest quality and reliable. All ETC internal drives come with brackets, cables and software.

ETC 52 Mb Quantum LPS, 17 msec $249.00
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ETC 120 Mb Conner-1, 13 msec $399.00
ETC 130 Mb Maxtor Cheyenne, 15 msec $429.00
ETC 170 Pentium Pro, 11 msec $399.00
ETC 213 Mb Maxtor LXT, 15 msec $649.00
ETC 340 Mb Maxtor LXT, 13 msec $999.00
ETC 535 Mb Maxtor LXT, 13 msec $1599.00

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ETC 535 Mb Maxtor LXT, 13 msec $3999.00

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If you need extra space on-line storage, we have the best value in the market. With a 250,000-sector buffer, ETC internal drives can be used in the Mac II, IIIx, and Macintosh.

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ETC 376 Mb W3REN-4, 11 msec $1549.00
ETC 376 Mb W3REN-Runer-2, 12 ms $1749.00
ETC 2426 Mb Maxtor $3199.00
ETC 1.6 Gb Maxtor $3399.00
External:
ETC 307 Mb W3REN-4, 14 msec $1249.00
ETC 337 Mb W3REN-Runner-1, 10.7 ms $1339.00
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ETC 1.6 Gb Maxtor $1899.00
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If you and your data are always on the move, don't ship down or backup without one of these.

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Circle 36 on reader service card.
Finally, the first affordable PostScript\textsuperscript{\textregistered} printer designed specifically for Macintosh\textsuperscript{\textregistered} users. It's from GCC Technologies\textsuperscript{\textregistered}, and it's called the BLP Elite.\textsuperscript{\textregistered} A printer so advanced that it offers exactly the features you're looking for, at a price you've never seen before. Just $1599.

That's a full $1000 less than Apple's $2599 Personal LaserWriter\textsuperscript{\textregistered} NT. But that doesn't mean the BLP Elite has less to offer. In fact, the BLP Elite is packed with more features you want, like true Adobe\textsuperscript{\textregistered} PostScript and built-in AppleTalk\textsuperscript{\textregistered} for sharing over a network. There's also edge-to-edge printing for super-sized spreadsheets and banners, and a straight-through paper path for printing wrinkle-free envelopes and labels.

The new BLP Elite is a faster printer, too.

In fact, with its 16.67 MHz processor, it's one of the fastest PostScript printers in its class. About 40% faster than Apple's Personal LaserWriter NT. But what makes the BLP Elite a more sophisticated, more affordable printing machine is its breakthrough technology, engineered at GCC.

At the heart of the BLP Elite is the most compact, cost-effective PostScript controller board ever designed - half the size of the Apple\textsuperscript{\textregistered} Personal NT's, with one-third the number of chips.

A compact controller means two things: fewer components and lower manufacturing costs, which translates to exceptional product reliability and a significant cost savings for you.

---

The "Winning Combination" Rebate Program.

And now during our "Winning Combination" laser printer rebate program (September 1, 1991 through January 5, 1992), when you purchase any of our PostScript printers including the BLP Elite, we'll send you a $100 rebate. And that's not all. We're also offering GCC Extended Care - our warranty extension program - on all our laser printers at half price during our printer promotion.

800-422-7777 for the BLP Elite.

The $1599 BLP Elite PostScript printer is available from your Authorized GCC Dealer or directly from GCC. Call 800-422-7777 for the name of the dealer nearest you or to place your order directly with us. Either way, you'll find it's painless to go lean and mean with the new BLP Elite.

GCC TECHNOLOGIES
Peripherals With Vision\textsuperscript{\textregistered}

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CIRCLE 146 ON READER SERVICE CARD.
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- **Mac LC 2/40**: $1799.00
- **Mac Iie 3/40**: $2300.00
- **Mac Iie 13/120**: $2990.00
- **Mac Iic 5 MB 800**: $3600.00
- **Mac Iic 5/120**: $3990.00
- **Mac Iic 9/12**: $5539.00

Call for other configurations.

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<td><strong>APPLIED ENGINEERING</strong></td>
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<td>144MB DRK DRIVE</td>
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<td>DESKTOP VIDEO CARD</td>
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<td>POKER YOUR GOLF</td>
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<td>$159.00</td>
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**Circle 419 on reader service card.**
THE FIRST LASER PRINTER TO COMBINE HIGH STANDARDS AND LOW COST. THE $999 PLP II.

Now you can have everything you ever wanted in a laser printer. Without paying the price.

Introducing the most affordable laser printer for the Macintosh® computer: the $999 PLP™ II from GCC Technologies®. GCC developed the very first personal laser printer in 1987, and has over 30,000 satisfied users... more than everyone else combined.

Finally, a revolutionary printer at a revolutionary price. In fact, at $999, it's nothing short of a technological marvel.

Unmatched Features.

The PLP II has features you won't find in any other personal laser printer. It comes with a 200-sheet paper tray and a straight-through paper path. Two features you won't find in Apple's Personal LaserWriter® LS. Plus a silent "sleep" mode, a user-friendly LCD display, and automatic toner recycling. The PLP II also prints edge-to-edge, something only GCC can offer. Also included is QuickEnvelope®, our own envelope printing desk accessory.

And, unlike the Personal LaserWriter LS, we even offer an upgrade option providing both network and PostScript® printing support. This user-installable option, the BLP Elite™ PostScript Upgrade, is available for the PLP II for an additional $799.

The Highest Quality Printing.

Because PLP II includes 6 outline font families (for a total of 22 individual fonts), its razor-sharp, clean output can be shaped, scaled, and rotated to any point size—all at a full 300 dpi.

These outline fonts, combined with GCC's powerful QuickDraw™ imaging software, give you unlimited flexibility in producing perfect documents from such applications as PageMaker®, Word®, Excel®, MacWrite®, MacDraw®, and Canvas®.

Even More Power: PLP IIS.

For those who demand even more power, there's also the PLP IIS.

With the PLP IIS, you get all the breakthrough technology of the PLP II, only now, you get it at a swift 8 pages per minute, making it the perfect solution for anyone printing a high volume of output.

You also get one megabyte of RAM, which will save you time when printing multiple page documents. PLP IIS also gives you a very powerful font library with over 40 individual fonts. Both the PLP II and PLP IIS support TrueType™ and Adobe Type Manager® (ATM®), which means you'll have thousands of fonts to choose from.

During our "Winning Combination" laser printer rebate program (September 1, 1991 through January 5, 1992), when you purchase a PLP II or PLP IIS, we'll send you a $50 rebate. With the PLP II you'll also receive a $200 coupon good toward the purchase of a BLP Elite PostScript Upgrade. And that's not all. We're also offering GCC Extended Care™—our warranty extension program—on all our laser printers at half price throughout our printer promotion.

GCC has made acquiring your new PLP II or IIS just as easy as using it.

Simply call us toll-free, and we'll give you the name of your nearest GCC Technologies dealer. Or order direct from us, with a 30-day money-back guarantee and $9 overnight delivery. The award-winning PLP II and the powerful PLP IIS. Everything you ever wanted in a laser printer. For less.

PLP II $999, PLP IIS $1499.
### POWER Drives

**NEW LOWER PRICES**

**POWER PACKED**

**POWER Drives**

**International**

800-733-3472

**HARD DRIVES**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Mechanism</th>
<th>Access Time</th>
<th>Internal</th>
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<td>28ms</td>
<td>$219</td>
<td>$249</td>
</tr>
<tr>
<td>52 Mb</td>
<td>Quantum</td>
<td>17</td>
<td>$249</td>
<td>$299</td>
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<tr>
<td>80 Mb</td>
<td>Maxtor</td>
<td>17</td>
<td>$279</td>
<td>$339</td>
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<td>105 Mb</td>
<td>Quantum</td>
<td>16</td>
<td>$349</td>
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<td>210 Mb</td>
<td>Maxtor</td>
<td>15</td>
<td>$599</td>
<td>$679</td>
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<tr>
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<td>Quantum</td>
<td>16</td>
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<td>$689</td>
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<td>320 Mb</td>
<td>Maxtor</td>
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<td>$999</td>
<td>$1049</td>
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<tr>
<td>320 Mb</td>
<td>Micropolis</td>
<td>14</td>
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<td>$1199</td>
</tr>
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<td>16</td>
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<td>$1599</td>
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<td>NA</td>
<td>$2299</td>
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<td>Seagate</td>
<td>14</td>
<td>NA</td>
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<tr>
<td>1500 Mb</td>
<td>Micropolis</td>
<td>14</td>
<td>NA</td>
<td>$2699</td>
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</table>

**REMOVABLE HARD DISK**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Drive</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>44 Mb</td>
<td>SyQuest</td>
<td>$449</td>
<td></td>
</tr>
<tr>
<td>88 Mb</td>
<td>SyQuest</td>
<td>$699</td>
<td></td>
</tr>
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</table>

**OPTICAL STORAGE**

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<tr>
<th>Capacity</th>
<th>Drive</th>
<th>Internal</th>
<th>External</th>
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</thead>
<tbody>
<tr>
<td>1.3 Gb</td>
<td>CD-ROM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150 Mb</td>
<td>Teac</td>
<td></td>
<td></td>
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</tbody>
</table>

**TAPE BACKUP**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Drive</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3 Gb</td>
<td>DAT</td>
<td>$1495</td>
<td></td>
</tr>
<tr>
<td>150 Mb</td>
<td>Teac</td>
<td>$549</td>
<td></td>
</tr>
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</table>

**MEMORY**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Drive</th>
<th>Internal</th>
<th>External</th>
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</thead>
<tbody>
<tr>
<td>1 Mb</td>
<td></td>
<td>$39</td>
<td></td>
</tr>
<tr>
<td>4 Mb</td>
<td></td>
<td>$179</td>
<td></td>
</tr>
</tbody>
</table>

**POWER PRICED**

- NEW super low prices
- We buy quality components in huge volume & pass the savings to you!

**POWER PACKED**

- Choice of brand name hard drives
- Super FAST access time: 12ms - 28ms
- 50,000+ hours MTBF
- Whisper-quiet fan
- 50-pin connectors to daisy-chain
- Power surge protection
- Steel case for low heat & support

**POWER Drives**

- By the experts at HDI, since 1987
- Compatible with ALL Mac Systems
- Toll-free technical support
- Step-by-step Manual included
- 30-day "Worry-Free" Guarantee
- 1 & 2 Year Replacement Policies
**Fujitsu 3.5" Drives**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 MB</td>
<td>$228</td>
<td>$288</td>
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<tr>
<td>90 MB</td>
<td>$338</td>
<td>$398</td>
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<tr>
<td>135 MB</td>
<td>$418</td>
<td>$488</td>
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<tr>
<td>180 MB</td>
<td>$548</td>
<td>$618</td>
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<tr>
<td>330 MB</td>
<td>$1,568</td>
<td>$1,638</td>
</tr>
<tr>
<td>425 MB</td>
<td>$1,648</td>
<td>$1,718</td>
</tr>
</tbody>
</table>

*Mean time between failure is the average life expectancy of a drive. In case of a 200,000 MTBF, this means a potential of 24 years of 40 hour weeks, 52 weeks per year.*

--

**Fujitsu 5.25" Drives**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>357 MB</td>
<td>$1,198</td>
<td>$1,298</td>
</tr>
<tr>
<td>680 MB</td>
<td>$1,448</td>
<td>$1,548</td>
</tr>
<tr>
<td>1.2 Gig</td>
<td>$2,498</td>
<td>$2,598</td>
</tr>
</tbody>
</table>

*Mean time between failure is the average life expectancy of a drive. In case of a 24 hour factory replacement available for 5.25" drives for additional fee.*

---

**Archive DAT Tape Backup**

- **2.2 Gig Capability**: $1,498
  - Up to 10 mb per minute backup time
  - Includes SoftBackup II for Fast network and unattended backup capabilities

**SyQuest! 44MB & 88MB Removables**

- **44MB REMOVABLE**: $448.00
  - 19ms Access time
  - Both Drives include Cartridge
  - Dual AC Outlets, 40 Watt power supply
  - SCSI Select and 2 Year Warranty

- **88MB REMOVABLE**: $848.00
  - 19ms Access time
  - Both Drives include Cartridge
  - Dual AC Outlets, 40 Watt power supply
  - SCSI Select and 2 Year Warranty

**Ricoh Optical**

- **00 MB Optical**: $296
  - Read/write reliable storage
  - 6ms Access Time
  - Great for archiving, color scans etc.

- **1.2 Gig H/D**: $2,498.... $2,598
  - 11.5 U.S. access time / 4.8 mb transfer rate
  - 200,000 hours mean time between failure
  - 5 year warranty
  - Incredibly fast! MacWorlds Fastest 1.2Gig!

**JX-9500PS Sharp Printer 35 Fonts**

- **JX-9500PS 35 Fonts**: $1,648.00
  - 2.5 mb Ram Memory
  - Adobe Postscript
  - MacUser #1 printer 5.5 mice rating
  - 35 Fonts, 6 page per minute
  - Letter, legal and transparencies
  - Includes AppleTalk interface!
  - Sharp is the manufacturer of the TI Microlaser, this is the same printer, but with 2.5mb!

**Quantum Drives/Wren Drives**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>52 MB 3.5&quot; LPS</td>
<td>$288</td>
<td>$338</td>
</tr>
<tr>
<td>105 MB 3.5&quot;LPS</td>
<td>$408</td>
<td>$438</td>
</tr>
<tr>
<td>120 MB 3.5&quot;</td>
<td>$528</td>
<td>$598</td>
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<tr>
<td>170 MB 3.5&quot;</td>
<td>$608</td>
<td>$698</td>
</tr>
<tr>
<td>210 MB 3.5&quot;</td>
<td>$728</td>
<td>$848</td>
</tr>
<tr>
<td>337 MB RUNNER</td>
<td>$1,198</td>
<td>$1,498</td>
</tr>
<tr>
<td>630 MB RUNNER II</td>
<td>$1,598</td>
<td>$1,698</td>
</tr>
<tr>
<td>1.2 Gig</td>
<td>$2,298</td>
<td>$2,398</td>
</tr>
</tbody>
</table>

**Monitors!**

- **19" Ikekami Color System…RasterOps 8Bit…**$1,098
  - DM-2060…National Semiconductor 24Bit…$2,098
  - Ikekami Monochrome System…$798
  - Ikekami Grey Scale System…$1,098
  - Trinitron Color System…$2,398
  - Ikekami CT-20…National Semiconductor 24Bit…$3,198
  - NEC Color System…$458
  - The NEC MacSync is plug compatible with Ikekami, Cl and LC
  - All monitor systems except NEC include interface board and cables.

---

**Fujitsu Special!**

- Fujitsu 330 Internal...$1,548
- Fujitsu 425 Internal...$1,648
- Fujitsu 525 Internal...$1,748
- 3 year Warranty
- 200,000 Hours MTBF
- 9ms Access time
- Incredibly Fast & Reliable
- Perfect internal for all Macs!

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**CIRCLE 403 ON READER SERVICE CARD.**
**Quantum Hard Disk Drives**

**30 Day Money Back Satisfaction Guarantee on all Hard Disk Drives!**

<table>
<thead>
<tr>
<th>Internal</th>
<th>52 Megabytes</th>
<th>$239</th>
<th>105 Megabytes</th>
<th>$349</th>
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<tbody>
<tr>
<td></td>
<td>120 Megabytes</td>
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<td>120 Megabytes</td>
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<td>170 Megabytes</td>
<td>$629</td>
<td>170 Megabytes</td>
<td>$699</td>
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<tr>
<td></td>
<td>210 Megabytes</td>
<td>$659</td>
<td>210 Megabytes</td>
<td>$739</td>
</tr>
<tr>
<td></td>
<td>425 Megabytes</td>
<td>$1,379</td>
<td>425 Megabytes</td>
<td>$1,449</td>
</tr>
</tbody>
</table>

**Now Available! Complete Macintosh Systems**

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- **Mac LC**
- **Mac IIsi**
- **Mac IIci**

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Five Pak—Each $116
Ten Pak—Each $110

*Cartridge Not Included

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1mb Mac llf 80NS $60
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QMS-PS®410 2 Megabyte $250

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QMS-PS®410 $1,799

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CIRCLE 151 ON READER SERVICE CARD.
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VISIONPRO COLOR MONITOR SYSTEMS

VisionPro graphic cards are manufactured under license for MacTel. Our SP and SPS cards support multiple monitors, block mode transfer & acceleration, pan/zoom 2x & 4x and virtual desktop. With our monitors, they are an outstanding color solution.

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SystemPRO
- 8-bit SP card, 20" Triniton........$2797
- 24-bit SP card, 20" Triniton........$3349

SystemPRO Sony
- 8-bit SPS card, 19" Sony Triniton (GDM-1950)..........$3544
- 24-bit SPS card, 19" Sony Triniton (GDM-1950)..........$3997
- Apple 13" RGB..............................$749
- Hitachi 14" MVX Super (Hi-res w/ tilt & swivel)..........$575

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- 8-bit VisionST 813
  (for Apple 13" or 14" color).......$257
- 24-bit VisionST 2413
  (for Apple 13" or 14" color).......$375

STORAGE SOLUTIONS

MacTel offers you a number of storage and backup solutions, including a complete line of Index hard drives. MacUser Labs has rated the MacTel 45R drive (8/91) and the Index 1.2 Gb drive (7/91) 4 mice.

Removable - Optical - Tape

The Index HD formatter is System 7 compatible and supports partitioning, password protection and is A/UX compatible.
- Index 45R w/1 cartridge ....$479
- Index 88R w/1 cartridge ..........$999
- Index 45R and 88R are bundled with Backmatic® and AutoSave®
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- SyQuest cartridge SQ 800 ........$149
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New Telnet phone net ...........$12.99

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- VisionPro C300, 300 dpi, 8½ x 11" w/ Adobe Photoshop ..........$1199

Index Hard Drives

Quantum drives Index 3.5"
- 52 Mb, 12 ms, Slimline ..........$249 $329
- 105 Mb, 12 ms, Slimline .........$389 $469
- 210 Mb, 12 ms .................$699 $779
- 425 Mb, 12 ms .................$1599 $1679

Imprimis drives Index 5.25"
- 320 Mb, 16 ms .................$1179* $1279
- 330 Mb, 10.7 ms (Runner) ......$1299* $1399
- 640 Mb, 16 ms .................$1499* $1599
- 650 Mb, 10.7 ms (Runner) .......$1899* $1999
- 1.2 Gb, 16 ms .................$2299* $2399

*Mac II and III only

Index and VisionPro are registered trademarks of MacTel Technology.
can’t afford to miss. . .

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MacTel manufactures and tests our memory modules in-house to ensure the highest possible quality and reliability. All our SIMMs use gold traces and contacts and have a field test failure rate of less than 1%. We have so much confidence in our memory products that we back them with a lifetime warranty.

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INDEX extended keyboard
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- French, German, Swiss ..............................$119

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New
On-board 68882/20 MHz math co-processor with adaptor for Macintosh IIsi. Free performance evaluation software included.

+ Index Mac IIsi 030
Direct Slot Interface .......................................$99.00

Accelerate math-intensive operations on your LC operations by up to 39% with a 68882/16 MHz math co-processor — and get a 15% overall CPU improvement. Benchmark software included.

+ Index LC Mathmate .......................................$99.00

Increase the speed of your Mac IIci up to 33% with MacTel’s new CachePro card — offered at an amazingly low introductory price! Easy to install and DA controlled.

+ Index CachePro / Mac IIci ......................... $119.00

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AND SYSTEMS
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Contact the professionals at MacTel now for additional information. We handle only the best in Macintosh hardware, systems and peripherals, with names like Apple, Nikon, RasterOps, Wacom, Sharp and our own top-quality VisionPro and Index brands. Call or fax for a free catalog.

CIRCLE 31 ON READER SERVICE CARD.
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
All hard drives come bundled with your choice from two utility software packages and a 3-year warranty.

*Disk Doubler not available with 45MB removable

member of our family; 20 inches of 8-bit and 24-bit color in high quality, 72 DPI monitors that end users will love, and budget watchers will adore.

The new Ehman 2-page color monitors are as affordable as they are practical. Backed up by a one year warranty and our 30 day money back guarantee, the price tags once again demonstrate Ehman’s commitment to value on the most popular peripherals.

The other members of the family are just as cost conscious. From the lightning fast “highly recommended” 660MB drive (Macworld, July 91)
No Introduction Needed.

“At $899, Ehman’s Two-Page Monochrome display is an excellent buy.”

MACWORLD, MAY, 1991

“If you want a full-page display, we recommend the Ehman: it’s rare to find such high quality and low price ($499) in the same monitor.”

MACWORLD, MAY, 1991

to our reliable 45MB removable and the popular 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 monitors we also have the full line of peripherals you need most.

<table>
<thead>
<tr>
<th>(MB)</th>
<th>Floppy Drive</th>
<th>Internal</th>
<th>800 K</th>
<th>29+</th>
<th>39+</th>
<th>49 EXI</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>External</td>
<td>$129</td>
<td>$249</td>
<td>$249</td>
<td>$249</td>
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<table>
<thead>
<tr>
<th>52Q LPS</th>
<th>60Q+</th>
<th>80Q+</th>
<th>102Q LPS</th>
<th>170Q</th>
<th>207MX</th>
<th>332W H+H</th>
<th>600WR H/H</th>
<th>45MB Removable</th>
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<tbody>
<tr>
<td>$360</td>
<td>$335</td>
<td>$335</td>
<td>$479</td>
<td>$729</td>
<td>$499</td>
<td>$2,049</td>
<td>$1,949</td>
<td>$499</td>
</tr>
</tbody>
</table>

Color 20" Monitor
- 8-Bit $2,395
- 24-Bit $3,395

Monochrome/Gray Scale 19" Monitor
- Monochrome $895
- Gray Scale $1,495

Monochrome 15" Monitor
- $495

Pricing and availability are subject to change without notice.
I've been in this business for six years, and I've NEVER been this excited about printers!

PostScript® Level 2 is the next generation of Adobe's page description language. The new release contains a number of significant performance, function, and print quality enhancements. It's compatible with all current applications which support the PostScript® language.

Best of all, the time-saving features of PostScript® Level 2 are available RIGHT NOW in our RealTech Laser and RealTech Laser 400:

• IMPROVED MEMORY MANAGEMENT. One pool of memory (RAM and hard drive) is available for all resource needs. Dynamically allocated and automatically reclaimed; no arbitrary memory restrictions exist. Disk space management is improved to eliminate fragmentation and improve transfers of information from the hard disk to RAM.

• ATM FONT RENDERING TECHNOLOGY. Raw characters are built 4 to 5 times faster.

Features available through software applications:

• COMPRESSION. Reduce transmission time and save disk space by sending compressed files directly to your printer.

• FORMS SUPPORT. You can define a base form whose representation stays cached in the printer. Then only the information that changes between forms needs to be interpreted.

• COMPOSITE FONTS. Provides the capability to handle very large character sets and non-horizontal writing modes.

President
Software & Hardware That Fits

Versatile, with PC compatibility: its 3 interface ports can be used at the same time. Includes AppleTalk®, RS-422, IBM PC parallel, and RS-232-C serial interface ports (can be assigned either PostScript® or LaserJet II commands). Auto switches between interfaces, and spools files on a real-time basis. A Hewlett-Packard LaserJet Series II emulation allows use with non-PostScript® applications software.

2 Mb RAM, upgradeable to 10 Mb! The only printer of its kind with this much RAM and hard disk expansion capability. Includes a SCSI port for a hard disk and 35 resident PostScript® typefaces. Compact design (only 33.5 lbs.; measures 13.4"W x 14.2"D x 10.9"H).

FAX: 1-409-539-4141  Call: 1-409-760-2400
610 South Frazier • P.O. Box 3106 • Conroe, TX 77301
Sure, other companies are coming out with 11x17 printers. But before you buy one from someone else, ask yourself:

1. Can I choose from multiple page sizes: letter, 11x17, and all sizes in between?
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The RealTech Laser 400 has 4 Mb RAM, upgradable to 16 Mb! Includes a SCSI port for a hard disk and 35 resident PostScript® typefaces. Compact design (measures 20.25"W x 16"D x 11.75"H; weighs 80.5 lbs). Comes with two trays and manual feed as standard features (optional bypass feeder available).

- 8 ppm (11x17)
- 16 ppm (letter)
- RISC processor
- 2 printer trays
- 20,000 pages per month duty cycle

Limited quantities available in 1991! Order today!

Only $3995!

Twice the printer.

High-speed, 8 1/2 x 11

OR

400 dpi, 11x17

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For speed and performance, they're based on a RISC-based (Reduced Instruction Set Computing) processor and PostScript® Level 2 software from Adobe.

The RealTech Laser and RealTech Laser 400 are especially suited to networks. Be sure to check out the great prices on networking solutions on the last page of this ad!
We only sell names you can trust. WE GUARANTEE you'll be pleased with the power, performance, and competitive price of any of our products, which are:

- Priced LESS than the comparable Apple product.
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$5789

21" Color System

The latest in 24-bit technology. Live video and on-board acceleration, 16.8 million colors, 72 dpi, 75 Hz refresh rate. A full two pages of vibrant color!

$995

21" Display

RealTech Dual Page 21" Display

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Cipher Monitor Price

Mac II, IIcx, IICl, IICl, IICl...

Mac II, IIcx, IICl, IICl, IICl...

Mac IICl...

Mac Portable...

CPU Monitor Price

Mac SE, SE30 Mono $995

Mac II, IIcx, IICl, IICl, IICl GS 256 $1479

Mac IICl Mono $1059

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ColorBoard 24STV .......... 1199
ColorBoard 24XLTV ......... 2689
ColorBoard 264SE/30 .... 599
ColorBoard 8LC ............. 469
ColorBoard 8XL ............. 2349
CorrectColor Calibrator .... 2019
ImagePak Still Compression 335
TV Tuner ...................... 335
Pro Video 32 ................ 1349
14" Trinitron 24-bit ........ 979
19" Trinitron 8XL ........... 2999

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$2479

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Master's 16 million $3195

$979

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- Full grayscale capability
- Flat CRT, P4 phosphorus, polished screen
- One-year warranty

CPU Monitor Price

Mac II, IIcx, IICl, IICl...

Mac II, IIcx, IICl...

Mac IICl...

Mac Portable...

15" portrait display...

870 x 640 resolution...

Vertical refresh rate...

Full grayscale capability...

Flat CRT, P4 phosphorus...

One-year warranty...

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$1079

$495

$849

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Can be connected directly to the internal slot in the Mac IIci or to the RealTech IIi adapter, which has a math coprocessor socket, a cache card slot and a processor direct slot. 64K of static RAM and SANE control via the control panel.

**RealTech Hsi Adapter**

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| Mac LC, 14" Trinitron, 4 Mb RAM, 40 Mb Hard Drive, FastMath LC, MacPro Plus Keyboard | $3019 |
| SUPER SERVER SPECIAL: Mac IIci, 20 Mb RAM, PowerCache 50 w/6882, MicroNet SB 644NP Hard Drive, B&W Full Page Display, MacPro Plus Keyboard | $10,029 |
APPLIED ENGINEERING

<table>
<thead>
<tr>
<th>MB</th>
<th>MS</th>
<th>MByte Per Sec.</th>
<th>Price</th>
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<td>III-303</td>
<td>14.0</td>
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<tr>
<td>Rewritable Optical</td>
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<td>$2439</td>
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</tbody>
</table>

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Reliable drives backed by a two-year warranty.

**Internal Hard Drives**

- Q 105LPS: $399
- Q 170PS: $699
- Q 210PS: $799

**External Hard Drives**

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We know networking...try us!

We run our entire business on Macs, and we've had to deal with networking issues for more than five years. We use Shiva, Farallon, Dayna, and Asanté networking products in our day-to-day operations, and we know from experience how they work. We can tell you firsthand how a twisted pair Ethernet network is configured and interfaced with a LocalTalk network. If you already have a sticky network issue, our sales consultants will team up with one of our technical specialists to find a custom solution for you. Try us!

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Asante continues to lead the pack with quality Ethernet products at affordable prices. It's worth considering if you don't know whether you need 16 or 64K call us; we'll tell you!

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DaynaPORT w/Fax.....$375
EtherPrint.........$340
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Netbridge.....$445
NetModem v.32$1249
NetModem v.2400.....$369
Netseria 1......$295

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- HyperNet DB-9 Connectors...$27
- Star Connector...$17
- Star Connector EN...$131
- Star Control ler...$865
- Star Controller EN...$1709

**Farallon**

- Star Connector...$17
- Star Connector EN...$131
- Star Controller...$865
- Star Controller EN...$1709

**Software**

- AppleShare/Print Server...$225
- AppleShare/File Server 2.0...$480
- AppleTalk Internet Router...$330
- Carbon Copy Mac 2 User...$189
- Data Club, 3 User...$215
- GraceLAN (50 User)...$285
- LIASION V.3.0...$263
- QuickMail, 10 User...$335
- Tintbu rku Remote V.3.1...$125
- Tintb uktu V.3.1...$195

**Everex**

- EMAC Silhouette Trackball...$79
- EMAC 150Mb Tape Backup...$665
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- Zoom 2400......$99
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**APPLIED ENGINEERING**

AE HIGH DENSITY 3.5 MAC DRIVE 225
GUARDIAN 199

**ARTICLE SYSTEMS**

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HAI

**SMARTMODEM 400 & SMARTCOM 345
V SERIES ULTRA 9600 MODEM 762**

**PROMETHEUS**

24900BAUD MODEM (MAX5) 263
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PREMODIO 2400 MINI MODEM 15
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SHARP

E81-5600 BAUD MODEM W/MNP 5 379
SHIVA

ETHER/ISDN 299
ETHERPORT 285
FASTPATH 965

**Storage**

**CHINON**

CDDC-431 CD ROM REMOTE DRIVE 583

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PHOVOS 600GS SCANNER 1725

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**MONITORS & BOARDS**

**APPLIED ENGINEERING**

CACHE IN 185
FASMATIX LC 129
QUICKSLIVER 265

**PRO 135 MB QUANTUM PRO 135 MB FUJITSU PRO 200 MB CONNER WIP/PRO 50 MB QUANTUM REMOVABLE DISKETTE**

**FROM**

**355**

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FULL PAGE SYSTEM FOR LC 549
FULL PAGE SYSTEM FOR SEP/PLUS 549
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QUICKVIEW 22L 1839
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T16 COLOR SYSTEM 1650
TX 16" COLOR SYSTEM 2545
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MAC CLASSIC 15" MONO SYS 1088
MAC 15" MONO SYS 980
KIGRAM

CT30 20 TRINTRON 24 BIT SYSTEM 2089
CT30 20 TRINTRON 8 BIT SYSTEM 2089
MSS MICRO SYSTEMS

COLORSPACE IN 1195
COLORSPACE IN 1205
COLOR SPACE IFX 1650
DATAPAK 639
QUICKIMAGE W/PHOTOSHOP 659
MICRO

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GRAY SCAL 2 30 BIT CARD FOR SE/30 384
COLOR 20 VIDEO CARD FOR SE/30 339
MAC SE ISO CARD CACHE 235
NEC

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RADIANT 299
24/SX/33 ABALIDATED BOARD 582
NEC COLOR DISPLAY CARD 118
NEC DISPLAY BOARD 1299
24/SX/33 ABALIDATED BOARD 1399
15" COLOR TRINTRON MONITOR 2498

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SCAN 300 COLOR 1275
SCAN 300RGB 999
ANWAR TEXT COLOR HAND SCANNER 585

**MARSTEK ARTIST**

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CAMPAGE 3.0 409
CHIRON

CLASSAD 2.0 625
FILEMANAGER PRO 135
MACWIRSE 83
RECOVER 235
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FISHER

IDEA FISHER 385
INNOVATIVE DESIGN DATA CREEK 399
MACROART 279
MICA

MANAGING YOUR MONEY 99

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MICROSOFT OFFICE 590
MICROSOFT WORD 6.0 248
PIRAGON 248
MINUS 238
REALITY 94
SOFTWARE DISCOVERIES 50
RECORD HOLDER PLUS 66
S 1 INSTITUTE 142
JMP 2.0 589
SUMMIT

KEY PLAN 199
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TIMELINE 12.0 55
WOLFRAM

MATHEMATICA 2.0 285
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WORKSTAR

CORRECT GRAMMAR 48
WORKING SOFTWARE 84
QUICK LETTER 84
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- Adobe Type Manager
- Adobe TouchUp
- Adobe Type Manager 2.0
- Adobe TouchUp 2.0
- Adobe Type Manager 2.0

**Networking**

- Canvas 3.0
- Network 3.0
- Network 3.0
- Network 3.0
- Network 3.0
- Network 3.0

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- INSIGNA
- SOFT PICT
- SIGMA OPTN MODULE Special with Soft PICT 10
- INTERNATIONAL BUSINESS
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- DATABASE 10 PACK KIT

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- Adobe Type Manager

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## Affordable Macintosh System Sales and Leasing

**Macintosh Systems**

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<thead>
<tr>
<th>Model</th>
<th>Buy</th>
<th>Lease</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW MACS! Call for pricing!</td>
<td></td>
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<tr>
<td>Mac Quadra 700 - The desktop 040</td>
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<td>Mac Quadra 900 - The Tower 040</td>
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<td>Mac Classic II - 68030 Classic</td>
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<td>Mac PowerBook 100 - 68000 Notebook</td>
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<td>Mac PowerBook 140 - 16 MHz 68030</td>
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<td>Mac PowerBook 170 - 25 MHz 68030</td>
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</tbody>
</table>

**Macintosh Classic**

- Includes keyboard
- 1MB/40MB HD $1140/$34
- 4MB/40MB HD $1240/$37
- 4MB/105MB HD $1409/$42
- Classic + StyleWriter $1469/$44
- Classic + Personal LaserWriter LS $1999

**Macintosh LC**

- Includes keyboard
- 2MB/40MB HD $1949/$59
- 4MB/40MB HD $2034/$61
- 4MB/105MB HD $2249/$68
- 4MB/210MB HD $2679/$80
- Mac LC + 12" Apple RGB Color Monitor and Apple StyleWriter $2299/$69
- Mac LC + 13" Apple RGB Color Monitor and Apple StyleWriter $2629/$79
- Mac LC + 13" Apple RGB Color Monitor and Personal LaserWriter LS $3153/$95

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- 3MB/40MB HD $2653/$80
- 5MB/40MB HD $2745/$83
- 9MB/105MB HD $3099/$93
- 17MB/105MB HD $3470/$104

**Macintosh IIci**

- 5MB/40MB HD $3699/$111
- 5MB/40MB HD $3879/$117
- 32MB/105MB HD $4469/$134
- 32MB/105MB HD $5180/$156
- 32MB/210MB HD $5610/$168

**Macintosh IIXs System**

- Call for latest competitive pricing

---

### Hard Drives and Storage

#### Buy

<table>
<thead>
<tr>
<th>Drive Mechanisms, 2 year warranty</th>
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<tbody>
<tr>
<td>40MB Hard Drive $199/$6</td>
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<tr>
<td>52MB Quantum low profile $239/$8</td>
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<td>105MB Quantum low profile $369/$14</td>
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<td>170MB Quantum $730/$22</td>
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<td>210MB Quantum $799/$24</td>
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<td>300MB Wren Runner $1650/$54</td>
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<td>600MB Seagate $1899/$60</td>
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<tr>
<td>600MB Wren Runner $2199/$69</td>
</tr>
<tr>
<td>1.5GB Seagate $2695/$85</td>
</tr>
</tbody>
</table>

#### Lease

- **MagicDrive**
  - Extended Warranty Available $75/year
  - Includes Retrospect, 2 year warranty
  - MagicTape 150MB $699/$21
  - MagicTape 525MB $999/$21
  - MagicTape 1.2GB DAT $1695/$21
  - MagicTape 2.0GB DAT $1895/$27
  - MagicTape 2.4GB 8mm $2895/$87
  - MagicTape 5.0GB 8mm $4499/$135

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- Magic CD ROM (Toshiba) $529/$19
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- Pinnacle REO 130 Optical $2629/$81
- PII Infin ty Turbo 88 $1149/$41
- Micronet 88 Removable $1099/$36

#### MagicDrive Accessories

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- Magic SCSI II Accelerator $899/$27
### MacProducts USA Carries Over 3,000 Products for Your Macintosh

Affordable leasing available for the entire MacProducts USA inventory. Leasing prices are denoted in the gray shaded area.

<table>
<thead>
<tr>
<th>Modems &amp; Fax Modems</th>
<th>BUY LEASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magic 2400/1200/300 baud modem. 100% Hayes compatible. Includes 2 year warranty. $69........ $3</td>
<td></td>
</tr>
<tr>
<td>Magic 2400/9600 SendFax modem 100% Hayes &amp; Group 3 compatible Includes 2 year warranty $99........ $3</td>
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<tr>
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<tr>
<th>Model</th>
<th>Price Per Month</th>
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<td>PS35</td>
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<td>XL PS17</td>
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<td>XL PS35</td>
<td>$100</td>
<td>$1200</td>
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### microLaser Memory
- 110 & 220 Volt microLasers Available
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<td>LabelWriter II/II Plus</td>
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<td>AddressWriter Envelope Printer</td>
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### Scanners

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### Data Modems

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<td>Ultra 144 V.32b, V.42, V.42bis</td>
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<td>Hayes</td>
<td>HST Dual Standard V.32b</td>
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### Fax Modems

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<tr>
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<td>InterFax 24/96</td>
<td>$285</td>
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<tr>
<td>Call!</td>
<td></td>
<td>$275</td>
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<td>DoveFax</td>
<td>9600M Plus</td>
<td>$599</td>
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<td>Call!</td>
<td></td>
<td>$589</td>
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<tr>
<td>EMAC</td>
<td>FaxModem 24/96</td>
<td>$285</td>
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<td>Call!</td>
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<tr>
<td>Ultima 14/4 9600 V.32b, V.42, V.42bis</td>
<td>$689</td>
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<td>Call!</td>
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<td>$689</td>
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<td>210</td>
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<td>1.2G</td>
<td>2649</td>
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<th>Tape Drive</th>
<th>Capacity</th>
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<td>SyQuest 88MB</td>
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<td>TEAC 155</td>
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<tr>
<td>TEAC 600</td>
<td>$899</td>
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<tr>
<td>WangDAT 1449</td>
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<tr>
<td>WangDAT 1999</td>
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<tr>
<td>Python 1499</td>
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### Affordable EtherNet

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tr>
<td>SQ-555 34mb</td>
<td>$479</td>
</tr>
<tr>
<td>SQ-5110 8mb</td>
<td>799</td>
</tr>
<tr>
<td>SQ-555 Dual</td>
<td>899</td>
</tr>
<tr>
<td>SQ-5110 Dual</td>
<td>1599</td>
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</table>

## Toshiba CD ROM

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>3301</td>
<td>$579</td>
</tr>
</tbody>
</table>

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- Toll-free support
- 1- & 2-year warranties

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<th>用途</th>
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<tbody>
<tr>
<td>Colby ClassMate 54lb</td>
<td>$2795</td>
<td>Mac Portable w/20mb</td>
</tr>
<tr>
<td>Mac LC 2/40</td>
<td>$1599</td>
<td>Mac</td>
</tr>
<tr>
<td>Mac SE/30</td>
<td>$3999</td>
<td>QMS PS410</td>
</tr>
<tr>
<td>Abaton</td>
<td>LaserScript LX 2.5 mg</td>
<td>$500</td>
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<tr>
<td>Scan 300 Color w/Photoshop</td>
<td>$1199</td>
<td>Interface 24/96 w/Intershare</td>
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<tr>
<td>Emac Silhouette Trackball</td>
<td>$75</td>
<td>MacAcademy Videos</td>
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<tr>
<td>Pli Quick SCSI Card</td>
<td>$159</td>
<td>Pli Inlay Kit w/Case</td>
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<tr>
<td>Bernoulli 90</td>
<td>$850</td>
<td>Jamine</td>
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<td>Clipper</td>
<td>$369</td>
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<tbody>
<tr>
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<th>Mac Classic Boards</th>
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<tbody>
<tr>
<td>Mac Portable Ram</td>
<td>Video Ram</td>
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<td>68882 LC Math chip</td>
<td>HP Laserjet Boards</td>
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<tr>
<td>LC 512K Video SIMM</td>
<td>Iic/Iiis Cache Cards</td>
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<th>(User-Installable!)</th>
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<tr>
<td>512K+Plus $295</td>
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<td>128K-Plus $599</td>
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A lot of bogus theories are floating around concerning the IBM/Apple association. I'm sure I propagated a few of them myself. This isn't one of them. This column is the final analysis — the real bad news. It looks as though Apple is about to be owned by IBM — the enemy.

On the surface, it seems that IBM Entry System veep, James Cannavino, and Apple’s answer to a James Bond villain, Mike Spindler, hooked up the two companies after a series of clandestine meetings all around the country. They agreed to join forces to create a new open platform to be shared by the whole world and to be managed by a third company — an Apple/IBM joint venture. Apple coughs up its portable version of its next operating system — the so-called Pink project. IBM delivers to Apple the RS/6000 RISC chip and little else.

Looking at this deal, you have to wonder exactly what IBM tosses into the pot besides its smile and a hearty handshake. If IBM is licensing the RS/6000 chip to Motorola so that everyone can buy it from Motorola, then why is Apple giving away its proprietary operating system? There is some talk that this will be sold to the whole world too. Why doesn’t Apple just open its architecture, and why doesn’t IBM simply do a deal with Motorola? Apple can buy chips from Motorola, and IBM can buy the operating system from Apple. What’s the point of the joint venture and all these secret meetings? The point is that this is a smoke screen for the real reasons behind the powwows: a planned takeover of Apple by IBM.

The litany, according to Valley gossip, has it that ever since John Sculley ran into IBM CEO John Akers more than a year ago at some muckamuck event, Sculley has been selling Akers on the idea of taking over Apple. From Sculley’s perspective, this kind of a deal makes good sense, and from IBM’s perspective it’s a great idea.

Let’s start by looking at Sculley. This guy has got to be bored by now. He’s made plenty of money and made his point about how to run Apple. He no longer has anything to prove, and he’d rather raise horses, write books, and live the contemplative life. It’s doubtful that anyone else can run the company. Besides, there’s nothing exciting going on at Apple. Apple has become a big, successful company selling (dare I say it?) a niche machine. Just as the Amiga has become the choice of videophiles with its NTSC and genlock capabilities, the Mac is the ultimate inexpensive desktop-publishing workstation. Unfortunately, the Mac is under attack by the new workstation revolution, with machines such as the Silicon Graphics Indigo and the IBM RS/6000 — not to mention the continuing threat of the inferior but cheap PC clones running Windows.

To make up for attacks on the profitable high end, Apple resorted to rolling out the Mac Classic. It was a car; it would be called a gutless wonder. Worse than its mediocre performance is its thin profit margin for Apple. None of this looks good for the bottom line, and something needs to be done before anyone discovers that Apple is about to drive head first into the brick wall of no growth.

Enter the rubs from IBM.

Poor IBM can’t even manage to find a few good coders among its 400,000 employees. Still licensing MS-DOS after a decade, IBM is sick of its inability to produce an operating system for its small computers. It’s promising a super-duper version of OS/2 that will, according to IBM advertising, “run DOS programs better than DOS” and “run Windows programs better than Windows.” As far as I can tell, it currently can’t run anything.

IBM wants to retake a leadership role and sees that the future is in the next generation of desktop machine. These products look as if they will be RISC-based color graphics machines that can be interconnected — what have been dubbed workstations. But IBM doesn’t want them to be running the jinxed UNIX or anything Microsoft will be selling to IBM’s competition. This includes OS/2. (IBM will continue to reluctantly develop OS/2 as an interim OS, in case this deal with Apple falls apart.) If Apple can deliver a Mac operating system for the RS/6000, then IBM will be back in the driver’s seat. Compared with the pathetic competition, the Mac operating system is a jewel.

Apple, of course, will then be completely absorbed into IBM and will eventually disappear. Within a year or two, the Mac OS will be remade by IBMers and will eventually become one large mess. Within a few more years, the IBM/Mac will be dropped. The story will be over. Perhaps by the year 2000, when you refer to Apple Computer, people will ask, “Apple Computer? What’s that?” You’ll mumble to yourself that it was fun while it lasted.
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The line-up begins with our dependable, hard-disk drives, designed to fit nearly every need and budget. From the affordable 30 MB drive to the versatile 45 MB removable to our top ranked CD-ROM, you'll get the best value in the industry. And a two-year warranty.

If you're looking for a big screen monitor, you can save literally thousands by buying direct from Mirror. Our critically acclaimed

### System 7.0 Compatible

<table>
<thead>
<tr>
<th>Hard drives</th>
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<tr>
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<tr>
<td>88MB Rem.*</td>
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*(Q) Denotes Quantum mechanism
** Price includes 1 cartridge

The new 14" Color Monitor for the LC, SI and CI is now available for just $399.

Our flicker-free 15" Portrait Display allows you to view a full page. $499

The 24 bit Mirror 600 Color Scanner comes complete with a free copy of Adobe Photoshop LE. $1299

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ProView 20" Trinitron® color systems are half the price of Radius yet rated higher in MacUsers' Color Buyers' Guide (4.5 mice rating). Our PixelView full page and two page monochrome models are available for all Macs including the Classic.

And now, Mirror has a new troop of Mac peripherals including compact portable drives, a 14" Color Monitor for the LC, SI and CI and the Mirror 600 Color Scanner. All with the same trustworthy Mirror name.

Before you buy a Macintosh peripheral from a company that may expire before its warranty, give us a call at 1-800-654-5294. No need to scout around anywhere else.

Mirror's 20" Trinitron Display System is available in 8-bit for $2799 and 24-bit for $3499.

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